



Test Prep
Seminars

ACT PRACTICE DRILLS



27 WORKOUTS

WITH DETAILED EXPLANATIONS OF THE ANSWERS

ENGLISH ★ MATH ★ READING ★ SCIENCE



JUST 15 MINUTES A DAY

Test Prep Seminars

ACT

Practice Drills

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15 Minutes – 25 Questions

Directions: Each section consists of 25 questions. Some are underlined and some are box questions. Read each passage before beginning to answer questions. Choose the answer that you feel best answers each question.

PASSAGE 1

Innovation Reflects Well on Ingenuity of Magazine Readers

[1]

Come onto the scene Willenfall's unconventional idea.
1

The temperature of earth's atmosphere is part a result of its surface color; dark surfaces absorb more solar energy than light surfaces, so the lighter the earth's overall surface, the less it will heat up. Things are now, the earth reflects 29% of incoming sunlight back into space. Willenfall estimates that applying a coat of white paint to every roof on earth would increase its average reflectance to nearly 30%, lowering the temperature by 1° Celsius and averting the disastrous consequences of global warming.

[2]

Sometimes the most elegant solutions to world problems do not come from well-funded teams of scientists working in laboratories and from the living room sofa where Joe Six-pack daydreams. Mike Willenfall, a casual reader of *New Scientist* magazine, has solved the global warming problem. In a letter to the magazine, he proposed that if all the buildings on earth had white roofs, the average global temperature would be reduced by the same amount it has risen since the beginning of the Industrial Revolution.

Question 1

- A. NO CHANGE
- B. Come onto the stage
- C. Enter
- D. On

Question 2

- F. NO CHANGE
- G. part a resulting
- H. partly a result
- J. partly resulting

Question 3

- A. NO CHANGE
- B. Things will be now,
- C. As things are now,
- D. Things were now,

Question 4

- F. NO CHANGE
- G. but
- H. also
- J. although

Question 5

- A. NO CHANGE
- B. Joe Six-pack, daydreaming on his living room sofa
- C. the living room sofa from which Joe Six-pack daydreams
- D. the living room sofa daydreaming of Joe Six-pack

[3]

Most scientists agree on the causes of global warming.

The widespread use of coal and other fossil fuels that began⁶

in the late 18th century has⁷, over time, led to a 1° Celsius rise in the earth’s average temperature. Conventional wisdom

suggests the solution to this problem. A reduction of our⁸ dependence on fossil fuels. However, any change that would lower the temperature of earth’s atmosphere would counteract global warming.

[4]

Whether or not the specifics of Willenfall’s idea are wise, the general outline seems promising. Using a portion of the earth’s surface that we create—our roofs— in the service of environmental balance, is a clever and smart⁹ approach. His proposal also accomplishes what all great ideas should: it inspires creative and productive thinking in others. The “white roof” solution is an excellent example of how an average citizen can make a significant contribution to scientific thinking — without leaving their¹⁰ sofa.

[5]

But other magazine readers expressed misgivings about tampering with the earth’s delicate atmosphere. They suggested that such an approach could have unforeseen negative consequences. Instead, they offered alternative uses for roofs. One reader proposed that every roof on¹¹ every conceivable building on every continent in the world¹¹ be covered in solar panels. In this way, a significant portion of the electricity now generated with fossil fuels could be replaced with solar energy. Another reader suggested that roofs be covered with tiles that change color with temperature.

Question 6

- F. NO CHANGE
- G. begins
- H. had begun
- J. has begun

Question 7

- A. NO CHANGE
- B. had
- C. have
- D. will

Question 8

- F. NO CHANGE
- G. problem is to reduce
- H. problem. Reducing
- J. problem; reducing

Question 9

- A. NO CHANGE
- B. clever and sensible
- C. intelligent and smart
- D. clever and brilliant

Question 10

- F. NO CHANGE
- G. they’re
- H. its
- J. his

Question 11

- A. NO CHANGE
- B. every roof for the world
- C. every roof in the world
- D. a roof

The tiles would turn darkly¹² to absorb energy in winter and turn white to reflect energy in summer—offsetting fossil fuel-based heating and cooling costs.

PASSAGE 2

The Boston Tea Party: Patriotism or Profiteering?

Those of us who attended elementary schools in the United States know the Boston Tea Party as the bold act of persecuted American loyalists who opposed “the tyranny of taxation without representation.” An examination of the facts leading up to the legendary protest, however, suggest¹⁴ that it may have been motivated as much by greed as by righteous indignation and pro-American spirit. 15

In 1773, John Hancock, a wealthy Boston shipping mogul, stood to have his profits gutted by the British government’s passing of the Tea Act. Five years earlier, the British had seized Hancock’s ship *Liberty* and charged him with smuggling tea and other taxable goods. In response, Hancock organized a colonial boycott of China tea. Sold¹⁶ by the British East India Company. The boycott was so effective that it buoyed Hancock’s profits and bankrupted the British East India Company, whose sales of tea within a year¹⁷ in the colonies dropped from 320,000 pounds to 520 pounds in less than a year.

Question 12

- F. NO CHANGE
- G. have turned dark
- H. turning dark
- J. turn dark

Item 13 poses a question about the passage as a whole.

Question 13

Which of the following ordering of paragraphs makes the passage most logical and comprehensible?

- A. NO CHANGE
- B. 2, 3, 1, 5, 4
- C. 1, 3, 2, 4, 5
- D. 3, 1, 2, 5, 4

Question 14

- F. NO CHANGE
- G. suggestion
- H. suggests
- J. will suggest

Question 15

The author is contemplating deleting the word “however”, along with the commas surrounding it, from the preceding sentence. Should the word be removed or kept?

- A. Removed, because the contradiction it implies has already been expressed.
- B. Removed, because the information that follows is not contradictory to anything in the previous sentence.
- C. Kept, because the word expresses a contradiction that needs to be emphasized.
- D. Kept, because it stresses the indecision that characterized the colonists’ thinking at that time.

Question 16

- F. NO CHANGE
- G. tea sold
- H. tea, sold
- J. tea, that sold

Question 17

- A. NO CHANGE
- B. , within a year,
- C. within a year.
- D. DELETE the underlined portion

What allowed the British East India Company, without ¹⁸ paying a British import tax, to export tea was the Tea Act, ¹⁸ which, to save the company, the British passed. Hancock ¹⁸ had made his fortune smuggling Dutch tea into the colonies, and the Tea Act meant the British East India Company could sell its superior tea at a lower price than Hancock's smuggled tea.

Not surprisingly, as Hancock became the primary ¹⁹ financial backer of colonial demonstrations against the

Tea Act. Him ²⁰ and his close friend, Sam Adams, had little trouble drumming up resistance. 21 Hancock and Adams

immediately organized letter-writing campaigns and public ²² dissent. They went so far as to orchestrate terrorist attacks ²² on the businesses and homes of British East India Company agents—in an effort to “coax” them into retirement.

Although Adams was conspicuous in his activist role. ²³ The millionaire Hancock was ever working behind the scenes. Bostonians of the time joked that “Sam Adams writes the letters [to newspapers] and John Hancock pays the postage.” Today, many historians suspect that it was

Question 18

- F. NO CHANGE
- G. To save the British East India Company, the British Parliament passed the Tea Act, which allowed the company to export tea without paying a British import tax.
- H. Without paying a British import tax, the British East India Company was allowed to sell tea by the British Parliament by the Tea Act.
- J. The Tea Act, which allowed the British East Company to export tea without paying a British import tax, was passed to save the company by the British Parliament.

Question 19

- A. NO CHANGE
- B. surprisingly; as Hancock
- C. surprising, as Hancock
- D. surprisingly, Hancock

Question 20

- F. NO CHANGE
- G. They
- H. One
- J. He

Question 21

The author is considering replacing the period at the end of the previous sentence with a semicolon and adding the following clause after the semicolon:

most of Boston society had profited from the Dutch tea brought in by Hancock and other wealthy smugglers

Assuming the clause is true, should the author add it here?

- A. Yes, because it is direct support for the clause that precedes it.
- B. Yes, because it explains why the people of Boston preferred the Dutch tea.
- C. No, because the idea expressed in the clause has already been introduced in the passage.
- D. No, because it is not related to the clause that precedes it.

Question 22

- F. NO CHANGE
- G. campaigns. And public dissent.
- H. campaigns; and public dissent.
- J. campaigns. And also public dissent.

Question 23

- A. NO CHANGE
- B. role; the
- C. role, the
- D. role—

Hancock who, in November of 1773, laid out detailed plans for a bold, elaborately prepared²⁴ protest action: Citizens of Boston, dressed as Narragansett Indians, stormed the British East India Company's ships *Dartmouth*, *Beaver*, and *Eleanour*, and dumped 90,000 pounds of China tea into Boston Harbor. Of note is that Hancock's fortunes rose considerably in the wake of the incident. All of this casts doubt upon the purity of motives behind perhaps the most famous action of defiant civil disobedience²⁵ ever perpetrated—the Boston Tea Party.

Question 24

- F. OMIT the underlined portion
- G. elaborate planned
- H. elaborate plans
- J. elaborated plan

Question 25

- A. NO CHANGE
- B. defiant, civil disobedience
- C. defiance and civil disobedience
- D. civil disobedience

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 25 Questions

Directions: Each section consists of 25 questions. Some are underlined and some are box questions. Read each passage before beginning to answer questions. Choose the answer that you feel best answers each question.

PASSAGE 1

Explosive Computer Virus

On a June day in 1982, a massive explosion shook the Siberian wilderness. The blast was so large it was detected in space by U.S. satellites. Luckily, no one was hurt, what₁ had caused this colossal accident?

[1] The so-called “Farewell Dossier” revealed that the U.S.S.R. had gone a long way toward bridging the U.S.-Soviet technology gap by incorporating ill-gotten U.S. computer technology into Soviet science and industry. [2] Although the post-war Soviet Union had managed to beat the U.S. into space, but₂ its prowess in nuclear engineering had led to the Cold War, it still lagged behind the West in

computer technology. [3] In 1981 the French₃ government acquired top-secret information detailing Soviet efforts to catch up by stealing Western technology using a network of KGB spies. 4

The documents also revealed the KGB’s plans for the future. One such plan involved appropriating computer systems for running the Soviet Union’s giant new trans-Siberian natural gas pipeline. In the midst of the Cold War, the U.S. had refused to allow the sale of such technology to the U.S.S.R. Consequently, the KGB intended to infiltrate a Canadian software company and steal the needed U.S.-made software. Not long after the U.S. turned down their

Question 1

- A. NO CHANGE
- B. hurt, but what
- C. hurt what
- D. hurt but what

Question 2

- F. NO CHANGE
- G. so
- H. and
- J. even though

Question 3

- A. NO CHANGE
- B. The French in 1981
- C. The, French, in 1981
- D. In 1981, the French

Question 4

Which of the following sequences of sentences renders this paragraph most logical?

- F. NO CHANGE
- G. 2, 1, 3
- H. 1, 3, 2
- J. 2, 3, 1

request to purchase a pipeline computer system
legitimately, the Soviets followed through with their plan.
5

As the covert operation went without a hitch, and the
6
trans-Siberian pipeline was up and running within a year.

What the KGB didn't know was that the U.S. and
Canada had anticipated just such a scenario. More than
willing to assist a traditional ally, the Farewell Dossier had
7
been made available to the U.S. government by the French
7

just months earlier. Also, ejecting all of the KGB agents
8
it immediately named, the U.S. elected to use them in a
counter-operation of its own. A purposefully flawed version
of the computer system was planted in the Canadian soft-
ware company targeted by the KGB. Soviet operatives
had not acquired a solution to their pipeline operation
problem; they had took some very dangerous bait.
9

The planted software they stole had been designed and for-
10
mulated by engineers who worked for the CIA to run
10
smoothly for several weeks, and then suddenly activate a
sub-program that would pump an unmanageable amount of
natural gas through the pipeline. It was this modified
code, perhaps the most dangerous computer virus in history,
11
that eventually caused the earth-shaking explosion in

Question 5

- A. NO CHANGE
- B. legitimate
- C. legitimacy
- D. by legitimately

Question 6

- F. NO CHANGE
- G. While the
- H. When the
- J. The

Question 7

- A. NO CHANGE
- B. the Farewell Dossier, by the French, had been made available to the U.S. government
- C. the U.S. had been made available to them the Farewell Dossier by the French
- D. the French had made the Farewell Dossier available to the U.S. government

Question 8

- F. NO CHANGE
- G. In order to
- H. Moreover,
- J. Rather than

Question 9

- A. NO CHANGE
- B. had taken
- C. taken
- D. will take

Question 10

- F. NO CHANGE
- G. The planted software they stole were designed and formulated by engineers
- H. The planted software they stole had been designed by engineers
- J. The planted software they stole would be designed and formulated by engineers

Question 11

- A. NO CHANGE
- B. perhaps the most dangerous computer virus to have ever been constructed in our history,
- C. the most dangerous, perhaps, of any computer virus in history,
- D. a computer virus that was perhaps the most dangerous in history,

Siberia—and ushers¹² in the collapse of the KGB’s unique technology development program. [13]

PASSAGE 2

Freud’s Dream Analysis

[1]

The medical profession is justly conservative. Human life¹⁴ is not the proper material for wild experiments. Conservatism, however, is too often a welcome excuse for lazy minds,

loath to adapt itself¹⁵ to fast changing conditions.

[2]

Consider the scornful reception that first was accorded to Freud’s discoveries in the domain of the unconscious. When, after years of patient observations, he finally decided to appear before medical bodies to modestly tell them of some facts that always recurred in his dreams and his patients’ dreams, he was first laughed at and then he was¹⁶ avoided¹⁶ as a crank.

[3]

The words “dream interpretation” are fraught with unpleasant, displeasing, unscientific¹⁷ associations. They remind one of all sorts of childish, superstitious notions, which make up the thread and woof of dream books, read by none but the ignorant and the primitive. The wealth of detail and infinite care with which he presented the results of his investigations eventually impressed more and more serious-minded

Question 12

- F. NO CHANGE
- G. it ushers
- H. ushered
- J. ushering

Item 13 poses a question about the passage as a whole.

Question 13

Into which of the following collections would this essay best fit?

- A. A collection of essays on the rise of Canadian software companies.
- B. A collection of essays on Cold War intrigue.
- C. A collection of essays about the dangers of unsafe natural gas pipelines.
- D. A collection of essays detailing the successful exploits of the KGB.

Question 14

- F. NO CHANGE
- G. Human life, as a subject to study or analyze in great detail
- H. Human life, when scrutinized under carefully controlled conditions
- J. Human life on this earth, as we know it at the present time

Question 15

- A. NO CHANGE
- B. themselves
- C. oneself
- D. yourself

Question 16

- F. NO CHANGE
- G. then afterwards avoided
- H. then avoided
- J. then they avoided

Question 17

- A. NO CHANGE
- B. displeasing, unscientific,
- C. displeasing unscientific
- D. unscientific

scientists, but the examination of his evidential data demands
18
arduous work and presupposes an absolutely open mind.

[4]

Besides those who sneer at dream study, because they
have never looked into the subject. There are those who do
19
not dare to face the facts revealed by dream study. Dreams tell

us many an unpleasant truth about ourselves, since only
20

very free minds can thrive on such a diet. Withering fast
21
in the pellucid atmosphere of dream investigation is a plant
21
self-deception. The faint of heart are not anxious to turn
21
such a powerful searchlight upon the dark corners of

his psychology.
22

[5]

This is why we still encounter people entirely ignorant
of Freud's writings—people who are not even interested
enough in the subject to attempt an interpretation of their
dreams or their patients' dreams—dissing Freud's theories
23
and combating them with the help of statements that
he never made. Some of them reach conclusions that are
strangely similar to Freud's, but, in their ignorance of
psychoanalytic literature, they failed to credit Freud for
24
observations antedating their own. [25]

Question 18

- F. NO CHANGE
- G. scientists
- H. scientists the
- J. scientists, and the

Question 19

- A. NO CHANGE
- B. subject their
- C. subject; there
- D. subject, there

Question 20

- F. NO CHANGE
- G. ourselves,
- H. ourself, since
- J. ourselves, and

Question 21

- A. NO CHANGE
- B. Dream investigation withers fast the plant self-deception in its pellucid atmosphere.
- C. Self-deception is a plant that withers fast in the pellucid atmosphere of dream investigation.
- D. A plant that withers fast is self-deception in the pellucid atmosphere of dream investigation.

Question 22

- F. NO CHANGE
- G. their
- H. one's
- J. our

Question 23

- A. NO CHANGE
- B. deriding
- C. accepting
- D. knocking

Question 24

- F. NO CHANGE
- G. failing
- H. fail
- J. failure

Item 25 poses a question about the passage as a whole.

Question 25

Which of the following ordering of paragraphs makes the passage most logical and comprehensible?

- A. NO CHANGE
- B. 1, 2, 3, 5, 4
- C. 1, 3, 2, 4, 5
- D. 2, 1, 3, 4, 5

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 25 Questions

Directions: Each section consists of 25 questions. Some are underlined and some are box questions. Read each passage before beginning to answer questions. Choose the answer that you feel best answers each question.

PASSAGE 1

Baseball

As I dug my cleats into the pitcher’s mound that afternoon, my mind was cleared of everything but the intramural league championship. It was the bottom of the 9th inning. We were ahead by one run. The opposing team had base runners on first and second, but they also had one out. Having shuffled nervously up to the plate, I struck out their
next batter easy. A handful of fans in the bleachers went

crazy. My faith was supreme. As a new victim entered the batter’s box. I threw two blistering fastballs, and she fanned them both. One more strike and it would all be over. That’s when I took a closer look at the batter and noticed the bright red canvas high-tops—the same shoes my wife had worn the day she died. My hand tried to squeeze the ball, but found nothing there. From far away, I watched myself step off the mound and walk across the tall grass. I bent over, lifted a small white object out of the grass, pivot
crawled back up the mound like an ant, and pivoted again to face the batter with the red canvas high-tops.

Question 1

- A. NO CHANGE
- B. Their next batter shuffled nervously up to the plate, and I struck him out
- C. After having shuffled up to the plate, nervously, I struck out their next batter
- D. Shuffling up to the plate, I struck out their next batter

Question 2

- F. NO CHANGE
- G. easily
- H. easy like
- J. easeful

Question 3

- A. NO CHANGE
- B. supreme: as a
- C. supreme as a
- D. supreme. As, a

Question 4

- F. NO CHANGE
- G. high-tops: the
- H. high-tops. The
- J. high-tops the

Question 5

- A. NO CHANGE
- B. grass, pivot
- C. grass, pivoted
- D. grass, pivoted,

[1] My next pitch floated over the plate, and the
6

batter scooped the ball up into a slow arc. [2] It hung
7
stationary and motionless, framed by the sun, and then
dropped into an open spot in right field. [3] I tried not to
watch as the red high-tops bounced to first base and planted
themselves there. [4] I had a vague understanding that the
bases was now loaded. [5] My next three pitches were
8
wobbly and wide: three balls. [6] I closed my eyes to

concentrate, but then desperately tried to deliver a
9
respectable pitch, but the ball bounced on the dirt two feet
in front of home plate. [7] I knew then it was all over.

[8] I eased up on the next batter, and they hit it over the
10
fence. [9] The red high-tops oozed a blurry streak around
the bases. [10] I headed straight to the parking lot, avoid-
11
ing the gazes of my friends and teammates. [12] [13]

Question 6

- F. NO CHANGE
- G. plate, the
- H. plate; and the
- J. plate the

Question 7

- A. NO CHANGE
- B. It hanged stationary and motionless,
- C. It hung motionless,
- D. Stationary and motionless it hung

Question 8

- F. NO CHANGE
- G. were
- H. are
- J. is

Question 9

- A. NO CHANGE
- B. for then
- C. or then
- D. and then

Question 10

- F. NO CHANGE
- G. batter and they
- H. batter, and he
- J. batter. And they

Question 11

- A. NO CHANGE
- B. nearby parking lot to the west of the field
- C. lot for parking
- D. parking lot, where I had parked my car

Question 12

Where in the second paragraph would the following sentence fit most logically?

*I made a stop at the liquor store on my way home,
and slept in my baseball shoes that night.*

- F. Before sentence 1
- G. Between sentences 1 and 2
- H. Between sentences 5 and 6
- J. After sentence 10

Item 13 poses a question about the passage as a whole.

Question 13

Passage 1 changes narrative tone at lines 10-13 (“That’s when ...she died”). Which of the following best characterizes this change in tone?

- A. From serious to witty
- B. From intimate to detached
- C. From optimistic to distressed
- D. From light-hearted to ironic

PASSAGE 2

Vacation in Washington D.C.

For the first twenty minutes of my vacation, the city of Washington D.C. consisted of a terribly nice airport attendant and it also consisted of a respectful and courteous cab driver. They both observed my bungling ignorance without impatience or amusement. The airport was a great, chaotic

maze for a place, crammed full of hurried people, and I was irritated because they all seemed to know what to do, whereas I was completely bewildered. This made them appear very stony-hearted, and I remember taking great pleasure in disliking them. I was nervous about my suitcase. The act of tracking it down seemed to promise crushing embarrassment. I apparently had to locate an obscure wing of the airport before I could find it, claim, it, and then I had to lug it back to the waiting cab. I rather would have had

the money to buy an entirely new wardrobe than have no suitcase at all.

[1] Of course, my struggle was not with Washington D.C. [2] A person of my nervous temperament does not like new experiences until they become old ones. [3] Besides, I have learned that a man, any man, who knows much more about a subject than I do, will bully me because of it, and pour his knowledge upon my bowed head until I am drenched with their superiority. [4] Therefore, I braced myself for the inevitable humiliation. But the holy father of an airport attendant and the saintly cab driver met me halfway, and did not come down from their hills to clout me with knowledge; they were actually quite nice. [5] I was instantly filled with an almost guilty ecstasy. [19]

Question 14

- F. NO CHANGE
- G. OMIT the underlined portion of the sentence
- H. of
- J. it consisted of

Question 15

- A. NO CHANGE
- B. maze of a place
- C. maze of place
- D. maze, for a place

Question 16

- F. NO CHANGE
- G. find it, claim it, and lug it back to the waiting cab.
- H. find, claim it, lug it back to the waiting cab.
- J. find it, then I had to claim it, and lug it back to the waiting cab.

Question 17

- A. NO CHANGE
- B. did have
- C. had
- D. will have

Question 18

- F. NO CHANGE
- G. his superiority
- H. one's superiority
- J. their superior

Question 19

Where in the second paragraph would the following sentence most logically fit ?

My struggle was with a new game.

- A. Between sentences 1 and 2
- B. Between sentences 2 and 3
- C. Between sentences 3 and 4
- D. After sentence 5

This Washington D.C.—composed of an airport attendant and a cab driver—became my great champion. I had analyzed they,²⁰ and decided that they were not merely sucking up to improve their chances of obtaining a decent tip. Nor did their kindness seem to come from any natural good will. They displayed a perfect artificial²¹ virtue; it was drill—plain, simple drill. And I was quite glad that they had been well trained, and sincerely approved of it, because I saw that it was good for me. (Whether it was good or bad for the airport attendant and the cab driver I don't know. Nor did I spend too much time worrying about that question.)

I am sure that it would have been more proper to have reserved any emotion for the Lincoln Memorial and the Smithsonian. But, as a matter of fact, I did not see them for several days, and at this time they did not concern me at all.²² I was re-born in D.C. at an airport, and my new

vision was limited to an attendant and a cabby. They deep²³ immersed²³ me in new experience, but²⁴ I did not then care to see the Lincoln Memorial and the Smithsonian.

I considered the attendant and the cabby to be more important.

Question 20

- F. NO CHANGE
- G. analyzed them
- H. analyze they
- J. analyzed their

Question 21

- A. NO CHANGE
- B. less than natural
- C. done as rote
- D. not completely sincere or genuine

Question 22

- F. NO CHANGE
- G. at all that moment
- H. at all presently
- J. at all for now

Question 23

- A. NO CHANGE
- B. deeply immerse
- C. deep immerses
- D. deeply immersed

Question 24

- F. NO CHANGE
- G. nevertheless
- H. and
- J. but then

Item 25 poses a question about the passage as a whole.

Question 25

Which of the following best captures a main theme of the passage?

- A. The airport attendants and cab drivers in Washington D.C. are more professional than those in other cities.
- B. Commuters in Washington D.C. airports must travel a long way to find their luggage after landing.
- C. A city's character is sometimes best revealed in small, mundane interactions with its inhabitants.
- D. Airport attendants and cab drivers are not paid enough for their services, which are considerable.

END OF TEST.

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PASSAGE 1

Intelligence

[1] Intelligence is a difficult thing to define, let alone explain. [2] Nevertheless, it is common for people, including some renowned and quoted experts, to attribute intelligence to genetic—to insist that it is something we are “born with.” [3] However, we seem to be no closer to deciding this, thorny, question than we were over a hundred years ago when Alfred Binet developed the first intelligence test. [4] In short, nowhere is the “nature vs. nurture” debate more heated than on the subject of human intelligence. [5] Other experts contend that intelligence develops as the result of experiences in society, it will vary as these experiences vary. [5]

One person who champions the hereditary view of intelligence is experimental psychologist Arthur Jensen. Jensen criticizes conventional intelligence tests, because they require learned skills such as language and mathematics.

He asserts that true and genuine intelligence can only be measured with tests that are symbol and culture free. Jensen’s own intelligence test involves a small display with several buttons on top.

Question 1

- A. NO CHANGE
- B. Likewise
- C. Moreover
- D. Therefore

Question 2

- F. NO CHANGE
- G. including some renowned, and quoted
- H. some renowned and quoted experts included
- J. including some experts

Question 3

- A. NO CHANGE
- B. this, thorny question
- C. this thorny question
- D. this thorny, question

Question 4

- F. NO CHANGE
- G. society, and that it
- H. society
- J. society; and it

Question 5

For paragraph 1, which of the following sequences of sentences makes the paragraph most logical and coherent?

- A. NO CHANGE
- B. 1, 2, 5, 4, 3
- C. 1, 2, 5, 3, 4
- D. 1, 2, 3, 5, 4

Question 6

- F. NO CHANGE
- G. true, genuine intelligence
- H. true intelligence
- J. truly and genuine

When the buttons light on, a subject must react by pushing one of them as quickly as possible. Smaller average reaction times over several pushes of the button mean more intelligence. Jensen carefully collects and compares these times, but he is still left with the sticky question of how intelligence should be defined; what evidence is there to support his claim that this “chronometric” test reveals true intelligence? Jensen is forced to return to the very instruments he condemns as “culture-tainted” to make his case: “Chronometric measures are correlated with scores on [traditional] psychometric tests of mental abilities.”

Developmental psychologists Joseph Glick and his colleague Michael Cole studied the Kpelle people of Liberia to test a theory on the “nurture” side of the debate.

The ability to form abstract categories are a hallmark of human development and human intelligence in the West. The theory Glick and Cole investigated suggests that written language leads to this ability, and predicts that people in cultures with no written language (such as the Kpelle) should exhibit less abstract—and, therefore, more “primitive”—classification behavior than people in literate cultures. The researchers presented their Kpelle subjects with twenty articles common in their village, and asked them to sort the objects into groups that belonged together. The objects had been pre-selected by the researchers to represent four abstract categories: food, cookware, tools, and clothing. Instead of these four categories, the Kpelle subjects tended to produce ten two-item groups, in categories such as an orange and a knife, say, or a potato and a hoe. When Glick and Cole inquired as to the reasoning behind such decisions,

subjects often said, “A wise man would do it this way.” After hearing this explanation many times, an exasperated Glick finally shot back, “Then how would a *fool* do it?”

Question 7

- A. NO CHANGE
- B. buttons light up
- C. buttons glow up
- D. buttons issue light

Question 8

- F. NO CHANGE
- G. and also Michael Cole
- H. and Michael Cole
- J. but Michael Cole

Question 9

- A. NO CHANGE
- B. categories is a
- C. categories, are a
- D. categories were a

Question 10

- F. NO CHANGE
- G. groups; an orange
- H. groups, an orange
- J. groups: an orange

Question 11

- A. NO CHANGE
- B. say
- C. will say
- D. will said

His Kpelle subject calmly sorted the objects into four groups: food, cookware, tools, and clothing. Needless to say, although¹² Glick and Cole left the experience with no clear answer concerning the effect of culture on classification ability and intelligence. [13]

PASSAGE 2

House Flies

[1]

Several frequently seen¹⁴ species of flies are found commonly in houses. Some of them so closely resemble the true housefly that it requires very careful observation to distinguish them from it.

[2]

Another frequent visitor of households, particularly in the spring and fall, is the cluster fly. It is somewhat larger than the housefly, and is distinguished by their covering of¹⁵ fine yellowish hairs. Occasionally, this fly occurs in houses in such numbers as to cause great annoyance. It gets its name of “cluster fly” from its habit of collecting in compact groups or clusters in protected corners during cold periods.

[3]

One of these is the biting stable fly. It lives frequent¹⁶ in houses and differs from the housefly in that its

mouthparts are constructed by nature¹⁷ for piercing the skin. This fly is so often mistaken for the housefly that most people think that the housefly can bite.

Question 12

- F. NO CHANGE
- G. while
- H. after
- J. OMIT the underlined portion

Item 13 poses a question about the passage as a whole.

Question 13

Which of the following would be an appropriate title for Passage 1?

- A. Nurture Wins: The Fall of Hereditary Views of Intelligence
- B. Chronometric Intelligence Tests: Firm Foundation or Hall of Mirrors?
- C. Attributing Intelligence to a Single Source: Some Bumps in the Road
- D. Defining Intelligence: Real Life Abilities or Abstract Thinking?

Question 14

- F. NO CHANGE
- G. seen frequent
- H. OMIT the underlined portion
- J. frequent

Question 15

- A. NO CHANGE
- B. one’s covering of
- C. its covering of
- D. your covering of

Question 16

- F. NO CHANGE
- G. frequently
- H. infrequent
- J. but frequent

Question 17

- A. NO CHANGE
- B. shaped precisely and purposefully
- C. constructed and arranged
- D. designed

[4]

Several species of metallic greenish or bluish flies can also occasionally be found in houses. These includes the¹⁸

bluebottle fly, the black blowfly, and they include the¹⁹ green-bottle fly. They are essentially the same size and shape as the common housefly, but their bright metallic backs distinguish them from the dull gray housefly.

[5]

All of these species, however, is greatly dwarfed in²⁰ numbers by the common housefly. A recent study sampling houses in various parts of the country found that the true housefly made up 98.8% of those flies that take up residence in American homes. The remainder comprised various species, including the²¹ “imposters” mentioned above.

[6]

There is still another species, smaller than any of those so far mentioned, which is sometimes called the “lesser house fly.” Because of its paler and pointier body, the housefly—²² with its dark and relatively blunt body—can be distinguished²² from this insect.²² The male is more common than the²³ female, has large pale patches at the base of the abdomen, which are translucent when the fly is seen on a window-pane. These little flies are not the young of the larger flies. Flies do not grow once their wings have expanded and dried.

24 25

Question 18

- F. NO CHANGE
- G. These include the
- H. These includes a
- J. These, including the

Question 19

- A. NO CHANGE
- B. blowfly, and included is
- C. blowfly, and
- D. blowfly,

Question 20

- F. NO CHANGE
- G. was greatly dwarfed
- H. is not greatly dwarfed
- J. are greatly dwarfed

Question 21

- A. NO CHANGE
- B. species. Including
- C. species. That include
- D. species. Which include

Question 22

- F. NO CHANGE
- G. With its paler and more pointed body, the dark and relatively blunt housefly can be distinguished from this insect.
- H. With its paler and more pointed body, this insect can be distinguished from the dark and relatively blunt housefly.
- J. Because of its paler and more pointed body, the dark and blunt housefly can be distinguished from this insect.

Question 23

- A. NO CHANGE
- B. the more common male than
- C. male was more common than
- D. male, which is more common than

Items 24 and 25 pose questions about the passage as a whole.

Question 24

Which of the following is the best description of the type of writing this passage represents?

- F. Informative essay
- G. Persuasive essay
- H. Personal essay
- J. Short story

Question 25

Which of the following ordering of paragraphs makes the passage most logical and comprehensible?

- A. NO CHANGE
- B. 1, 3, 2, 4, 5, 6
- C. 3, 1, 2, 4, 6, 5
- D. 1, 3, 2, 4, 6, 5

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 25 Questions

Directions: Each section consists of 25 questions. Some are underlined and some are box questions. Read each passage before beginning to answer questions. Choose the answer that you feel best answers each question.

PASSAGE 1

Cell Walls

Biologist Ernest Just changed the direction of research in biology, but paid dearly for his brilliance and ambition. As an African American at the forefront of cell research in the 1920s and 1930s, he came up against a barrier of white egos that he will never be able to surmount. At his death at age 57, Just's legacy included brilliant contributions to biological science and a story of tragic professional discrimination.

In 1907, Just was the sole magna cum laude graduate of his Dartmouth class. Celebrated as a poet, Classicist, historian, and biological researcher. Unable to secure a position at a major research university because of his race, he took an appointment as Chair of Biological Research at historically-black Howard University in Washington D.C. Just quickly gained a reputation in the study of cells (cytology). Other Cytologists had concentrated their efforts on the cell nucleus, Just's breakthrough was realizing that the membrane surrounding the nucleus (the nuclear membrane) was equally important. Along the way, he became an expert in methods of cell research, but was much in demand as a consultant and teacher of those methods.

[1] Additionally, African American universities, such as Howard, were unable to draw the research money white universities took for granted. [2] Just's research was pitifully under-funded, a frustrating situation for a man who was becoming one of the world's most accomplished biologists.

Question 1

- A. NO CHANGE
- B. will have never been able
- C. was to never be able to
- D. was never able

Question 2

- F. NO CHANGE
- G. class; celebrated
- H. class, and was celebrated
- J. class. Was celebrated

Question 3

- A. NO CHANGE
- B. OMIT
- C. Just as other
- D. Whereas other

Question 4

- F. NO CHANGE
- G. or
- H. and
- J. yet

[3] A drawback to Just's position at Howard was that his responsibilities as a methods consultant and teacher left him little time for his own research. 5

During the summer months, Just was able to escape the confines of Howard and enter an atmosphere

more conducive to pure science between May and August ⁶—but ₆ at a cost he could never have foreseen. At the prestigious University of Chicago Marine Biological Laboratory in Woods Hole, Maine, Just conducted cell fertilization research alongside some of the most acclaimed scientists of his time. One of these was Jaques Loeb of the University of Chicago. Although Just and Loeb's relationship began as one of mutually respect, ₇ it quickly turned uncongenial when

Just demonstrates ₈ that one of Loeb's established theories was wrong. In apparent retaliation to Just's findings, Loeb wrote a letter to the Rockefeller Institute for Medical Research claiming Just was unintelligent and vain. Many think that this letter from a famous white scholar effectively barred Just from ever gaining a position at a major American university. He became stuck in his overworked, under-funded position at Howard.

Frustrated and resentful, European Universities ₉ were where services were offered by Just. He eventually landed a post as guest professor at the Kaiser Wilhelm Institute for Biology in Germany. In 1930, Just returned to

the United States to give a lengthy talk, the kind biologists ₁₀ give at receptions in which many other biologists are in ₁₀ attendance, ₁₀ at a Woods Hole laboratory party. He ended his

Question 5

Which of the following sequences of sentences for the third paragraph creates the most logical and coherent paragraph?

- A. NO CHANGE
- B. 2, 3, 1
- C. 1, 3, 2
- D. 3, 2, 1

Question 6

- F. NO CHANGE
- G. —but
- H. between the months of May and August—but
- J. May through August—but

Question 7

- A. NO CHANGE
- B. mutually respectful
- C. mutual respectful
- D. mutual respect

Question 8

- F. NO CHANGE
- G. demonstrate
- H. demonstrated
- J. will demonstrate

Question 9

- A. NO CHANGE
- B. Just offered his services to European universities.
- C. European universities were where Just offered his services
- D. Services were offered by Just to European universities.

Question 10

- F. NO CHANGE
- G. give a lengthy talk of the kind biologists give at big conventions
- H. speak
- J. speech

talk by lambasting his audience, saying he had been offered more fellowship and support in one year at the Kaiser Wilhelm Institute than in his twenty years at the Marine Biological Laboratory. Needless to say, Just never returned to Woods Hole.

Over the next decade, Just spent most of his time working in Europe. In 1936, he wrote a letter to Italian dictator Benito Mussolini, in which he spoke out against his treatment in America and offered his services to Mussolini's government; Mussolini never replied. By 1940—broke, he was unhappy, physically ill,¹¹ and having rejected most family and friends in the U.S.—Just was forced back to America and his position at Howard, due to the outbreak of war. Within a year, he had died of pancreatic cancer—a man who had greatly benefited science, but whom had been¹² twisted by the prejudices of his native land. 13

PASSAGE 2

Predatory Love

The most important thing to know about cats is that they are hunters. Much of their cat-ness can be attributed to their evolution into a very narrow niche in the food chain; species of cats absolutely lives or dies¹⁴ by their ability to

capture, eat, and digest other animals. Therefore,¹⁵ everything about them, including their “recreational behavior,” is

Question 11

- A. NO CHANGE
- B. Just was unhappy, physically ill
- C. unhappy, physically ill
- D. unhappily, physical illness

Question 12

- F. NO CHANGE
- G. whom have
- H. who will have
- J. who had

Item 13 poses a question about the passage as a whole.

Question 13

Which of the following best summarizes the main point of the passage?

- A. The nuclear membrane, or outer membrane of a nucleus, is just as important as its nucleus.
- B. Ernest Just could have had a successful career if he had not been crippled by bitterness.
- C. Jaques Loeb sabotaged Earnest Just's career out of jealousy.
- D. Ernest Just is an example of a brilliant mind stifled by American prejudice.

Question 14

- F. NO CHANGE
- G. live or die
- H. lives or die
- J. live or dies

Question 15

- A. NO CHANGE
- B. But,
- C. However,
- D. Nevertheless,

16 closely related to hunting.

This is just as true of house cats—descendants of the Near Eastern wildcat—as it is of lions, tigers, and

17 other large felines. All cat “play” is a form of hunting, and emotions that humans express in diverse ways are expressed

in hunting behaviors by cats. It’s not because they’re 18 lazy and idle that cats spend most of their free time sleeping;

19 resting up for the hunt. And it’s no accident that a cat will only get up from a nap to attack things, animals, and people around the house; they’re practicing for the hunt. Cats will often express positive emotion—happiness, excitement, or gratitude—by ambushing and pouncing on the object of their pleasure. If you come home from a long day away from your cat after a 20 seemingly endless day and she jumps out from behind the sofa and sinks her claws deep into your lower leg, it’s probably because she’s missed you. [21]

[1] The most obviously hunt-related “bonding” behavior exhibited by cats toward their owners is the much-discussed practice of bringing small animals home without eating them. [2] Although the dog’s view of its human owner is usually characterized as something like that of a

child to a 22 parent, the cat-person relationship is more complex. [3] Cats “knead” the stomachs of their owners in the same way they knead the breasts of their mothers to stimulate milk flow, suggesting that they see their owners as parents. [4] Delivering dead prey is what mother cats do

Question 16

- F. NO CHANGE
- G. close
- H. closed
- J. closeness

Question 17

- A. NO CHANGE
- B. of other large felines.
- C. of other large feline.
- D. the case of other large felines.

Question 18

- F. NO CHANGE
- G. lazily idle
- H. lazy or idle
- J. lazy

Question 19

- A. NO CHANGE
- B. they’re resting
- C. rest
- D. rested

Question 20

- F. NO CHANGE
- G. seemingly after an endless day
- H. after an endless-seeming day
- J. DELETE the underlined portion

Question 21

What is the main purpose of the last sentence of this paragraph?

- A. It is meant to illustrate how cats are a bad choice of pets for young children.
- B. It is an example of how a hard day’s work can leave one vulnerable to unlucky events.
- C. It is an example of the idea from the previous sentence that cats use hunting behavior to express emotion.
- D. It is meant to warn the reader against entering a house without first determining the location of the cat that lives there.

Question 22

- F. NO CHANGE
- G. parent. The
- H. parent; the
- J. parent. But the

when their youthful²³ kittens are too young to hunt for themselves. [5] And bringing live prey home for release is thought to be a training opportunity for kittens; it gives a mother's young the chance to practice hunting under her direct supervision. [6] So, we are our cat's kittens, and when our "parent" releases a terrified mole in our house,²⁴ she²⁴ is attempting to give us the most loving gift a cat is capable of giving: the gift of skill in hunting. [25]

Question 23

- A. NO CHANGE
- B. youth
- C. youthfulness
- D. DELETE the underlined portion

Question 24

- F. NO CHANGE
- G. house. She
- H. house; she
- J. house, and she

Question 25

If the following sentence were to be added to the third paragraph, at which location would its addition make the paragraph most logical and coherent?

However, capturing birds, small mammals, insects, and other prey to bring into the house or leave on the doorstep seems not to fit the human-as-parent pattern.

- A. Before sentence 1
- B. Between sentences 2 and 3
- C. Between sentences 3 and 4
- D. Between sentences 5 and 6

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 25 Questions

Directions: Each section consists of 25 questions. Some are underlined and some are box questions. Read each passage before beginning to answer questions. Choose the answer that you feel best answers each question.

PASSAGE 1

Lincoln and the Black Hawk War

Long before he ran for the office of President, Abraham Lincoln was a captain in the so-called “Black Hawk War,” an experience that both revealed and developed his character. The center of conflict in the war was the Rock Valley, in the northern part of Illinois, which had been formerly the home of the Sauk tribe of Indians. Discontented with their life on the reservation west of the Mississippi, to which they had been removed, the Sauk’s, along with several other tribes, resolved to recover their old hunting grounds. Chief

Black Hawk, a great military strategist like a Lee or a Patton, was at the head of the revolt, and his march toward the Rock

River is marked by a number of brutal attacks on white settlements. Governor Reynolds of Illinois issued a proclamation calling for volunteers to aid the regular troops in the emergency. Lincoln was one of the first to answer the call. He unanimously was voted captain of the volunteers, garnering more than three times as many votes as the opposing candidate. Speaking of this affair when President, he said that he was more gratified with this first success than with any other election of his life.

[1] In describing the incident, he said: “I could not, for the life of me, remember the proper word of command

Question 1

- A. NO CHANGE
- B. Sauks,
- C. Sauks’,
- D. Sauks -

Question 2

- F. NO CHANGE
- G. a great military strategist like Lee or Patton,
- H. a great military strategist,
- J. a great military strategist reminiscent of Lee or Patton,

Question 3

- A. NO CHANGE
- B. will be marked
- C. were marked
- D. was marked

Question 4

- F. NO CHANGE
- G. He spoke of this affair when President,
- H. He was speaking of this affair when President,
- J. When President, he spoke of this affair,

for getting my company endwise, so that it could pass through the gate. [2] So, as we came near the gate, I shouted, ‘Halt! [3] This company is dismissed for two minutes, when it will fall in again on the other side of the gate.’” [4] He was crossing a field with a front of twenty men when he came to a gate through which it was necessary to pass. [5] The maneuver was executed successful. [6] Neither Lincoln, nor

his company, was in any engagement during the campaign, but there was plenty of hardship and fatigue, and some incidents occurred to illustrate his unique character. [7] Lincoln himself told a good story of his first experience in drilling raw troops during the Black Hawk War. [7]

[8] One day there came to the camp an old Indian, footsore and hungry. He was provided with a letter of

safe-conduct from a General. However there was a feeling of great irritation against the Indians, and the men objected strongly to receiving him.

Question 5

- A. NO CHANGE
- B. was successful executed.
- C. was successfully executed.
- D. was executed success.

Question 6

- F. NO CHANGE
- G. were
- H. will be
- J. will have been

Question 7

Which of the following sequences of sentences for the second paragraph creates the most logical and coherent paragraph?

- A. NO CHANGE
- B. 6, 7, 1, 2, 4, 3, 5
- C. 6, 7, 2, 1, 4, 3, 5
- D. 6, 7, 4, 1, 2, 3, 5

Question 8

Suppose the author considered adding a sentence to the beginning of this paragraph. Which of the following sentences would establish an appropriate theme for the paragraph while maintaining the essay’s style?

- F. Although the Black Hawk War brought out some of the best and most honorable aspects of Lincoln’s character, it also revealed some of his deepest flaws.
- G. Lincoln did not begin wearing his signature stovepipe hat until he entered public office, and so he didn’t impress his troops in the Black Hawk War as being particularly tall.
- H. During this campaign, an incident occurred, which well serves to show Lincoln’s keen sense of justice, his great common sense, and his resoluteness when aroused.
- J. Folks today think of Lincoln as cool as a cucumber, but he was apt to get pretty steamed-up when the situation called for it.

Question 9

- A. NO CHANGE
- B. General. And
- C. General. So
- D. General. Although

Between them, the tall figure of their captain, Lincoln suddenly appeared when they pronounced him a spy, and his passport a forgery, and were rushing upon the defenseless Indian to kill him. His men had never seen him so aroused, and they cowered before him. “Men,” said he, “this must not be done! He must not be killed by us!” His voice and manner

produced an effect on the mob. They paused, they listened, fell back, and sullenly obeyed him, although there were still some murmurs of disappointed rage. At length, one man, probably thinking he spoke for the crowd, cried out: “This is cowardly on your part, Lincoln!” Lincoln only gazed with contempt on the men, who would have murdered one unarmed Indian, but who quailed before his single hand. “If any man thinks I am a coward,” said he, “let him test it.” “Lincoln,” was the reply, “you are larger and heavier than any of us.” “That you can guard against,” responded the captain. “Choose your weapons!” Although the insubordination ended, and the word “coward” was never associated with Lincoln’s name again. 13

Question 10

- F. NO CHANGE
- G. The tall figure of their captain, Lincoln, suddenly appeared when they pronounced him a spy, and were rushing upon the defenseless Indian to kill him, and his passport they called a forgery.
- H. They pronounced him a spy and his passport a forgery, and were rushing upon the defenseless Indian to kill him, when the tall figure of their captain, Lincoln, suddenly appeared between them and their victim.
- J. His passport they called a forgery, when the tall figure of Lincoln, their captain, appeared between them and their victim, when they pronounced him a spy, and were rushing upon the poor Indian to kill him.

Question 11

- A. NO CHANGE
- B. they did listen
- C. listens
- D. listened

Question 12

- F. NO CHANGE
- G. Whereas the insubordination ended,
- H. The insubordination ends,
- J. The insubordination ended,

Item 13 poses a question about the passage as a whole.

Question 13

Suppose a publisher had asked the author to write an essay about Lincoln’s mental and moral qualities when he was President of the United States. Would this essay satisfy the publisher?

- A. No, because the essay reveals Lincoln’s mental and moral qualities, but is not set during his Presidency.
- B. No, because the essay does not reveal Lincoln’s mental and moral qualities, and is not set during his Presidency.
- C. Yes, because the essay reveals Lincoln’s mental and moral qualities, and is set during his Presidency.
- D. Yes, because the essay reveals Lincoln’s mental and moral qualities, and is set during the Black Hawk War.

PASSAGE 2

Black Hawk

[1]

In 1832, the offensive, fronted by Sauk war chief, Black Hawk, to regain possession of hunting grounds east of the Mississippi—land that had been ceded to the whites by Black Hawk’s rival, Keokuk—terminated in Black Hawk’s defeat and the near complete annihilation of his band. During the operations of that period, American forces approached 3,500. The commander of the U.S. troops.¹⁴ General Atkinson, estimated Black Hawk’s force at seven or eight hundred, but historians agree that it did not, at any time, exceed 500—many of whom died of starvation during the course of the war. [15]

[2]

Upon Black Hawk’s capture, when the chief,¹⁶ his two sons, and other Sauk and Fox leaders were taken to Jefferson Barracks in Missouri and immediately put in irons, apparently as a precaution. When the artist George Catlin visited Jefferson Barracks for the purpose of painting the prisoners’ likenesses, Black Hawk’s son, Naopope, seized the ball and chain that were fastened to his leg, raised them high, and exclaimed, “Make me so, and show me to your President.”

[3]

The captives were eventually liberated by President Andrew Jackson, who directed Black Hawk and his comrades to be taken home through some of the principal cities of the union. By exhibiting to the Sauk and Fox

Question 14

- F. NO CHANGE
- G. U.S. troops;
- H. U.S. troops,
- J. U.S. troops was

Question 15

The purpose of the last two sentences in this paragraph is to

- A. reveal that Black Hawk had amassed a large band of warriors.
- B. show that the U.S. forces greatly outnumbered Black Hawk’s forces.
- C. suggest that General Atkinson was a liar.
- D. imply that Black Hawk was not the great military leader his reputation would suggest.

Question 16

- F. NO CHANGE
- G. the chief,
- H. as the chief,
- J. although the chief,

leaders the extent of the population, the extent of the wealth,¹⁷ and means of defense of the United States, Jackson hoped to make a subduing impression on them. They were, accordingly, carried as far north as Philadelphia, and then through New York City, Buffalo, and Detroit to Fort Armstrong, Illinois.

[4]

Black Hawk remained on the Sauk and Fox reservation, west of the Mississippi, until his death at age 72. He was buried on a farm in what would later become the State of Iowa. Within a year of his death, Black Hawk's remains were robbed by a local doctor and put on display in his office. After some time, his skeleton¹⁸ was eventually exhibited publicly at the Burlington Geological and Historical Society, where, in 1855, it was destroyed in a fire.

[5]

In July of 1833, having been displayed before awestruck crowds on the East Coast, the prisoners were taken¹⁹ west to Detroit, where their reception is said to have been much less enthusiastic. It was stated in Detroit newspapers of the day that crowds gathered to burn and hang effigies of Black Hawk and his band. When the prisoners passed by the site of their former village, Saukenuk, on their way to Fort Armstrong, Black Hawk was overcome with emotion²⁰ and feeling.²⁰ The village had been decimated—his wigwam burned to the ground and his family dispersed.

[6]

A grand council for the final liberation of the prisoners were held²¹ the following day at Fort Armstrong. Major Garland of the U.S. Army rose and stated that their great Father, the President, would hereafter receive and acknowledge Keokuk as the principal chief of the Sauk and

Question 17

- A. NO CHANGE
- B. wealth,
- C. the wealth,
- D. the extent of wealth,

Question 18

- F. NO CHANGE
- G. OMIT underlined words
- H. His skeleton
- J. Eventually, his skeleton

Question 19

- A. NO CHANGE
- B. prisoners have been taken
- C. prisoners was taken
- D. prisoners will be taken

Question 20

- F. NO CHANGE
- G. emotional feeling.
- H. emotion and passion.
- J. emotion.

Question 21

- A. NO CHANGE
- B. were then held
- C. will be held
- D. was held

Fox nations, although²² he wished and expected Black Hawk to listen and conform to his counsel. He further stipulated that the band of Black Hawk must, henceforth, be merged with that of Keokuk. Upon the commencement of Garland's speech, Black Hawk sprang to his feet, stating²³ "I am a man²³—an old man. I will not conform to the counsel of anyone. I will act for myself; no one shall govern me." The Major's interpreter was directed to explain to Black Hawk that the President had only "requested" him to listen to the counsels of Keokuk. Black Hawk made no reply, but drew his blanket around him and sat in silence. 24 25

Question 22

- F. NO CHANGE
- G. and that
- H. but
- J. however

Question 23

- A. NO CHANGE
- B. stating: "I am a man
- C. stating, "I am a man
- D. stating; "I am a man

Items 24 and 25 pose questions about the passage as a whole.

Question 24

Which of the following paragraph sequences produces the most logical and coherent essay?

- F. NO CHANGE
- G. 1, 2, 3, 6, 5, 4
- H. 1, 2, 3, 5, 6, 4
- J. 1, 2, 3, 4, 6, 5

Question 25

Suppose the author decided to change the title of the essay to "The Humiliation and Degradation of Black Hawk." Would this title capture the theme of the passage?

- A. Yes, because the essay relates a series of events in Black Hawk's life that would have been humiliating and degrading.
- B. Yes, because the essay includes explicit commentary on the degrading and humiliating effects these events had on Black Hawk.
- C. No, because the author does not include commentary suggesting that the events would have been humiliating or degrading to Black Hawk.
- D. No, because the theme of the essay is that the U.S. is a wise and mighty nation and Black Hawk was a disgraced outlaw.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

- $5x^5 \times 3x^5y^4 \times 2y^3 + 10x^{11}y^7$ is equivalent to which of the following?
 - $30x^{10}y^7 + 10x^{11}y^7$
 - $30x^{25}y^{12} + 10x^{11}y^7$
 - $40x^{10}y^7$
 - $40x^{21}y^{14}$
 - $40x^{36}y^{19}$
- George decided to swim across a river to visit his one true love. If George swam at an average speed of $1 \frac{\text{mile}}{\text{hr}}$ and always swam perpendicular to the river's current, the river was 600 feet wide, and the river's current was $3 \frac{\text{miles}}{\text{hr}}$, how far away from his original position was George when he finished crossing the river?
 - 600 feet
 - $600\sqrt{10}$ feet
 - 1800 feet
 - $1800\sqrt{10}$ feet
 - 2400 feet
- In Question 2, how long did it take George to cross the river?
 - $\frac{1}{11}$ hour
 - $\frac{1}{10}$ hour
 - $\frac{5}{44}$ hour
 - $\frac{7\pi}{6}$ hour
 - 1 hour

DO YOUR FIGURING HERE.

4. If $a^2 = 9$ and $b^2 = 4$, what can $(a + b)$ *not* be equal to?

- F. -5
- G. -1
- H. 1
- J. 5
- K. None of the above.

5. $\frac{\left(\frac{4}{3}\right)}{\left(\frac{1}{3}\right)} \times \frac{3}{2} \times \frac{2}{3} + \left(\frac{1}{3}\right)^2 = ?$

- A. $\frac{4}{9}$
- B. $\frac{5}{9}$
- C. $\frac{35}{9}$
- D. $\frac{37}{9}$
- E. 4

Use the following matrices to answer questions 6 and 7

The number of people in the candy store is shown in the matrix below.

<u>Adolescents</u>	<u>Adults</u>	<u>Senior Citizens</u>
50	75	100

The ratio of people from each age group who will purchase a product to the number of people in that age group in the store is shown in the following matrix:

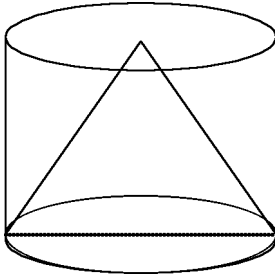
Adolescents	0.50
Adults	0.20
Senior Citizens	0.35

6. Based on the matrices, how many senior citizens will make purchases?

- F. 3.5
- G. 20
- H. 30
- J. 35
- K. 50

7. How many people in the store will make purchases?

- A. 60
- B. 67
- C. 75
- D. 85
- E. 90



8. If the above picture has a base diameter of 10 and the cone has a slant height of 10, what is the volume of the cylinder?

- F. $\sqrt{125\pi}$
- G. $\frac{125}{3}\pi\sqrt{5}$
- H. $125\frac{\sqrt{3}}{3}$
- J. $125\pi\frac{\sqrt{3}}{3}$
- K. $125\pi\sqrt{3}$

9. Solve the following system of equations:

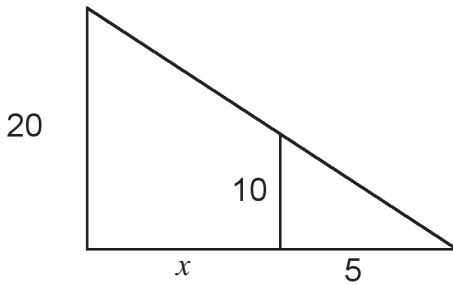
$$\begin{aligned}x + 3y &= 7 \\ 2x - 4y &= 5\end{aligned}$$

- A. $\left(0, \frac{7}{3}\right)$
- B. $\left(\frac{9}{10}, \frac{43}{10}\right)$
- C. (4, 1)
- D. $\left(\frac{43}{10}, \frac{9}{10}\right)$
- E. $\left(\frac{97}{10}, -\frac{9}{10}\right)$

DO YOUR FIGURING HERE.

10. There are 32 red marshmallows, 15 blue marshmallows, and 3 purple marshmallows left in a bowl of cereal. If a marshmallow is chosen at random from the bowl, what is the probability that the marshmallow is NOT purple?
- F. 0
G. $\frac{3}{50}$
H. $\frac{15}{50}$
J. $\frac{47}{50}$
K. 1
11. If the sine of angle A is $\frac{3}{5}$, and the cosine of angle A is $\frac{4}{5}$, what is the tangent of angle A ?
- A. .4
B. .55
C. .6
D. .75
E. .8
12. If I have 50 apples in a barrel but want to give 30% of them away, how many apples should I give away?
- F. 10 apples
G. 14 apples
H. 15 apples
J. 16 apples
K. 30 apples
13. Point $M(-2, 3)$ and point $N(-4, 7)$ are points on the coordinate plane. What is the length of the segment MN ?
- A. $-\sqrt{6}$ units
B. $\sqrt{2}$ units
C. $2\sqrt{5}$ units
D. 2 units
E. 4 units

DO YOUR FIGURING HERE.



14. What is x ? Assume triangles are similar.

- F. 1
- G. 5
- H. 10
- J. 15
- K. $5\sqrt{11}$

15. Which is the graph of the equation $x = y^2 + 2$?

- A.
- B.
- C.
- D.
- E.

END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.

15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

1. What is $(x^2)^{-3}$?
 - A. $\frac{1}{x^6}$
 - B. $\frac{1}{x^5}$
 - C. $\frac{1}{x}$
 - D. $x^{\frac{2}{3}}$
 - E. $x^{\frac{3}{2}}$

2. Expand $(4x + 2)(2x - 4)$.
 - F. $8x^2 - 12x - 8$
 - G. $8x^2 - 12x + 8$
 - H. $8x^2 + 12x - 8$
 - J. $8x^2 + 12x + 8$
 - K. None of the above

3. $9wy^4 \times 2yz \times 3$ is equivalent to
 - A. $18wyz$
 - B. $18wy^5z$
 - C. $18wy^3z$
 - D. $54wy^3z$
 - E. $54wy^5z$

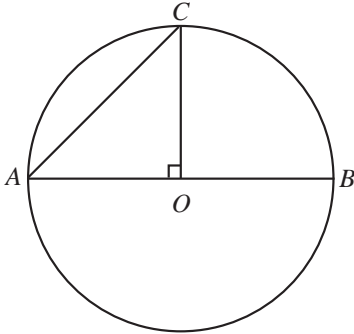
4. If ship *A* is 13 miles north and 3 miles west of the lighthouse, and ship *B* is 8 miles north and 4 miles east of the lighthouse, how many miles apart are ship *A* and ship *B*?
 - F. $\sqrt{5} + \sqrt{7}$
 - G. $\sqrt{74}$
 - H. 12
 - J. $7\sqrt{10}$
 - K. 28

DO YOUR FIGURING HERE.

5. What is $36^{\frac{3}{2}}$?
- A. 10.9
 - B. 24
 - C. 54
 - D. 216
 - E. 23,328
6. If Robert bought $6\frac{3}{8}$ yards of fabric to make a curtain requiring 3 yards of fabric and a pillowcase requiring $2\frac{5}{8}$ yards, how much fabric does he have left over?
- F. $\frac{5}{8}$ yard
 - G. $\frac{3}{4}$ yard
 - H. $\frac{7}{8}$ yard
 - J. 1 yard
 - K. Robert does not have any fabric left over.
7. Find the volume of a cube that circumscribes a sphere of circumference 3π .
- A. $\frac{8}{27}$
 - B. $\frac{27}{8}$
 - C. 9
 - D. 12
 - E. 27
8. What is the probability of rolling a prime number on a standard 6-sided die?
- F. 0
 - G. $\frac{1}{6}$
 - H. $\frac{1}{2}$
 - J. $\frac{2}{3}$
 - K. 1

DO YOUR FIGURING HERE.

9. In the circle below, chord AB passes through the center of the circle O . If the radius OC is perpendicular to chord AB and has a length of 9 centimeters, what is the length of chord AC to the nearest tenth of a centimeter?



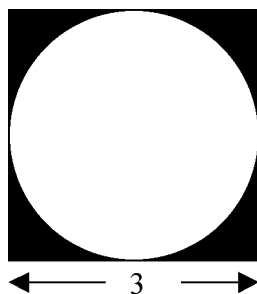
- A. 5.5
B. 9.0
C. 12.7
D. 15.6
E. 18.0
10. If $\tan x = \frac{3}{4}$, what is $\csc x$?
- F. $\frac{3}{5}$
G. $\frac{3}{4}$
H. 1
J. $\frac{4}{3}$
K. $\frac{5}{3}$
11. Mike is a fast typist. He can type 90 words per minute. How long would it take him to type 10 pages, assuming there are 540 words per page?
- A. 5 minutes
B. 17 minutes
C. 50 minutes
D. 54 minutes
E. 60 minutes

DO YOUR FIGURING HERE.

12. What is the length in meters of the diagonal of a rectangle whose dimensions are 5 meters by 10 meters?

- F. 10
- G. $5\sqrt{5}$
- H. $10\sqrt{5}$
- J. 95
- K. 125

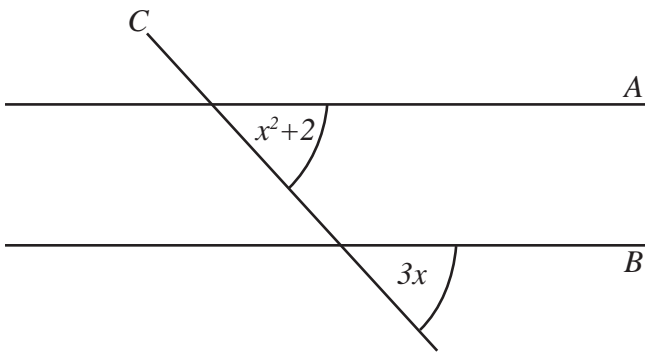
13. What is the area of the shaded region? Assume the circle is perfectly inscribed in the square.



- A. $\pi - 3$
 - B. $9 - \frac{9\pi}{4}$
 - C. π
 - D. 3π
 - E. $9\pi - 9$
14. Where does the parabola $y = -x^2 + 3$ achieve its maximum?
- F. (0,0)
 - G. (0,3)
 - H. (3,0)
 - J. (3,3)
 - K. Never reaches maximum

DO YOUR FIGURING HERE.

15. Let A and B be parallel lines cut by a transversal, C .
Find x .



- A. -2
- B. -1
- C. 1
- D. x can equal 2 or 1
- E. x can equal -1 or 1

**END OF TEST.
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15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

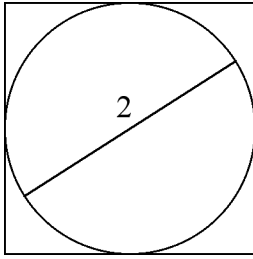
- Joe drove over the river and through the woods to his grandmother's house. For half of the distance he drove at 50 miles per hour, and for the rest of the distance he drove at 30 miles per hour. What was his average speed for the whole trip?
 - 35 miles per hour
 - 37.5 miles per hour
 - 40 miles per hour
 - 42.5 miles per hour
 - 45 miles per hour
- What is the full solution to $x^2 + 3 > 12$?
 - $x > 3$
 - $x < 3$
 - $x > -3$
 - $x < -3$
 - $|x| > 3$
- When is $\frac{x}{x^3 - 3x}$ positive for $x > 0$?
 - $x < -\sqrt{3}$
 - $-\sqrt{3} < x < \sqrt{3}$
 - $x > \sqrt{3}$
 - Not positive anywhere
 - Positive everywhere
- Where does the graph of $y = x^2 + 2$ intersect the graph of the line $x = -10$?
 - $(-10, 102)$
 - $(98, -10)$
 - $(-10, -98)$
 - $(102, -10)$
 - Never

DO YOUR FIGURING HERE.

5. If $16^{2x+3} = 2^{3x+2}$, then $x =$?
- A. -2
 - B. -1
 - C. 0
 - D. 1
 - E. 2
6. In a right triangle, the cotangent of one of the angles $= \sqrt{3}$. If the shorter leg has length $6\sqrt{3}$, what is the length of the hypotenuse?
- F. 9
 - G. $9\sqrt{3}$
 - H. 12
 - J. $12\sqrt{3}$
 - K. 16
7. Which of the following is not an integer if $x = 2$?
- A. x
 - B. x^2
 - C. x^5
 - D. x^{-2}
 - E. $\frac{1}{x^{-3}}$
8. The advance ticket price for a football game is \$60. The game-day price is 25% more. If Johnny uses a coupon for 15% off the game-day price to purchase a ticket on the day of the game, how much does he pay?
- F. \$38.25
 - G. \$51.00
 - H. \$63.75
 - J. \$66.00
 - K. \$68.00

DO YOUR FIGURING HERE.

9. What is the area of the square if the diameter of the inscribed circle is 2?



- A. 2
B. π
C. 4
D. 2π
E. 4π
10. What is the surface area of a sphere perfectly inscribed in a cube of volume 8 m^3 ?
- F. $\pi \text{ m}^2$
G. $4\pi \text{ m}^2$
H. $16\pi \text{ m}^2$
J. $32\pi \text{ m}^2$
K. $64\pi \text{ m}^2$
11. If a square has an area of 100 square units, what is the area of a circle with the same perimeter as the square?
- A. 10π
B. $\frac{100}{\pi}$
C. 100
D. $\frac{400}{\pi}$
E. 100π
12. At the dance there are 6 females to every 4 males.
If there is a total of 80 males at the dance, how many females are present?
- F. 120
G. 150
H. 240
J. 320
K. 480

DO YOUR FIGURING HERE.

13. One solution to the equation $x^2 - 13x = 30$ is:
- A. -15
 - B. 0
 - C. 2
 - D. 15
 - E. 30
14. Stacy has 7 distinct tops, 3 distinct skirts, and 4 distinct hair ribbons in her closet that fit the school uniform code. How many distinct outfits are available if an outfit consists of one top, one skirt, and one ribbon?
- F. 4
 - G. 7
 - H. 28
 - J. 84
 - K. Cannot be determined by the given information
15. The chart below shows the percentages of Cindy's budget expenses by category. The remainder of the budget will be placed in the category of Miscellaneous. If this data is put into a circle graph, what will be the measure of the central angle of the Miscellaneous wedge, rounded to the nearest degree?

Budget Category	Percentage of Budget
Movies	25
CDs	36
Clothes	14

- A. 25
- B. 32
- C. 45
- D. 75
- E. 90

**END OF TEST.
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15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

- Solve for x in the following equation:
 $ax - by + cxy = z$, with $a \neq cy$.
 - $\frac{a + cy}{z + by}$
 - $\frac{z + by}{a + cy}$
 - $\frac{a + cy}{z - by}$
 - $\frac{z + by}{a - cy}$
 - $\frac{z - by + cy}{a}$
- If $x^4 = 256$, and $\sqrt{x} - 3x^3$ is a real number, then what is $\sqrt{x} - 3x^3$?
 - 1726
 - 1724
 - 190
 - 188
 - 100
- Find the median of the following set of numbers:
1, 2, 4, 5, 3, 7, 4.5, 2, 1, 6, 7, 43.
 - 4
 - 4.25
 - 4.5
 - 1, 2, 7
 - 7.125

4. If $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$ and $\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$, what does $\frac{1}{\sqrt{8}}$ equal?

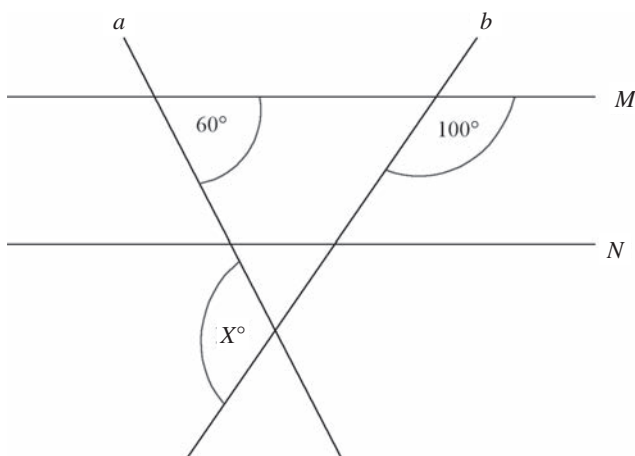
F. $\frac{\sqrt{2}}{2}$

G. $\frac{\sqrt{2}}{4}$

H. $\frac{\sqrt{1}}{8}$

J. All of the above

K. None of the above



5. In the figure above, lines M and N are parallel. Lines a and b intersect lines M and N at the angles marked. What is X ?

A. 110

B. 120

C. 130

D. 140

E. 150

6. A new truck costs \$25,000. If it loses value at the rate of 15% the first year, and 10% each year after that, how much is it worth, to the nearest dollar, in three years?

F. \$15,491

G. \$16,250

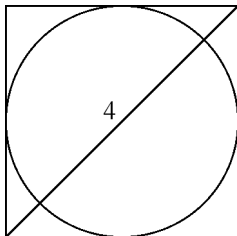
H. \$17,213

J. \$18,750

K. \$19,125

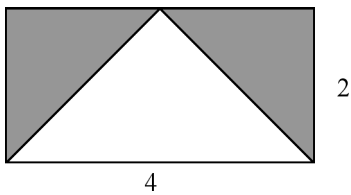
DO YOUR FIGURING HERE.

7. What is the next term in the sequence $i, -1, -i, 1,$
if $i = \sqrt{-1}$?
- A. i
 - B. $-i$
 - C. -1
 - D. 1
 - E. Impossible to determine
8. Mr. Peabody was walking his dog in the park when he spied his friend Mr. Fitzgerald 600 feet away. If Mr. Peabody walked toward Mr. Fitzgerald at 6 feet per second, Mr. Fitzgerald walked toward Mr. Peabody at 9 feet per second, and the dog dashed back and forth from one man to the other at 12 feet per second, how far did the dog run by the time the friends met?
- F. 480 feet
 - G. 600 feet
 - H. 840 feet
 - J. 1,000 feet
 - K. 1,280 feet

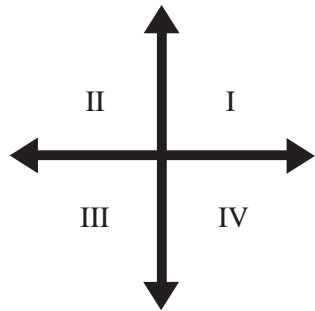


9. What is the area of a circle inscribed in a square with diagonal of length 4?
- A. $\frac{\pi}{4}$
 - B. $\frac{\pi}{2}$
 - C. π
 - D. 2π
 - E. 16π

DO YOUR FIGURING HERE.



10. What is the area of the unshaded region above? Assume that the unshaded region makes an isosceles triangle.
- F. 1
 - G. 2
 - H. 4
 - J. 6
 - K. 8
11. The standard coordinate plane is shown below, with the four quadrants labeled. Point R , denoted by $R(x, y)$ is graphed on this plane, such that $x \neq 0$ and $y \neq 0$.



If the product of x and y is a negative number, then the point R is located in which quadrant?

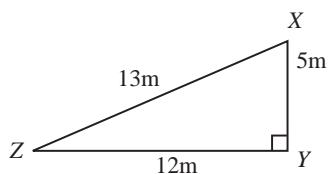
- A. Quadrant IV only
 - B. Quadrant II only
 - C. Quadrant III only
 - D. Quadrants I or III only
 - E. Quadrants II or IV only
12. Which of the following equations is equivalent to $y = \frac{5}{4}x - 16$?
- F. $-4x + 5y = 64$
 - G. $\frac{4}{5}x + y = 16$
 - H. $5x - 4y = 64$
 - J. $5x + 4y = 16$
 - K. None of the above

DO YOUR FIGURING HERE.

13. Marcia has a bowl containing 15 red candies, 30 brown candies, 20 green candies, and 25 yellow candies. How many more green candies must be added to the bowl in order for there to be a $\frac{1}{5}$ probability that Marcia will randomly pluck a yellow candy from the bowl?

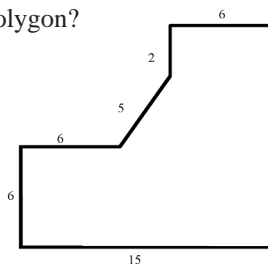
- A. 15
- B. 20
- C. 25
- D. 30
- E. 35

14. Given the right triangle $\triangle XYZ$ below, what is the cosine of angle Z?



- F. $\frac{5}{13}$
- G. $\frac{5}{12}$
- H. $\frac{12}{13}$
- J. $\frac{13}{12}$
- K. $\frac{12}{5}$

15. In the figure below, each corner of the polygon that looks like a right angle is a right angle. What is the area of the polygon?



- A. 48
- B. 90
- C. 100
- D. 132
- E. 138

**END OF TEST.
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15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

1. $\frac{1}{3} + \frac{3}{4} - \frac{\left(\frac{1}{3}\right)}{\left(\frac{3}{4}\right)} + \frac{1}{3} \times \frac{3}{4} = ?$

A. 0

B. $\frac{8}{9}$ C. $\frac{12}{13}$ D. $\frac{13}{12}$ E. $\frac{9}{8}$

2. Expand $(2x - 7)(3x + 4)$.

F. $6x^2 - 13x + 28$ G. $6x^2 - 13x - 28$ H. $6x^2 - 28$ J. $5x - 3$

K. None of the above

3. A group of students planned a trip. As they discussed their plans, the group grew by 50%, to a total of 300 students. When they found out how much the trip would cost, many of the students realized that they could not go on the trip, and only 45% of the original group ended up actually taking the trip. How many students went on the trip?

A. 9

B. 90

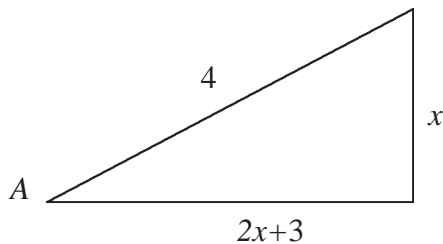
C. 202.5

D. 270

E. 900

DO YOUR FIGURING HERE.

4. The dimensions of a right triangle are shown in the diagram below. What is the cotangent of angle A?



- F. $\frac{x}{4}$
- G. $\frac{2x+3}{4}$
- H. $\frac{x}{2x+3}$
- J. $\frac{4}{2x+3}$
- K. $\frac{2x+3}{x}$
5. Kelly drew a picture on an 8-inch by 10-inch piece of paper. She attached it to a larger piece of paper so that a 2-inch border showed on all sides of the picture. What was the area of the border, in square inches?
- A. 40
- B. 64
- C. 88
- D. 120
- E. 168
6. What is the equation of the line containing the points (1,2) and (3,3)?
- F. $y = \frac{1}{2}x + \frac{3}{2}$
- G. $y = \frac{1}{2}x - \frac{3}{2}$
- H. $y = -\frac{1}{2}x + \frac{2}{3}$
- J. $y = -\frac{1}{2}x - \frac{2}{3}$
- K. $y = \frac{1}{2}x$

DO YOUR FIGURING HERE.

7. Assume you have 5 red marbles, 5 green marbles, and 10 blue marbles. What is the probability that you will pull one red marble, one green marble, and one blue marble, in that order, in 3 draws, with replacement?

- A. 0
 B. $\frac{1}{32}$
 C. $\frac{1}{16}$
 D. $\frac{3}{16}$
 E. $\frac{1}{2}$

8. Simplify the following expression: $\frac{xy^2z^3w}{x^4y^6z}$.

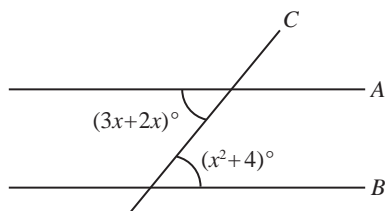
- F. $\frac{x^3y^4}{z^2w}$
 G. $z^2wx^3y^4$
 H. $\frac{z^2w}{x^3y^4}$
 J. $\frac{wxyz^7}{xyz^{11}}$

- K. None of the above

9. What is the value of $25^{\frac{3}{2}}$?

- A. 1
 B. 5
 C. 8.55
 D. 25
 E. 125

10. Assume A and B are parallel lines, and C is a transversal to A and B . What is a possible value for x ?



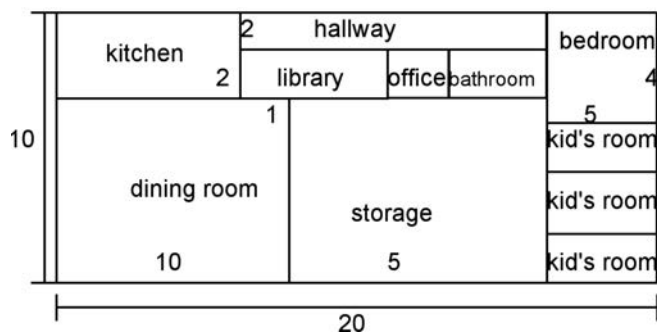
- F. -16
 G. -12
 H. 3
 J. 4
 K. 11

DO YOUR FIGURING HERE.

11. What is the length of an arc of a circle of radius 3, if the arc has a central angle of 70° ?

- A. $\frac{7\pi}{60}$
- B. $\frac{7\pi}{30}$
- C. $\frac{7\pi}{12}$
- D. $\frac{7\pi}{6}$
- E. Impossible to determine

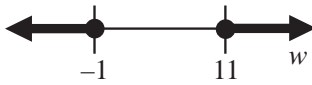
12. What percentage of the area of the house do the hallway, kitchen and dining room take up?



- F. 25%
 - G. 35%
 - H. 50%
 - J. 54%
 - K. 55%
13. For \$60, Henrietta bought a basket that was marked down 70% from its original price. She sold it on eBay for 20% more than its original price. For what price did she sell it?
- A. \$24
 - B. \$200
 - C. \$240
 - D. \$300
 - E. \$400

DO YOUR FIGURING HERE.

14. The following graph is the graph of which of these inequalities?



- F. $|w - 5| \geq 6$
G. $|w - 5| \leq 6$
H. $|w - 6| \geq 5$
J. $|w - 6| \leq 5$
K. $|w + 5| \geq 2$
15. To convert a temperature in degrees Celsius to degrees Fahrenheit, use the formula $F = \frac{9}{5}C + 32$, where C is the degrees Celsius and F is the degrees Fahrenheit. What temperature, to the nearest degree Celsius, equals a temperature of 59 degrees Fahrenheit?
- A. 15
B. 27
C. 49
D. 51
E. 138

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

1. If you walk $1\frac{1}{2}$ miles every day, how many days would it take to walk 15 miles?

- A. 5 days
- B. 10 days
- C. 14 days
- D. 22.5 days
- E. 30 days

2. Simplify completely: $\frac{\sqrt{5} + \sqrt{10}}{\sqrt{10} - \sqrt{5}} \times \frac{\sqrt{10} + \sqrt{5}}{\sqrt{10} + \sqrt{5}} = ?$

- F. 1
- G. $3 + 2\sqrt{2}$
- H. $\frac{2\sqrt{50}}{\sqrt{10}}$
- J. $\frac{15}{\sqrt{5}}$
- K. $\frac{15 + 2\sqrt{50}}{5}$

3. If $A = \frac{1}{2}x^2$ and $B = 3x + 5y$, $AB = ?$

- A. $\frac{1}{2}(3x^2 + 5y)$
- B. $\frac{1}{2}x^3(3 + 5xy)$
- C. $\frac{3}{2}x^3 + \frac{5}{2}x^2y$
- D. $\frac{1}{2}x^2y + \frac{3}{2}x^3$
- E. $4x^3y$

DO YOUR FIGURING HERE.

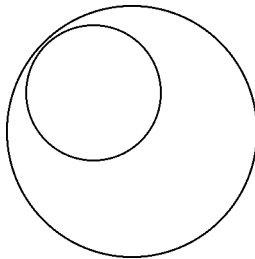
4. A high school has a graduating class of 150. Of these 150, $\frac{2}{3}$ are going to college, $\frac{1}{6}$ are going straight into the work force, and the rest are unsure. What percent of the class is unsure about what they are going to do after high school?

- F. 16.7
- G. 33.3
- H. 25
- J. 66.7
- K. 100

5. A school district pays its employees based on their experience. Every 10 years their salary increases by 30% of their starting salary. If an employee starts out making \$25,000 per year, how long would it take him to earn an annual salary of \$40,000?

- A. 10 years
- B. 15 years
- C. 20 years
- D. 25 years
- E. 30 years

6. In the following picture, the smaller circle has a radius of 1. What is the perimeter of the square that would perfectly circumscribe the larger circle? Assume the smaller circle's diameter is the radius of the larger circle.

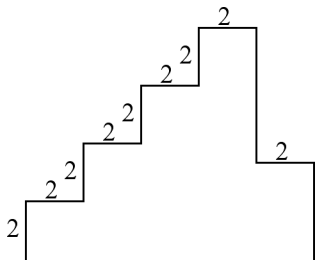


- F. 4
- G. 8
- H. 12
- J. 16
- K. 20

DO YOUR FIGURING HERE.

7. Jerry, George, and Elaine are taking the ACT. If the three of them average 30 or better, Kramer will take the ACT and all four will go to college to become actors in a sitcom. If George scores a 23 and Elaine scores a 34, what is the smallest score that Jerry needs in order to ensure that Kramer takes the ACT?
- A. 32
 - B. 33
 - C. 34
 - D. 35
 - E. 36

8. What is the perimeter of the following figure? Assume all corners are right angles.



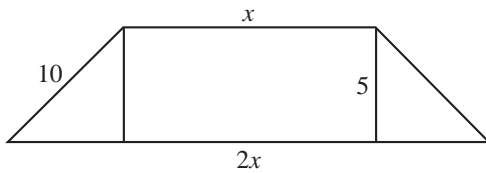
- F. 18
 - G. 26
 - H. 28
 - J. 32
 - K. 36
9. What is the least common multiple of 2,160 and 810?
- A. 1
 - B. 270
 - C. 2,160
 - D. 6,480
 - E. 1,749,600
10. In a convex 7-sided polygon, how many diagonals can be drawn?
- F. 12
 - G. 14
 - H. 21
 - J. 42
 - K. 49

DO YOUR FIGURING HERE.

11. What is the length of the line segment between the points $(1, \sqrt{2})$ and $(\sqrt{7}, 10)$?

- A. $\sqrt{110 - 2\sqrt{7} - 20\sqrt{2}}$
 B. $\sqrt{110 - 20\sqrt{7} - 2\sqrt{2}}$
 C. $\sqrt{110 + 2\sqrt{7} - 20\sqrt{2}}$
 D. $\sqrt{110 + 2\sqrt{7} + 20\sqrt{2}}$
 E. $\sqrt{110 - 20\sqrt{7} + 2\sqrt{2}}$

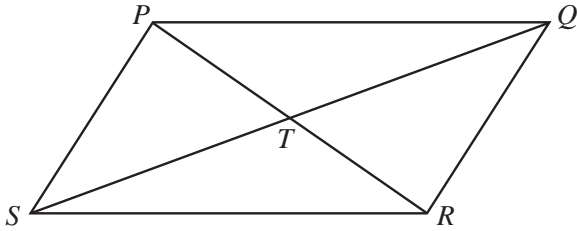
12. Given the area of the following trapezoid is 50, what is x ?



- F. $\frac{5}{3}$
 G. $\frac{5}{2}$
 H. $\frac{10}{3}$
 J. 5
 K. $\frac{20}{3}$
13. For x such that $0^\circ < x < 90^\circ$, the expression $\frac{\sin^2 x}{1 - \sin^2 x}$ can be simplified to what?
- A. $\sin^2 x - 1$
 B. $\frac{1}{(\sin^2 x)(\cos^2 x)}$
 C. $\tan^2 x$
 D. $\sin^2 x - \cos^2 x$
 E. 1
14. If $m = -(n + 7)$, then $(m + n)^3 = ?$
- F. -343
 G. -49
 H. 49
 J. 343
 K. Cannot be determined

DO YOUR FIGURING HERE.

15. In the figure below, \overline{PS} is parallel to \overline{QR} , and \overline{PR} intersects \overline{SQ} at point T . If the measure of angle PST is 35° , and the measure of angle QRT is 85° , then what is the measure of angle PTQ ?



- A. 10°
- B. 40°
- C. 120°
- D. 180°
- E. 280°

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
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15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

DO YOUR FIGURING HERE.

1. What is $(-1) + [3 - (-1)](-3)$?
 - A. -13
 - B. -11
 - C. 10
 - D. 11
 - E. 13
2. To which of the following is the expression $5x + 30y$ equivalent?
 - F. $5(x + 6y)$
 - G. $6(5y + x)$
 - H. $35(x + y)$
 - J. $35xy$
 - K. $35(xy)^2$
3. Kix's Pix Photography Studio charges a sitting fee plus a fixed cost per sheet of photographs purchased. If the sitting fee plus 5 sheets of photographs costs \$65, and the sitting fee plus 8 sheets of photographs costs \$80, how much does the sitting fee plus 12 sheets of photographs cost?
 - A. \$95
 - B. \$100
 - C. \$120
 - D. \$144
 - E. \$156

DO YOUR FIGURING HERE.

4. At what point do the lines $-3x + 2y = -3$ and $y = 10x - 4$ intersect?

F. $\left(-\frac{5}{17}, -\frac{18}{17}\right)$

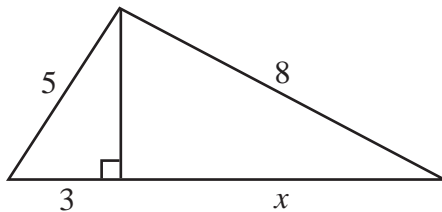
G. $\left(-\frac{5}{17}, \frac{18}{17}\right)$

H. $\left(\frac{5}{17}, -\frac{18}{17}\right)$

J. $\left(\frac{18}{17}, -\frac{5}{17}\right)$

K. $\left(\frac{18}{17}, \frac{5}{17}\right)$

5. Find the value of x in the diagram below.



- A. $\sqrt{3}$
B. $4\sqrt{3}$
C. $3 + \sqrt{21}$
D. $4\sqrt{5}$
E. 12

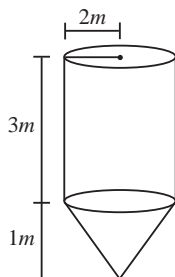
6. At Petunia's Pancake Palace, all pancakes must be made with thickness T , measured in centimeters, such that $|T - 1| \leq .2$. What is the thickness of the thinnest acceptable pancake at Petunia's Pancake Palace?

- F. 0.2 cm
G. 0.4 cm
H. 0.6 cm
J. 0.8 cm
K. 1.0 cm

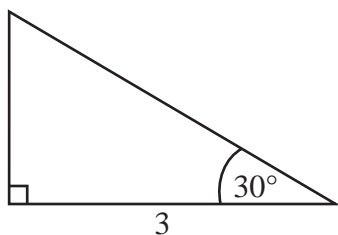
DO YOUR FIGURING HERE.

7. What is the union of the set of positive integers and the set of negative integers?
- A. The set of real numbers
 - B. The set of integers
 - C. The set of integers except 0
 - D. The set of rational numbers
 - E. The set of irrational numbers
8. To celebrate President's Day, a department store reduced the price of a certain line of clothes by 25%. A month later, the store reduced the price by an additional 10% and marked the clothes "Clearance." If the price of an item of the clothes originally was \$95, what was the clearance price?
- F. \$61.75
 - G. \$64.13
 - H. \$70.00
 - J. \$71.25
 - K. \$85.50
9. What is the 500th term in the sequence in which the first four terms are a , ab , ab^2 , ab^3 ?
- A. $a^{499}b$
 - B. ab^{500}
 - C. $(ab)^{499}$
 - D. ab^{499}
 - E. $(ab)^{500}$

10. What is the volume of the following figure?



- F. $6\pi m^3$
 G. $\frac{20\pi}{3} m^3$
 H. $12\pi m^3$
 J. $16\pi m^3$
 K. $\frac{40\pi}{3} m^3$
11. What is the perimeter of the triangle in the following diagram?



- A. $3 + 2\sqrt{2}$
 B. $3 + \frac{3\sqrt{3}}{2}$
 C. $3 + \frac{2\sqrt{2}}{3}$
 D. $3 + 3\sqrt{3}$
 E. $3 + 4\sqrt{2}$
12. Three workers can complete 4 jobs in 5 days. In how many days can 6 workers complete 7 jobs, if all the workers work at the same rate?
- F. 4
 G. $\frac{35}{8}$
 H. $\frac{40}{7}$
 J. $\frac{70}{9}$
 K. 8

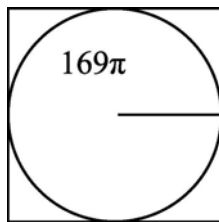
DO YOUR FIGURING HERE.

13. If $g = 2f + 17$ and $h = 14f - 42$, what is g in terms of h , in the most simplified form?

- A. $g = h\left(\frac{2f+17}{14f-42}\right)$
 B. $g = \frac{42h}{14}$
 C. $g = \frac{h}{7} - 25$
 D. $g = \frac{h}{7} + 23$
 E. $g = \frac{h}{7} + 25$

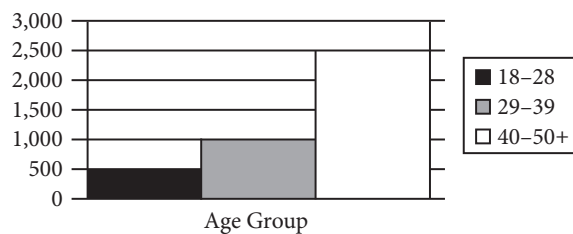
14. In the figure below, the sides of the square are tangent to the inner circle. If the area of the circle is 169π square units, what is the length of a side of the square?

- F. 13
 G. 26
 H. 84
 J. 169
 K. 13π



15. The bar graph below shows the number of people who voted in the presidential election in Boone County, separated into age groups. According to the graph, what fraction of the voters were over 28?

Number of Presidential Election Voters, by Age



- A. $\frac{1}{8}$
 B. $\frac{1}{4}$
 C. $\frac{3}{8}$
 D. $\frac{5}{8}$
 E. $\frac{7}{8}$

**END OF TEST.
 DO NOT TURN PAGE UNTIL TOLD
 TO DO SO.**

15 Minutes – 15 Questions

Directions: Do not spend too much time on difficult questions. Calculators are permitted. Do not assume that figures are drawn to scale. The word *average* refers to the arithmetic *mean*.

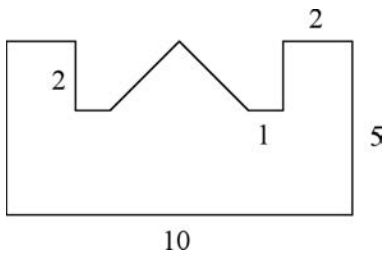
DO YOUR FIGURING HERE.

1. If Bill has test scores of 80%, 90%, 90%, 75%, and 99%, what score would he need on his last test to average exactly 88% overall?
 - A. 100%
 - B. 95%
 - C. 94%
 - D. 88%
 - E. 70%
2. What is the intersection of the set of all prime numbers with the set of all even numbers?
 - F. 0
 - G. 1
 - H. 2
 - J. 4
 - K. ∞
3. If the diameter of a circle is the hypotenuse of a 45-45-90 triangle with legs of length 1, what is the area of the circle?
 - A. $\frac{\pi}{4}$
 - B. $\frac{\pi}{3}$
 - C. $\frac{\pi}{2}$
 - D. $\frac{\pi\sqrt{2}}{2}$
 - E. $\pi\sqrt{2}$

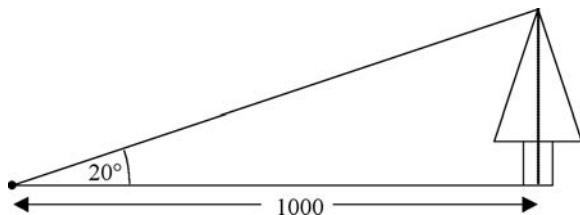
4. Which of the following systems has the point $(-5, -8)$ as a solution?

- F. $y = x + 2$
 $2y = 2x + 4$
- G. $y = x + 2$
 $2y = 2x - 4$
- H. $y = x - 2$
 $2y = 2x + 4$
- J. $2y = x + 3$
 $y = x + 6$
- K. $y = x - 3$
 $y = 3x + 7$

5. What is the perimeter of the following polygon?
Assume it is symmetric about a vertical axis, and that the angles that look like right angles are right angles.



- A. $26 - 4\sqrt{2}$
- B. $30 - 4\sqrt{2}$
- C. $26 + 4\sqrt{2}$
- D. $30 + 4\sqrt{2}$
- E. $30 + 4\sqrt{5}$
6. A line from the top of a tree, and a line from a point directly below the top of the tree, intersect at a 20° angle at a point which is 1000 feet from the point directly below the top of the tree. How tall is the tree?

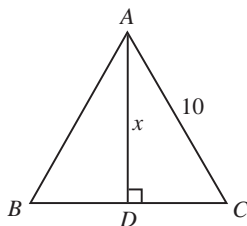


- F. $1000 (\cos 20^\circ)$ feet
- G. $1000 (\cot 20^\circ)$ feet
- H. $1000 (\sec 20^\circ)$ feet
- J. $1000 (\sin 20^\circ)$ feet
- K. $1000 (\tan 20^\circ)$ feet

DO YOUR FIGURING HERE.

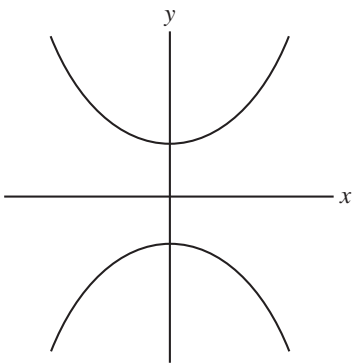
7. Hannah, David, and Peter each chose a number. Hannah's number was 30% more than David's, and Peter's number was 40% less than Hannah's. What percent of David's number was Peter's number?
- A. 42%
B. 52%
C. 78%
D. 94%
E. 120%
8. Paul goes to the store with \$15 to buy groceries. He buys 2 pounds of bananas at \$2.95 a pound, 2 gallons of milk at \$3.29 a gallon, and a candy bar for \$.72. If there is a 6% sales tax, how much money will Paul have left over? Round to the nearest cent.
- F. \$0.79
G. \$1.00
H. \$1.01
J. \$1.02
K. He would have no money left.
9. If $f(x) = x^2$, what is $\frac{f(x+h) - f(x)}{h}$?
- A. $2x - h$
B. $2x + h$
C. 1
D. h
E. 0

10. Given equilateral triangle ABC with segment AD the perpendicular bisector of segment BC , find x .



- F. 5
G. $3\sqrt{5}$
H. $5\sqrt{3}$
J. 10
K. $10\sqrt{3}$

11. What conic section does the graph below represent?



- A. A parabola
B. A hyperbola
C. A circle
D. An ellipse
E. A line
12. The ratio of the sides of two squares is 4:5. What is the ratio of the perimeters of these squares?
- F. 1:2
G. 1:5
H. 4:5
J. 25:20
K. 16:25
13. What are the coordinates of the reflection of the point (r, s) over the x -axis, if $r, s > 0$?
- A. $(-r, s)$
B. $(-r, -s)$
C. $(s, -r)$
D. $(r, -s)$
E. $(-s, r)$

DO YOUR FIGURING HERE.

14. Lucy is 4 times as old as Dan was 2 years ago. In 2 years, Lucy will be twice as old as Dan will be then. How old is Lucy now?

F. 4
G. 8
H. 12
J. 16
K. 20

15. The volume of a sphere is calculated by the formula $V = \frac{4}{3}\pi r^3$. If the circumference of a sphere is 10π inches, what is the approximate volume of the sphere in cubic inches?

A. 65
B. 104
C. 524
D. 2246
E. 4189

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
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8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

PROSE FICTION. This passage is taken from *Heart of the Sunset*, by Rex Beach
1915 Harper and Brothers

1 Alaire Austin slept badly. The day’s hardships had left their traces. The toxins of fatigue not only poisoned her muscles with aches and pains, but drugged her brain and rendered the night a long succession of tortures, during which she experienced, for a second time, the agonies of thirst, fatigue and despair. Extreme physical ordeals, like profound emotional upheavals, leave imprints upon the brain, and while the body may recover quickly, it often requires considerable time to rest exhausted nerves. The finer the nervous organism, the slower is the process of recuperation. Like most normal women, Alaire had a surprising amount of endurance, both nervous and muscular, but, having drawn heavily against her reserve force, she paid the penalty. During the early hours of the night, she slept hardly at all, and as soon as her bodily discomfort began to decrease, her mind became unruly. Twice she rose and limped to the water-hole for a drink, and it was not until nearly dawn that she dropped off into complete unconsciousness. She was awakened by a sunbeam, which pierced her leafy shelter and, with hot touch, explored her upturned face.

It was still early; the sun had just cleared the valley’s rim and the ground was damp with dew. Somewhere nearby, an unfamiliar bird was sweetly trilling. Alaire listened dreamily until the bird-carol changed to the air of a familiar cowboy song; then, she sat up, queerly startled.

Meanwhile, David Law was watering his horse, grooming the animal with a burlap cloth. Such attention was unusual in a stock country where horses run wild, but this horse, Mrs. Austin saw, justified unusual care. It was a beautiful blood-bay mare, and as the woman looked, it lifted its head, then with wet, trembling muzzle, caressed its owner’s cheek. Undoubtedly, this attention was meant for a kiss, and was as daintily conferred as any woman’s favor. It brought a reward in a lump of sugar. There followed an exhibition of equine

delight; the mare’s lips twitched, her nose wrinkled ludicrously, she stretched her neck and tossed her head as the sweetness tickled her palate. Even the nervous switching of her tail was eloquent of pleasure. Meanwhile, the owner showed his white teeth in a smile.

“Good morning,” said Mrs. Austin.

Law lifted his hat in a graceful salute as he approached around the edge of the pool, his spurs jingling musically. The mare followed.

The ranger smiled pleasantly. “Now, you just rest yourself, ma’am.”

He would not permit her to help with the breakfast, so she lay back, enjoying the luxury of her hard bed and watching her host, whose personality, now that she saw him by daylight, had begun to challenge her interest. Of late years, she had purposely avoided men, and circumstances had not permitted her to study those few she had been forced to meet; but now that fate had thrown her into the company of this stranger, she permitted some play to her curiosity.

Physically, Law was of an admirable make—considerably over six-feet in height, with wide shoulders and lean, strong limbs. Although his face was schooled to mask all but the keenest emotions, the deftness of his movements was eloquent, betraying that complete muscular and nervous control, which comes from life in the open. A pair of blue-gray, meditative eyes, with a whimsical fashion of wrinkling half-shut when he talked, relieved a countenance that otherwise would have been a trifle grim and somber. The nose was prominent and boldly arched, the ears large and pronounced and standing well away from the head; the mouth was thin-lipped and mobile. Alaire tried to read that bronzed visage, with little success, until she closed her eyes and regarded the mental image. Then, she found the answer: Law had the face and the head of a hunter. The alert ears, the watchful eyes, the predatory nose were like those of some hunting animal. Yes, that was decidedly the strongest impression

he gave. And yet, in his face, there was nothing animal, in a bad sense. Certainly it showed no grossness. The man was wild and untamed, rather than sensual, and despite his careless use of the plains vernacular, he
80 seemed to be rather above-the-average in education and intelligence. At any rate, without being stupidly tongue-tied, he knew enough to remain silent when there was nothing to say, and that was a blessing, for Mrs. Austin, herself, was not talkative and idle chatter distressed her.

85 On the whole, when Alaire had finished her analysis, she rather resented the good impression Law had made upon her, for, on general principles, she chose to dislike and distrust men.

1. Alaire's feelings toward Law can be best described as:
 - A. general indifference
 - B. uncomfortable fondness
 - C. mild disgust
 - D. exceptional annoyance
2. In line 61, the word "keenest" most closely signifies:
 - F. most intelligent
 - G. most indignant
 - H. most ardent
 - J. most intriguing
3. From this passage, we can deduce that Alaire's current situation:
 - A. reaffirms her dependency on others.
 - B. challenges her preconceptions about men.
 - C. demonstrates the careless nature of her caretaker.
 - D. convinces her of her own weakness.
4. The statement in line 78, that Law was "untamed, rather than sensual," insinuates that:
 - F. his wild past has prohibited romantic relationships.
 - G. he remains untouched by society, which makes him attractive.
 - H. his rugged nature originates from a lack of female guidance.
 - J. he is undomesticated, as opposed to sexually attractive.
5. From the third paragraph, we know that:
 - A. Law cares for his horse, because she is his only means of transportation.
 - B. Law is fond of his horse, because of the animal's conformation.
 - C. Alaire believes the attention Law bestows upon his horse is due to the animal's exceptional beauty.
 - D. Law has chosen to bond with his horse, rather than form relationships with people.

6. The first paragraph suggests that Alaire:
 - F. has reacted typically to an extreme drain on her endurance.
 - G. is corporally weaker than most women.
 - H. experiences more mental suffering than physical exhaustion.
 - J. endures mental exhaustion, as a result of her physical pain.
7. According to Alaire's description:
 - I. Law is not overly communicative.
 - II. Law does not readily convey his emotions.
 - III. Law's face reflects something animal, in a bad sense.
 - IV. Law is physically admirable and robust.
 - A. I, II, III, and IV
 - B. I, II, and III
 - C. I, II, IV
 - D. II, III, and IV
8. From the passage, it is reasonable to infer that:
 - F. Alaire's prejudice against men causes her to avoid speaking with Law.
 - G. Alaire's curiosity about Law motivates her to observe him carefully.
 - H. Alaire concludes that Law is astonishingly different from any other man she has known.
 - J. because of Alaire's past experiences with men, she prefers a man who rarely speaks.
9. Lines 79–81 ("despite his careless use of the plains vernacular, he seemed to be rather above-the-average in education and intelligence") signify that:
 - A. Law is wild and untamed, but also intellectually gifted.
 - B. Law's education was squandered when he chose the life of a ranger.
 - C. although he speaks with incorrect grammar, Law has achieved higher education.
 - D. Law appears bright, although his vernacular suggests otherwise.
10. In line 83–84, ("Mrs. Austin, herself, was not talkative, and idle chatter distressed her"), it can be assumed that:
 - F. Alaire dislikes anyone who speaks more than she.
 - G. it is difficult for Alaire to acknowledge the views of others, so she prefers to avoid discussions.
 - H. Alaire does not appreciate meaningless conversation.
 - J. Alaire becomes mentally fatigued from vigorous discussions, and, therefore, avoids them.

END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
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8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

SOCIAL SCIENCE: This passage is adapted from a book titled *Mutual Aid: A Factor in Evolution*, by Petr Kropotkin.

1 In the late 19th and early 20th centuries, Charles Darwin’s followers popularized a skewed conception of one of his fundamental evolutionary principles—the “struggle for existence.” Darwin’s basic idea was that
5 some individuals survived, while others perished, and those who survived passed on their characteristics to future generations. This assertion was interpreted by many as justifying all-out war between individuals. Biologists, economists, and social scientists raised the
10 “pitiless” struggle for personal advantage to the height of a biological and social principle, to which human kind must submit, if they are to avoid extinction. Even the most authoritative Darwinians did their best to maintain this misinterpretation. The biologist, Thomas Huxley,
15 wrote that among early humans “the weakest and stupidest went to the wall, while the toughest and shrewdest ...survived... [War] of each, against all, was the normal state of existence.” Unhappily, this understanding of Darwin remains popular to this day.

20 It may be remarked at the outset that Huxley’s view of nature had little claim to be taken as scientific deduction. When we study animal and human behavior closely, we at once perceive that—though there is widespread warfare—there is even more mutual support. We see
25 when we look objectively upon the struggle for existence under both its aspects—as a biological principle and as a metaphor for the human condition—an abundance of facts supporting mutual aid as its most successful outcome.

30 Observing an ants’ nest, we not only see that every description of work—rearing of progeny, foraging, building, and so on—is performed according to the principle of voluntary cooperation. We also recognize that the fundamental feature of life among ants is the obligation for every ant to share its food. If two ants, belonging to the same nest, approach each other and one is hungry or thirsty, a request for food will be made. The individual ant thus requested never refuses; it immediately

offers up food to the hungry ant. If an ant that has food
40 refuses to feed a comrade, it will be treated as an enemy. However terrible the wars between different species, mutual aid and self-sacrifice within the community, for the common welfare, are the rule. If we knew no other facts from animal life than what we know about the ants, we
45 might safely conclude that mutual aid is infinitely more important than mutual struggle in the evolution of species.

There are as many examples of this principle among mammals as among the lower forms of life. One of the more touching illustrations can be found in the prairie
50 dog villages of the American West. Heaps of earth abound and on each of them a prairie dog stands, engaged in a lively conversation with its neighbors by means of short barks. As soon as the approach of a predator is signaled, all plunge into their dwellings. But, if
55 the danger is over, the little creatures soon reappear. Whole families come out of their galleries and indulge in play. The young ones worry one another and display their gracefulness in standing upright, while the old ones keep watch. They visit one another, and the beaten foot-
60 paths, which connect their heaps, testify to the frequency of the visitations. Huxley’s ruthless “war of each against all” seems not to exist; the mutual dependence that pervades and protects prairie dog life would evaporate under such conditions.

65 That a social network is the most powerful weapon in the “struggle for life” is illustrated by any number of examples—both animal and human. Indeed, Darwin, himself, foresaw that the term he was introducing would lose its philosophical and its only true meaning, if it
70 were to be used in its narrow sense only—that of a struggle between separate individuals for the sheer means of existence. He pointed out how, in numberless animal societies, the struggle between individuals for the means of existence disappears and is replaced by cooperation,
75 and how that substitution results in the development of faculties, which secure the best conditions for survival. He argued that in such cases the fittest are not the physically strongest, but those who learn to cooperate and mutually support each other, strong and weak alike, for

80 the welfare of the community. “Those communities,” he wrote, “which included the greatest number of the most sympathetic members, would flourish best, and rear the greatest number of offspring.” The term “struggle for existence” thus lost its narrowness in the mind of one
85 who knew Nature. It is indeed regrettable that these remarks, which might have become the basis for a fruitful program of research and a fitting metaphor, were overshadowed by the masses of facts gathered to illustrate a supposed “pitiless” within-species competition for
90 survival.

1. A major argument made by the author is that the most popular interpretation of “struggle for existence”:
 - A. clarified the idea for the general public.
 - B. was approved by Darwin, himself.
 - C. was opinion, rather than science.
 - D. added nothing new to the idea.
2. The author contends that ants in their nest behave:
 - F. unselfishly and punish selfishness.
 - G. selfishly and punish unselfishness.
 - H. selfishly and reward selfishness.
 - J. unselfishly and reward selfishness.
3. The author implies that the *faculties* alluded to in line 76 are:
 - A. aggressive tendencies that can help the species survive in times of war.
 - B. the result of cooperation, but can be applied to other aspects of survival.
 - C. useful only for social interaction.
 - D. not possible under Huxley’s interpretation of Darwin.
4. The passage presents the description of prairie dog behavior to argue that:
 - F. Darwin’s “survival of the fittest” idea is wrong since prairie dogs engage in mutual aid and cooperation.
 - G. the prairie dog species is different from the human species in that it does not engage in warfare.
 - H. mammals are more likely to behave more cooperatively than insects.
 - J. the typical interaction of some mammals involves cooperation and play, rather than competition.

5. According to the last paragraph of the passage, what was Darwin’s intention when he coined the phrase “survival of the fittest”?
 - A. That a need for “fitness” would disappear once species reached a certain level of cooperation and mutual aid.
 - B. A meaning more general than mere fighting between individuals for limited resources.
 - C. That the expression be taken as a symbol, rather than as a literal reality.
 - D. A meaning that did not include conflict between individuals of the same species.
6. In context, the word *worry* in line 57 means:
 - F. pester
 - G. anxiety
 - H. distress
 - J. scare
7. Which of these books is most likely to support Thomas Huxley’s position on evolution?
 - A. *Intelligence and its Roots in Cooperative Social Behavior*
 - B. *The Plight of the Omega: How Weakness is Brutally Eliminated in Wolf Species*
 - C. *The “Unselfish” Gene and its Role in Effective Adaptation*
 - D. *The Death of Corporations that Stress Independence at the Expense of Teamwork*
8. The author suggests that Thomas Huxley was:
 - F. a popular writer with no scientific background.
 - G. a competitor to Darwin, who rejected his theory of evolution.
 - H. considered an expert on Darwin’s theory.
 - J. unable to popularize his view of the “struggle for existence”.
9. In the last sentence of the passage, the phrase “which might have become the basis for a fruitful program of research” conveys the opinion that:
 - A. scientific work has suffered by its failure to explore Darwin’s point about cooperative fitness.
 - B. social policy has been shaped by an interpretation of Darwin that stresses mutual competition rather than mutual aid.
 - C. the facts collected by scientists to support a social interpretation of Darwin have been ignored.
 - D. there has been little scientific investigation of Darwin’s theory of evolution.

-
10. The passage comes to the conclusion that a universal tendency toward ruthless struggle for life between individuals:
- F. was disproved by scientific data, insufficient in its scope.
 - G. was advanced only by economists and social scientists.
 - H. is contradicted by the investigation of animals in the wild.
 - J. is accurate when describing “lower” animals, but not when describing humans.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

HUMANITIES: This passage is adapted from the essay “Style,” by Walter Pater.

1 Some would argue that human progress consists primarily of the separation of complex objects into their component parts. It would be counterproductive, therefore, to undo useful distinctions. For instance, it would
5 be foolish to abandon the distinction between poetry and prose that is drilled into every 11-year-old in every 6th grade classroom. On the other hand, arguing too enthusiastically for a sharp distinction between prose and poetry may restrict prose expression too much. Critical
10 efforts to limit art by claiming that artists are only legitimate when they employ particular materials—the sculptor stone or the prose-writer natural language—always run the risk of being discredited by the facts of artistic production. If one examines actual writing,
15 prose style is found to run the gamut from the straightforward Hemingway to the musical Shakespeare and the magical Gabriel Garcia Marquez; it would be useless to protest that it must be confined to mainly unimaginative, practical means. Just as useless would be the assertion
20 that poetry cannot capture everyday language or common topics. As there are many beauties of poetry, there are many beauties of prose. It is the business of criticism to evaluate art on its own terms—not to limit its possibilities.

25 Dismissing, then, a harsh opposition of poetry to prose, I offer here certain qualities of all literature as fine art—qualities that apply, likewise, both to the literature of fact and to the literature of fiction. The line between fact and fancy is, indeed, hard to draw. In effective persuasive writing, it is difficult to define the point where
30 fact-based argument becomes an appeal to the reader to catch the writer’s spirit, his or her peculiar view of the world. In science, on the other hand, and in history, so far as it aspires to objective truth, we have a literary domain where one may assume that imagination has no
35 role to play. Yet here again the writer’s sense of fact will still take the place of fact in various degrees. Your historian, with absolutely truthful intention, must select from the multitude of facts presented, and in selecting, assert something of his or her own preferences. Viewing

40 records of the past through personal biases, the historian strings together a modified story. In thus modifying, historians pass into the domain of art. To the degree that the writer’s aim, consciously or unconsciously, is the transmission of his or her unique sense of the world, he
45 or she becomes an artist. And, the art is good in proportion to the truth in the presentment of that sense. As in those humbler or plainer functions of literature, truth is the essence of artistic expression; there can be no merit, no craft at all, without it. All constructed
50 beauty is fineness of truth, the skillful accommodation of matter to a personal vision.

The transmission of his or her sense of fact, rather than fact itself, is what motivates the writer. In literature, as in every other product of human skill, wherever
55 this sense asserts itself, wherever the producer modifies the work beyond its primary function to make it pleasing, there “fine art” exists. Literary art, like all art that imitates fact, is the representation of such fact as interpreted by the artist’s soul. Such is the matter of imaginative
60 or artistic literature—this transcript, not of mere fact, but of fact in its infinite variety, reflecting the infinite variety of human preference. It will be good literary art, not because it is brilliant or sober, or rich, or impulsive, or severe, but to the degree that the representation of that
65 sense, that soul-fact, is true.

1. A major supporting argument made by the author is that:
 - A. the development of the human race is advanced primarily by breaking large ideas into simpler pieces.
 - B. literature is a form of art that tends to mimic the real world.
 - C. in art, legitimacy of form is not as critical as truthfulness to the author’s inner perception.
 - D. prose fiction and non-fiction are not as appropriate for capturing imaginative ideas as is poetry.

2. According to lines 7–14, what generally happens when critics claim that prose should not use poetic language?
- F. They are contradicted by examples of many effective prose writers who use poetic language.
 - G. Their careers are destroyed by other critics who condemn their unfashionable opinions.
 - H. They are contradicted by examples of many famous authors who write both prose and poetry.
 - J. They restrict art unnecessarily by convincing prose writers to avoid using poetic language.
3. Which of the following represents the best example of the critic’s “business” (lines 22–23) as seen by the author of this passage?
- A. Using Shakespeare’s works to explain the subtle differences between poetry and prose
 - B. Appearing as an expert on a panel about the issue of writers who tell half-truths in their memoirs and autobiographies
 - C. Writing an essay criticizing a historian who fails to convey the “grand vision” of America she claims to have
 - D. Writing a book whose thesis is that the “Dada” artists of the early 20th fell short of creating true art
4. Which of the following is the best example of what the author calls the “humbler or plainer functions of literature” (line 47)?
- F. Describing the effects of a character’s poverty
 - G. Revealing the author’s weak personality
 - H. Portraying the nobility of everyday people
 - J. Accurately listing the dates of certain events
5. The author uses the writing of Gabriel Garcia Marquez (line 17) to:
- A. show that not all effective prose writing is limited to commonplace language and commonplace ideas.
 - B. demonstrate how some prose writers are actually writing poetry.
 - C. criticize the writer for using a style that should be reserved for poetry and poetic drama.
 - D. illustrate how prose fiction should never use ordinary language or depict ordinary human behavior.
6. When the author states that historians construct “a modified story” (line 41), he is referring to the fact that:
- F. a historical writer willfully distorts reality by modifying facts to promote a political agenda.
 - G. the large quantity of facts in historical documents confuse the historian’s sense of the truth.
 - H. historical writers shape history to their own dispositions when they select facts to put in their story.
 - J. historians are not skillful enough to present a version of history that is free of personal biases.
7. The passage implies in its reference to “every other product of human skill” (line 54) that:
- A. no other art reflects personal vision as much as literature.
 - B. every human-made object is potentially “fine art.”
 - C. all “fine art” objects also serve a practical function.
 - D. sometimes art is modified too much to remain truthful.
8. The passage indicates that the quality of a given work of creative literature depends upon:
- F. how much the writer is able to distort reality while keeping it recognizable.
 - G. how accurately the writer depicts an unbiased copy of reality.
 - H. the amount of personal detail the writer is able to put into the piece of writing.
 - J. the precision with which the writer expresses his or her spirit.
9. In the first paragraph, the author maintains that the difference between poetry and prose is:
- A. taught to all of us in school.
 - B. neglected in school.
 - C. dismissed as too restrictive by teachers.
 - D. believed by unsophisticated school children.
10. In saying it would be “useless” to assert that “poetry cannot capture everyday language or common topics” (lines 19–21), the author most likely implies that:
- F. critics would dismiss any claim that poetry cannot use everyday language or common topics.
 - G. many successful poets use everyday language and common topics in their poetry.
 - H. it is wrong for critics to base their assessment of new poetry on what has been done in the past.
 - J. most poetry employs everyday language and common topics.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

NATURAL SCIENCE: This passage is adapted from the book *An Elementary Study of Chemistry*, by William McPherson and William Henderson.

1 In 1766, the English investigator Cavendish obtained the first sample of hydrogen in a pure state, and showed it to be different from the other “inflammable” gases that had long been known. The French chemist
5 Lavoisier gave it the name *hydrogen*, signifying “water former,” since it had been found to be a constituent of water. Although describing the gas as “inflammable” would prove to be a bit premature, the name “water former” was soon found to be more than justified; one of
10 the most interesting and useful things about hydrogen is its relationship to oxygen and water.

Occurrence on earth. In the free state, hydrogen is found in the atmosphere, but only in traces. In the combined state, it is widely distributed, being a constituent
15 of water, as well as of all living organisms.

Physical properties. Hydrogen is similar to oxygen in that it is a colorless, tasteless, odorless gas. However, its simple atomic structure (one proton and one electron) makes it considerably lighter than oxygen. One liter of
20 hydrogen gas weighs only 0.09 g. By comparison, a liter of oxygen weighs 1.4 g, roughly 16 times the weight of hydrogen. As a result of its lightness, it is possible to pour hydrogen upward through air from one bottle into another. It is also possible to transport it relatively cheaply.

25 **Preparation from water.** Hydrogen can be produced from water by several methods, the most important of which are the following:

1. *By electric current.* Water is easily separated into its constituents, hydrogen and oxygen, by passing an
30 electric current through it under certain conditions.
2. *By the action of certain metals.* When brought into contact with certain metals under appropriate conditions, water gives up a portion or the whole of its hydrogen, its place being taken by the metal. In the

35 case of a few of the metals, such as sodium, this change occurs at ordinary temperatures. Other metals, such as magnesium and iron, also release hydrogen from water, but only at higher temperatures.

Hydrogen’s relationship with oxygen. Hydrogen’s
40 tendency to combine with oxygen is so great that a mixture of hydrogen and oxygen or hydrogen and air explodes with great violence when heated to its ignition point (about 500° C). Nevertheless, under proper conditions, hydrogen may be made to burn quietly in either
45 oxygen or air. The resulting hydrogen flame is almost colorless and is very hot. The combustion of the hydrogen is due to its union with oxygen. The product of the combustion is, therefore, a compound of hydrogen and oxygen: water.

50 **Reduction.** Again, because of its tendency to combine with oxygen, hydrogen has the power of extracting oxygen from many compounds. Thus, if a stream of hydrogen is conducted through a tube containing copper oxide (a compound of copper and oxygen) and heated to a moderate temperature, the hydrogen extracts the oxygen
55 from the copper oxide. The water formed collects in the cold portions of the tube. This change may be represented as follows:



60 In this process, the copper oxide is said to undergo reduction—the process of withdrawing oxygen from a compound.

Relation of reduction to oxidation. As can be seen, at the same time that the copper oxide is reduced, the
65 hydrogen combines with the released oxygen (i.e., it is **oxidized**). The two processes are very closely related; when one substance is oxidized, usually some other substance is reduced. The substance that gives up its oxygen is called an oxidizing agent, while the substance
70 that unites with the oxygen is called a reducing agent.

Producing electricity with hydrogen. It is because of hydrogen's unique relationship with oxygen and water that it holds such promise as a "clean" source of electricity. To create an electric current with hydrogen, a unique
75 process is employed in which oxidation is essentially accomplished without reduction. The oxidizing agent (hydrogen) combines with pure oxygen (rather than an oxygen compound) in a process that involves separation and recombination of the hydrogen's protons and elec-
80 trons. The byproducts are water and electricity, rather than the water and metal of the more typical oxidation process. This change may be represented as follows:

Hydrogen + oxygen => water + electric current

Hydrogen "fuel cells" using this process are currently
85 being perfected in hopes of developing practical hydrogen-powered vehicles and reducing the world's dependence on fossil fuels.

1. Taken in the context of the entire passage, the most likely significance of the statement "It is also possible to transport it relatively cheaply" (line 24) is that:
 - A. the ability to transfer hydrogen upward from one bottle to another is useful in laboratory work.
 - B. the cheap and easy transport of hydrogen is the reason it is not widely available in earth's atmosphere.
 - C. the construction of hydrogen bombs is made more practical by the fact that hydrogen can be transported inexpensively.
 - D. using hydrogen as a source of fuel is made more practical by the fact that it is inexpensive to transport.
2. The authors imply that Lavoisier called hydrogen inflammable because:
 - F. the fact that hydrogen exploded did not signify that it would burn.
 - G. he did not have the experimental data about the flammability of hydrogen that we have today.
 - H. he thought that hydrogen only existed as part of water, and he believed that water was inflammable.
 - J. the sample of hydrogen he had found was the kind of hydrogen that is not flammable.
3. What support do the authors provide for the assertion that hydrogen has a strong relationship with oxygen and water?
 - A. Descriptions of how hydrogen, oxygen, and water interact in nature and in the laboratory
 - B. The fact that the French chemist who named hydrogen called it "water former"
 - C. A reference to hydrogen as being similar to oxygen in its lack of color, taste, and odor.
 - D. Demonstrations of how water and oxygen can be combined to form hydrogen under special conditions
4. What is most likely meant by the statement "oxidation is essentially accomplished without reduction" (lines 75–76)?
 - F. Hydrogen combines with oxygen to form water.
 - G. Although oxygen is extracted from a compound, hydrogen does not combine with oxygen.
 - H. Although hydrogen combines with oxygen, oxygen is not extracted from another compound.
 - J. An electrical current is an outcome of the combination.
5. The passage suggests which of the following about oxygen?
 - A. It was not isolated in its pure state until after hydrogen had been.
 - B. It weighs considerably less than hydrogen.
 - C. It can be extracted from water using an electric current.
 - D. It has a simpler atomic structure than hydrogen.
6. According to the passage, what can be expected when hydrogen combusts in oxygen?
 - F. Water
 - G. An explosion
 - H. A colorless flame
 - J. Reduction
7. The passage asserts that the release of hydrogen from water when brought into contact with magnesium (line 37):
 - A. occurs when the magnesium is heated above room temperature.
 - B. only occurs when an electric current is run through the magnesium.
 - C. occurs at room temperature.
 - D. cannot occur without producing sodium in the process.

-
8. Which of the following accurately expresses the relationship of a *reducing agent*, an *oxidizing agent* and *water* in the typical oxidation process, according to the authors?
- F. The oxidizing agent gives up oxygen and the reducing agent combines with that oxygen so that water is formed.
 - G. The oxidizing agent combines with the oxygen given off by the reducing agent so that water is formed.
 - H. Water gives off oxygen to combine with the oxidizing agent to form the reducing agent.
 - J. Water gives off oxygen to combine with the reducing agent to form the oxidizing agent.
9. The passage indicates that hydrogen's simplicity of structure results in its being:
- A. 16 times heavier than oxygen.
 - B. 1.4 times lighter than oxygen.
 - C. 16 times lighter than oxygen.
 - D. .09 times the weight of oxygen.
10. In context, the expression "pure state" (line 2) is best defined as:
- F. not as an unstable isotope.
 - G. as a gas rather than as a liquid or solid.
 - H. not combined with other substances.
 - J. extracted from pure water.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

PROSE FICTION. This passage is taken from *The Food of the Gods and How it Came to Earth*, by H.G. Wells. Macmillan, 1904.

1 The Food of the Gods, I call it ... this substance that
Mr. Bensington and Professor Redwood made between
them; and having regard now to what it has already done
and all that it is certainly going to do, there is surely no
5 exaggeration in the name. So I shall continue to call it,
therefore, throughout my story. But Mr. Bensington
would no more have called it that in cold blood than he
would have gone out from his flat in Sloane Street clad
in regal scarlet and a wreath of laurel. The phrase was a
10 mere first cry of astonishment from him. He called it the
Food of the Gods, in his enthusiasm and for an hour or
so at the most, altogether. After that, he decided he was
being absurd.

Mr. Bensington proposed originally to try this stuff,
15 as soon as he was really able to prepare it, upon tadpoles.
One always does try this sort of thing upon tadpoles to
begin with; this being what tadpoles are for. And it was
agreed that he should conduct the experiments and not
Redwood, because Redwood's laboratory was occupied
20 with the ballistic apparatus and animals necessary for an
investigation into the Diurnal Variation in the Butting
Frequency of the Young Bull Calf, an investigation that
was yielding curves of an abnormal and very perplexing
sort and the presence of glass globes of tadpoles was
25 extremely undesirable while this particular research was
in progress.

But, when Mr. Bensington conveyed to his cousin
Jane something of what he had in mind, she put a prompt
veto upon the importation of any considerable number
30 of tadpoles, or any such experimental creatures, into
their flat. She had no objection whatever to his use of
one of the rooms of the flat for the purposes of a non-
explosive chemistry that, so far as she was concerned,
came to nothing; she let him have a gas furnace and a
35 sink and a dust-tight cupboard of refuge from the week-
ly storm of cleaning she would not forego. And, having
known people addicted to drink, she regarded his solici-

tude for distinction in learned societies as an excellent
substitute for the coarser form of depravity. But, any sort
40 of living things in quantity, "wiggly" as they were
bound to be alive and "smelly" dead, she could not and
would not abide. She said these things were certain to be
unhealthy, and Bensington was notoriously a delicate
man—it was nonsense to say he wasn't. And, when
45 Bensington tried to make the enormous importance of this
possible discovery clear, she said that it was all very well,
but if she consented to his making everything nasty and
unwholesome in the place (and that was what it all came
to), then she was certain he would be the first to complain.

50 And Mr. Bensington went up and down the room
and spoke to her quite firmly and angrily, without the
slightest effect. He said that nothing ought to stand in the
way of the Advancement of Science, and she said that the
Advancement of Science was one thing, and having a lot
55 of tadpoles in a flat was another; he said that it would
make him famous forever, and she said it was much more
likely to make him ill to have a lot of tadpoles in a flat
like theirs. He said he was master in his own house, and
she said that rather than wait on a lot of tadpoles, she'd
60 go as matron to a school; and then he asked her to be
reasonable, and she asked him to be reasonable then and
give up all this about tadpoles. He said she might respect
his ideas, and she said not if they were smelly, she wouldn't,
and then he gave way completely and said a bad
65 word. Not a very bad word it was, but bad enough.

And, after that she was greatly offended and had to
be apologized to, and the prospect of ever trying the
Food of the Gods upon tadpoles, in their flat at any rate,
vanished completely in the apology.

70 So, Bensington had to consider some other way of
carrying out these experiments in feeding that would be
necessary to demonstrate his discovery, as soon as he
had his substance isolated and prepared. For some days,
he meditated upon the possibility of boarding out his
75 tadpoles with some trustworthy person, and then the
chance sight of the phrase in a newspaper turned his
thoughts to an Experimental Farm.

1. According to the second paragraph, Professor Redwood could not house the tadpoles, because:
 - A. he was too engaged in his study about the frequency of head butting in calves.
 - B. he was conducting an experiment about how juvenile cows bond with each other.
 - C. his lab was inhabited by young calves, and the tadpoles' containers may have been broken by the animals.
 - D. he was very perplexed by his current investigation, and performing additional research about tadpoles would have been too distracting.
2. From the passage, it is reasonable to assume that in the future, Bensington will:
 - F. board out his tadpoles to a trustworthy person, so that his experiment can move forward.
 - G. forget about his tadpole experiment, because he is now interested in starting an Experimental Farm.
 - H. conduct his experiment in his apartment, despite his cousin's objections.
 - J. consider moving his tadpoles to an Experimental Farm, rather than board them out.
3. Line 43 states that "Bensington was notoriously a delicate man" and most closely signifies that:
 - A. Bensington was known for his fragile health.
 - B. Bensington had a low immunity against the diseases carried by tadpoles.
 - C. while he outwardly appeared strong and robust, Bensington's immune system was weak.
 - D. Bensington was certain to become ill from the experiment because of his delicate health.
4. The passage insinuates that the "Food of the Gods":
 - F. is the result of Mr. Bensington and Professor Redwood's years of devoted research in the area of restorative medicine.
 - G. has been thoroughly prepared for animal testing.
 - H. contains potential that Bensington feels could be demonstrated by feeding his discovery to animal test subjects.
 - J. annoys Jane, because she feels Bensington's experiment is religiously offensive.
5. The "dust-tight cupboard of refuge" in line 35 refers to:
 - A. the room Mr. Bensington uses for research and as a haven from his cousin's intrusions.
 - B. the storage unit where Bensington's experimental instruments are stored.
 - C. an investigational tool Bensington uses for some of his tests.
 - D. the room Jane resents being forced to overlook, because she enjoys keeping a clean house.
6. The word "considerable" in line 29 most nearly means:
 - F. Incomparable
 - G. Substantial
 - H. Thoughtful
 - J. Necessary
7. From the description of Jane in the third paragraph, it can be inferred that she:
 - A. has lived with Bensington for most of her life and is sheltered from the outside world.
 - B. is only allowed to live in Bensington's apartment, because she does the weekly cleaning.
 - C. tolerates her cousin's scientific endeavors, because she believes he could have worse habits
 - D. consistently obstructs Bensington's scientific experiments
8. The passage suggests that Mr. Bensington and Professor Redwood:
 - F. endow their discovery with the name "Food of the Gods" to impress others in the scientific community.
 - G. distrust outsiders who may want to steal their scientific ideas.
 - H. have created the "Food of the Gods" to cure a disease that often infects tadpoles.
 - J. are not certain of their discovery's potential, and, thus, want to observe its effect on test subjects.
9. We can assume from the passage that the narrator:
 - A. is very optimistic about the potential of Bensington and Redwood's discovery.
 - B. doubts that the experiment will succeed, since neither scientist has the capacity to house the tadpoles.
 - C. believes that while the experiment inspires short-lived enthusiasm, it is actually absurd.
 - D. agrees with Jane that the experiment would not contribute to the Advancement of Science.
10. Bensington ultimately gives up the idea of housing the tadpoles in his apartment, because:
 - F. he realizes that if he does, Jane will move away to be a matron in a school.
 - G. while asking for forgiveness after disagreement with his cousin, he inadvertently agrees not to.
 - H. he concludes that Jane would be very unhappy if he did and he wishes to avoid future conflict with her.
 - J. by conceding his argument, he can make Jane feel guilty for interfering with his experiment.

END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

SOCIAL SCIENCE: This passage is adapted from the book *An Introduction to the Industrial and Social History of England*, by Edward Cheyney.

1 One of the greatest obstacles for the early cotton mill owners of England was the insufficient supply of labor for their factories. Since steam power had not yet been developed, let alone the internal combustion
5 engine, the mills had to be powered by water. Consequently, they were placed along the rapid streams of North West England, a region characterized by a sparse population and a strong prejudice against factory work. There existed, however, a source of labor that
10 could furnish almost unlimited numbers and at the lowest possible cost. The poorhouses of the large cities—government-run facilities that supported and housed the needy—were overcrowded with children. The poorhouse authorities often had difficulty finding work for
15 them once they came of age, and any plan of putting them to work was received with open arms.

This source of supply was early discovered and utilized by the manufacturers, and it soon became customary for them to take as “apprentices” large numbers of
20 the poorhouse children. These children were essentially indentured servants; the factory owners signed contracts with the overseers of the poor, by which they agreed to provide housing, clothing, and instruction for a certain number of years to the children who were bound to
25 them. In return, they put them to work in the factories. Children from seven years of age upward were engaged by the hundreds from London and the other large cities and set to work in the cotton spinning factories of the North. Since there were no other facilities for boarding
30 them, “apprentice houses” were built in the vicinity of the factories. The conditions of life among these poor children were, as might be expected, very hard. They were remotely situated, apart from the observation of the community, left to the burdens of unrelieved labor and
35 the harshness of small masters or foremen. Their hours of labor were excessive. They were often arranged in two shifts, each shift working twelve hours, one in the day and the other at night, so that it was a common say-

ing in the North that “their beds never got cold;” one set
40 climbed into bed as the other got out. They were driven by their overseers and often abused. Their food was sub-standard, and they were frequently required to eat it while at their work, snatching a bite as they could while the machinery was still in motion. Much of the time that
45 should have been devoted to rest was spent in cleaning the machinery, and there seems to have been absolutely no effort made to give them any education or opportunity for recreation.

The sad life of these exploited children—over-
50 worked, underfed, neglected, and abused in the factories and barracks of remote North West England—eventually came to the notice of the outside world. Reports of their plight began to appear in the newspapers. In 1796, the Manchester Board of Health made a report calling
55 attention to the unsanitary conditions in the cotton factories. In 1802, Sir Robert Peel, himself an employer of nearly a thousand such children, brought the matter to the attention of the English government. An immediate and universal desire was expressed to abolish the abuses
60 of the system, and, as a result, the “Health and Morals Act to regulate the Labor of Sound Children in Cotton Factories” was passed that same year. It prohibited the contracting out for factory labor of children younger than nine years, restricted the hours of labor to twelve
65 working hours a day, and banned night labor. It required the walls of the factories to be properly painted and the buildings to be sufficiently ventilated. It specified that apprentices be furnished with at least one new suit of clothes a year. It insisted that the children attend reli-
70 gious service and be instructed in the fundamental school subjects. This was the first of the “Factory Acts,” for, although its application was quite restricted, applying only to cotton factories and indentured servants, subsequent laws were a development of the same principle:
75 factory labor involved conditions in which it was desirable for government to regulate.

1. A valid conclusion to draw from this essay is that the author feels that the early factory laws of England:
 - A. grew out of a flawed belief that factory conditions were sufficiently unique to require special laws.
 - B. were a necessary correction to a system of law that allowed for the exploitation of children.
 - C. resulted from exaggerated charges brought against the mill and factory owners of England.
 - D. Were an overreaction to the abuses of a handful of unscrupulous mill owners.
2. The passage suggests that two factors leading to the widespread use of poor children in the early mills of England were:
 - F. (1) the fact that most mills were located in the remote North West of England and (2) city poorhouses that were overpopulated with children.
 - G. (1) the unsanitary conditions of city poorhouses and (2) the example set by Sir Robert Peel in employing a thousand children in his factories.
 - H. (1) the profits poorhouse overseers stood to gain by contracting out children and (2) the quality of instruction offered to children by the factories.
 - J. (1) the existence of barracks in North West England for the housing of children and (2) the close proximity of poorhouses to mills and factories.
3. One of the author's intentions in the first sentence of the passage (lines 1–3) is most likely to:
 - A. justify the use of child labor in the early mills and factories of England.
 - B. present a major historical factor that would lead to the passage of the first Factory Act in England.
 - C. present the main theme of the passage: the labor shortage of mid-19th century England.
 - D. explain the reason for the development of steam-powered machinery in the factories of England.
4. Of the following, which is the most accurate encapsulation of the author's understanding of the child labor situation in early industrial England?
 - F. A few brave figures in the press and industry exposed the centuries-old exploitation of children in the workforce.
 - G. Unscrupulous foremen and overseers led to unacceptable conditions among children who otherwise would have benefited from positions in factories.
 - H. Unscrupulous overseers contracting away poorhouse children combined with new labor pressures presented by the introduction of factories resulted in widespread child labor abuses.
 - J. Children in the poorhouses of the bigger cities needed work and the new factories and mills of North West England provided it.
5. It can be inferred from the last sentence of the passage (lines 71–76) that:
 - A. child labor laws that came after the 1801 law applied only to contracted labor in cotton mills.
 - B. eventually, the idea that labor practices in factories should be regulated was abandoned as too restrictive to economic growth.
 - C. later laws concerning factory labor practices applied to more children than just those who worked in cotton factories.
 - D. the labor conditions of factories improved after the 1801 statute, and it became unnecessary to enact further laws dictating labor practices.
6. That the author places the word “apprentices” (line 19) in quotation marks suggests that
 - F. although they were called “apprentices,” the situation into which these children were bound was not typical of an apprenticeship.
 - G. the word “apprentice” was not in use at the turn of the 18th century in England.
 - H. he assumes that the word “apprentice” will be unknown to the reader and so marks the unusual word accordingly.
 - J. “apprentice” is a shorter, more concise way of expressing “indentured servant.”
7. Which of the following was a consequence of the “Health and Morals Act” of 1802?
 - A. Children no longer had to work 12-hour shifts in the cotton mills.
 - B. Conditions that had led to the expression “their beds never got cold” became illegal for indentured servants in the cotton mills.
 - C. It was no longer legal to bind 9-year-old children to a multi-year factory labor contract in the North West of England.
 - D. Cotton mill owners were required to give children lunch and dinner breaks and feed them healthy food.
8. Given the author's discussion of the intersection between factory power and sources of labor in England, which of the following was probably a consequence of advances in steam power technology?
 - F. The Factory Acts were repealed.
 - G. Farmers in North West England began to work in factories.
 - H. Factories moved into and around the cities.
 - J. The North West of England became more densely populated.

-
9. The “outside world” referred to in line 52 most likely refers to:
- A. the other industrialized nations.
 - B. the owners of the factories and mills.
 - C. the anti-factory population of North West England.
 - D. influential people in the cities of England.
10. According to the passage, overseers of the poor in England were eager to:
- F. find work for the children who overcrowded their facilities.
 - G. make money from the labor of their wards.
 - H. find cheap sources of labor for their institutions in the cities.
 - J. provide children with good jobs and comfortable lodging.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

HUMANITIES: This passage is adapted from the book *Royal Palaces and Parks of France*, by Milburg Mansfield.

1 The history of France is intimately associated with the history of that grand structure in the center of Paris, the Louvre. The life of the Louvre was that of Paris; the life of Paris that of the nation; and, the life of the nation
5 that of the people. Of course, this is to ignore the significance of the French countryside. But the French capital is much more representative of France than London is of England, or Washington of America; Paris is, and has always been, the center of France’s intellectual,
10 artistic, architectural, musical, and commercial life.

Paris, before the conquest by the Franks, was practically only the island known as Lutetia, surrounded by the river Seine. The Franks attacked the city in the 5th century, and established a camp in what is now the
15 courtyard of the Louvre. The camp was surrounded by a moat, and was baptized Louvre, or Lower, meaning a fortified camp. This fortification was necessary for the Franks to defend themselves against the native occupants of Lutetia, and, in time, enabled them to acquire
20 the surrounding region. All of this the Louvre made possible, and it is well deserved that its name should live on to the present day.

Little by little, this half-barbaric camp became a fort, then a palace and, finally, an art museum. Nothing
25 remains of the old fort, which King Philippe Auguste turned into an ambitious castle early in the thirteenth century. The Paris of Philippe Auguste was already a city of one hundred and twenty thousand inhabitants, occupying poor houses throughout the region. This forward-looking monarch built up the great tower of the Louvre and added to its sidewalls. It is said that the rumbling carts, plowing through the mud beneath the palace windows, annoyed the monarch so much that he established what must have been the first city paving
30 work on record. He commanded that all the chief roads passing near the Louvre should be paved with cobblestones. This was real municipal improvement. Since

that day, it has been customary for city streets to be paved, and, though cobblestones have since gone out of
40 fashion, it was this monarch who first showed us how to do it.

By destiny, this palace, set down in the very heart of Paris, was to dominate everything around it. Its very location ensured its civic importance, and the Seine,
45 flowing swiftly by its walls, added much charm to the major festivals and ceremonies held there. The receptions of ambassadors, the baptisms of royalties, royal marriages, and celebrations of victories all took place within the walls of the palace Louvre.

50 In the 14th century, King Charles V completely changed the character of the palace from what it had formerly been—half-fortress, half-residence—and made it a palace in truth as well as in name, by the addition of many fine enhancements. Most notably, he built a tower
55 that became known as the Louvre Library, the egg from which was hatched the present magnificent National Library of France. History tells us that in 1373, Charles V had a catalogue made of the nine hundred and ten volumes, which formed this collection, an immense number
60 for the time; his predecessor, King Jean-le-Bon, possessed seven volumes of history and four religious books as his entire library.

In 1557, the ambitious, art-loving King Francis I conceived the idea that the palace was well-suited to
65 house his Renaissance luxuries—chiefly paintings—and, by a process of “restoration” (including the near-complete demolition of the old palace), built the magnificent structure we now call the “New Louvre”. A passionate lover of art, he collected the first pictures, which
70 formed the foundation of the present collections of the Louvre National Museum. His architect was Pierre Lescot. Lescot was as yet unknown in the world of architecture, but his talents were sufficiently great to give to Paris what has ever been regarded as its chief
75 Renaissance glory. His work was not interrupted by intrigues of court, of love, of war, nor by the deaths of

Francis I and his successor, Henri II. Even after Lescot's death, work continued from his plan, and subsequent Louvre architects have been inspired by his example.

80 The present day Museum of the Louvre, France's National Museum of Art, was established by a 1793 Decree. Though no longer a functioning fortress or palace, its history, as such, contributes much to its unique architectural character and to the central place it
85 holds in the hearts of the French and their capital city.

1. In claiming that the architect Lescot gave to France "what has ever been regarded as its chief Renaissance glory" (lines 73–74), the author implies that:
 - A. after designing the "New Louvre," Lescot worked on a building that is the most famous in France.
 - B. a Lescot painting hanging in the "New Louvre" is considered the great masterpiece of the French Renaissance.
 - C. before designing the "New Louvre," Lescot had designed another building that became known as the great masterpiece of French architecture.
 - D. Lescot's "New Louvre" is widely considered to be the greatest artistic creation of Renaissance France.
2. Which of the following statements best represents the overall theme of the passage?
 - F. The Louvre is the greatest art museum in France and probably in all of Europe.
 - G. The Louvre grew and changed in a way that both mirrored and inspired the growth and change of France and its people.
 - H. The whims of the Kings of France transformed the Louvre over the centuries so that it is a very different building today than it was originally.
 - J. The Louvre changed gradually from a center of French strife and bloodshed to a center of French art and culture.
3. During what period of time was Paris composed primarily of a single island?
 - A. Prior to the 5th century
 - B. Throughout the 5th century
 - C. During the reign of King Philippe Auguste
 - D. During the reign of King Francis I
4. The author implies by the statement that Charles V made the Louvre a "palace in truth as well as in name" that:
 - F. although the Louvre had previously been referred to as a palace, it did not really fit the term very well prior to Charles V.
 - G. Charles V was the first king to officially refer to the Louvre as a palace.
 - H. prior to Charles V, no monarch had actually resided in the Louvre, so it was not a true palace in the sense of a royal home.
 - J. the term "palace" implies the inclusion of a library, which did not exist at the Louvre prior to Charles V.
5. The author argues that the nature of the French countryside can safely be ignored when referring to the life of Paris as "that of the nation" (line 4) because:
 - A. very few people lived in the French countryside from the 5th to 17th century.
 - B. Paris has always been more powerful than any other city in France.
 - C. the French countryside follows Paris in all cultural matters.
 - D. the French countryside has always been essentially a different country from Paris.
6. The passage suggests that King Philippe Auguste and his work on the Louvre:
 - F. began a tradition of limiting traffic around the homes of monarchs.
 - G. started the greatest art museum in Europe.
 - H. transformed a rough palace into a modern fortress.
 - J. inspired the tradition of paving city streets.
7. The sixth paragraph of the passage (lines 63–85) suggests that the palace built by King Philippe Auguste was:
 - A. so loved by King Francis I that he used it to display his priceless collection of paintings.
 - B. essentially replaced by King Francis I.
 - C. designed by the architect Pierre Lescot.
 - D. refurbished to its former glory by King Francis I.
8. According to the passage, which of the following has remained with the Louvre from its original conception in the 5th century to the present day?
 - F. Its outer wall
 - G. Its name
 - H. Its moat
 - J. Its middle tower

-
9. According to the passage, France's National Library found its beginning in the 14th century when:
- A. King Jean-le-Bon built a tower in the Louvre to house his large collection of books.
 - B. King Francis I decided to keep his collection of Renaissance treasures at the Louvre.
 - C. King Charles V had his large collection of books catalogued and housed at the Louvre.
 - D. King Philippe Auguste founded the library as part of his program of municipal improvement.
10. The author suggests that a major reason for the Louvre's central role in Parisian and French culture is:
- F. its function as a French museum of art.
 - G. the fact that it was constructed by the great architect Pierre Lescot.
 - H. the great tower, built by King Philippe Auguste in the thirteenth century.
 - J. its location at the center of the capital surrounded by the river Seine.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

8 to 11½ Minutes – 10 Questions

Directions: Choose the answer that you feel best answers the question. You may look back at the passage as often as necessary.

NATURAL SCIENCE: This passage is adapted from a book titled *Great Astronomers*, by Robert Ball.

1 The career of the 2nd century A.D. astronomer, Ptolemy, is one of the most remarkable in the history of human learning. There may have been other discoverers who have done more for science than Ptolemy, but there
5 has never been a discoverer whose authority on the subject of celestial bodies held sway for so long a period as the fourteen centuries during which his opinions reigned supreme. Even more amazing is the fact that at least one of those opinions remains valid, even to the present day;
10 though many of his principles were discarded in the wake of Copernicus, Galileo, and Newton, Ptolemy's theory concerning the shape of the earth and the arguments he made in its support, remain essentially intact some 1,800 years after he set them down in his famous
15 book, *The Almagest*.

Ptolemy began his discussion of astronomy by laying down the undoubted truth that the shape of the earth is spherical.

The proofs which he gives are quite satisfactory; they
20 are indeed the same proofs we give today. There is, first of all, the well-known circumstance that when an object is viewed at a distance across the sea, the lower part of the object appears cut off by the interposing curved mass of water. The astuteness of Ptolemy enabled him to offer
25 another argument, which, though not quite so obvious as that just mentioned, demonstrates the curvature of the earth in a very impressive manner. Ptolemy mentions that travelers who went to the south reported that, as they did so, the appearance of the sky at night underwent a gradual
30 change. Stars that they were familiar within the northern skies gradually sank lower in the sky. The constellation of the Great Bear, which in our skies never sets during its revolution round the pole, did set and rise when a sufficient southern latitude had been attained. On the other
35 hand, constellations new to the inhabitants of northern climates, were seen to rise above the southern horizon. These circumstances would be quite incompatible with the supposition that the earth was a flat surface.

Ptolemy went on to illustrate his subject by a variety of further demonstrations. One of his proofs is particularly striking in nature and exemplifies Ptolemy's acuteness. If the earth were flat, sunset must necessarily take place at the same instant, no matter in what country the observer may happen to be placed. Ptolemy,
40 however, proved that the time of sunset did vary greatly as the observer's longitude was altered. He was acquainted with the fact that the illumination of the moon is derived entirely from the sun. He knew that an eclipse of the moon was due to the interposition of the
45 earth, which cuts off the light of the sun. It was, therefore, plain that an eclipse of the moon would begin at the same instant from whatever part of the earth the moon could be seen at the time. Ptolemy brought together from various regions the local times at which different
50 observers had recorded the beginning of a lunar eclipse. He found that the observers to the west made the time earlier and earlier, the further away their stations were from Alexandria. On the other hand, the eastern observers set down the hour as later than that at which
55 the phenomenon appeared at Alexandria. As these observers all recorded something which, indeed, appeared to them simultaneously, the only interpretation was that the more easterly a place, the later its time—
60 i.e., the later the time of sunrise and sunset in that region. Of course, the apparent time of sunset would be the same from all points, if the earth were flat. When Ptolemy, therefore, demonstrated that the time was not the same at various places, he showed conclusively that the earth was not flat.

1. When he wrote this piece, the author's probable goal was to:
 - A. demonstrate that most of Ptolemy's ideas in the 2nd century book, *The Almagest*, are still relevant today.
 - B. show how Ptolemy's reasoning about the shape of the earth was ahead of its time.
 - C. argue that Ptolemy was the greatest astronomer of his or any age.
 - D. use Ptolemy's reasoning to argue that the earth is spherical.

2. Which of the following, if true, would serve as the best evidence of a flaw in Ptolemy's spherical earth theory?
- F. A lunar eclipse does not occur simultaneously for everyone on earth due to the fact that the angle of the sun-moon alignment changes with the observer's position.
 - G. The sundials used to tell time in the 2nd century were not as accurate as the mechanical and electronic timepieces of today.
 - H. The earth is so huge that people in the northern hemisphere are actually noticeably closer to the Great Bear constellation than people in the southern hemisphere.
 - J. Large bodies of water, like the ocean, are slightly dish-shaped; they are pulled down to a lower altitude in the middle, due to surface tension effects.
3. The last sentence of the passage (lines 67–70) supports a statement made earlier in the essay that:
- A. subsequent astronomers have contributed more to our understanding of astronomy than Ptolemy.
 - B. Ptolemy and his contemporaries were aware that a lunar eclipse was caused by the "interposition of the earth."
 - C. Ptolemy was aware that the earth revolved around the sun, rather than the other way around.
 - D. Ptolemy was able to present arguments for a spherical earth that are "quite satisfactory."
4. Which of the following is the most reasonable conclusion to make based on the passage?
- F. The author does not respect Ptolemy's intellect.
 - G. Ptolemy lived in Alexandria.
 - H. Ptolemy's insights were obvious and self-evident.
 - J. Astronomy has changed little since Ptolemy.
5. The primary function of lines 24–39 is to give an example of a proof from *The Almagest* that is:
- A. different from the arguments made in modern astronomy.
 - B. no longer considered viable.
 - C. more complex and ingenious than the "object across the sea" proof.
 - D. more complex and ingenious than the "lunar eclipse" proof.
6. The author suggests that, though many of Ptolemy's ideas were eventually discarded, they:
- F. were misunderstood by those who rejected them, and are actually quite accurate.
 - G. are being reconsidered and tested today by the scientific community.
 - H. were never intended to be taken as scientific fact by Ptolemy.
 - J. were accepted as truth for longer than those of any other astronomer.
7. Which of the following statements, if true, would lend the strongest support to the author's assertion that Ptolemy's reasoning was "astute"?
- A. The opening to the chapter on the motions of celestial bodies in *The Almagest* states that all orbits are undoubtedly elliptical since the ellipse is Nature's most perfect shape.
 - B. Ptolemy argues in *The Almagest* that the moon's orbit cannot be perfectly circular since the rate of its waxing and waning changes slightly over the cycle of phases.
 - C. Ptolemy theorizes in *The Almagest* that the retrograde motion of planets is caused by their being bombarded by asteroids.
 - D. The conclusion of *The Almagest* predicts that everything there is to know about celestial bodies will be known within 1,000 years of the book's writing.
8. To whom does the pronoun "our" refer in the phrase "which in our skies never sets during its revolution around the pole" (lines 32–33)?
- F. People living in the Eastern hemisphere
 - G. People living in the Western hemisphere
 - H. People living in the Northern hemisphere
 - J. People living in the Southern hemisphere
9. In line 40, the author uses the word "demonstrations" to mean:
- A. things that prove or make evident.
 - B. outward displays of feeling.
 - C. hands-on enactments to reveal how something works or is performed.
 - D. symbols of a particular characteristic.
10. It can be inferred from the passage that the majority of Ptolemy's theories were discredited starting roughly in the:
- F. 16th century.
 - G. year 1400.
 - H. 20th century.
 - J. year 1800.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

15 Minutes – 13 Questions

Passage 1

Greenhouse researchers performed several experiments in order to find optimal growing conditions for a certain species of plant. The researchers quantified plant growth by measuring the average length of the plant leaves, the average width of plant leaves, and the number of leaves per 1 cm of plant stalk (leaf density). They compiled the following tables displaying their data. Each data point represents the average of 50 samples.

Experiment 1: Humidity (9 hours of sunlight per day, 20°C ambient temperature)

% humidity	Length (cm)	Width (cm)	Leaf Density (leaves/cm)
15	7.3	3.5	0.54
30	9.6	3.4	0.69
55	10.8	2.9	0.72
85	12.2	2.2	0.89
100	8.9	2.4	0.70

Experiment 2: Sunlight Exposure (at 55% humidity, 20°C ambient temperature)

Sunlight (hrs/day)	Length (cm)	Width (cm)	Leaf Density (leaves/cm)
0	2	.98	0.14
3	4	1.8	0.69
5	8.8	2.6	0.63
9	10.8	2.5	0.72
12	12.9	2.4	0.86

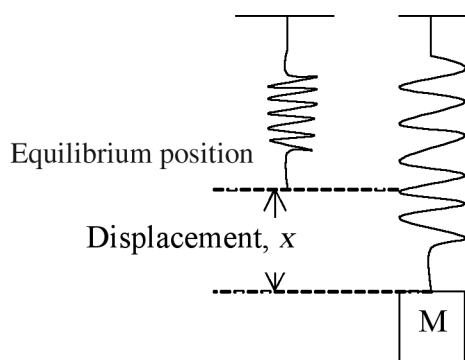
Experiment 3: Ambient Temperature (at 55% humidity, 9 hours of sunlight per day)

Temp. (Celsius)	Length (cm)	Width (cm)	Leaf Density (leaves/cm)
10	11.1	2.6	0.72
15	10.9	2.5	0.73
20	10.8	2.5	0.72
25	10.7	2.5	0.71
30	10.6	2.4	0.75

- Which of the following conclusions can be made from experiment 2?
 - An increased amount of light leads to smaller, finer leaves that are dense.
 - The leaf density is independent of the amount of light.
 - The average length of leaves increases with increased exposure to light.
 - The average width of leaves continues to increase as exposure to light increases.
- Plants growing in 40 percent humidity, 20 degrees Celsius and 9 hours of sunlight would most likely exhibit an average leaf width of:
 - 10.2 cm
 - 8.9 cm
 - 5.4 cm
 - 3.2 cm
- Which variable is the least influential in leaf width development?
 - Soil moisture content.
 - Humidity.
 - Ambient temperature.
 - Exposure to sunlight.
- According to the experiment, which set of conditions would most likely produce the longest leaves?
 - 85% humidity, 6 hours of sunlight per day, 10°C temperature.
 - 80% humidity, 12 hours of sunlight per day, 15°C temperature.
 - 90% humidity, 8 hours of sunlight per day, 25°C temperature.
 - 15% humidity, 12 hours of sunlight per day, 25°C temperature.
- Which variable seems to have a negative correlation with leaf width?
 - Soil moisture content.
 - Humidity.
 - Ambient temperature.
 - Exposure to sunlight.

Passage 2

A spring will hang at its equilibrium point if no weight is attached to it. The spring will stretch out if a mass (M) is attached to the end of it. The change in the spring's length is called the displacement (x).



The force in newtons F (N), required to return the spring to its equilibrium position is the negative product of the displacement (x) times the spring constant (k), where the negative indicates the direction, not the value, of the force. The spring constant measures the elasticity of a spring and is a different value for every spring. A spring with a high spring constant (k) is much stiffer and cannot be stretched easily, whereas a spring with a low k is much more flexible.

Experiment

Various masses were attached to two different springs, one with a spring constant k of 15 and the other with a constant k of 5. Displacement (x) and force (F) were then measured. The results are shown in the following table.

Trial	k	x (cm)	F (N)	Mass (g)
1	15	5	75	M_1
2	15	25	375	M_2
3	15	45	675	M_3
4	5	15	75	M_1
5	5	75	375	M_2
6	5	—*	—*	M_3

*Spring bottomed out on the floor

- If you had to choose a spring to assist closing a door, which one would cause the door to shut the fastest?
 - A spring with $k = 3$
 - A spring with $k = 5$
 - A spring with $k = 10$
 - A spring with $k = 13$
- If a mass of weight M_3 were attached to a spring with $k = 5$ and released from a higher platform, allowing it to complete its fall, what would you estimate x to be?
 - 60 cm
 - 75 cm
 - 90 cm
 - 135 cm
- In trial 6, M_3 bottomed out on the floor. If the spring is released from a higher point, it might not solve the problem. Why?
 - It would increase the k value of the spring.
 - It would decrease the k value of the spring.
 - The increased distance still might be too short to realize the maximum displacement value for M_3 .
 - It would cause M_3 to swing like a pendulum.
- Calculate the force required to restore a spring with $k = 5$ by 35 cm.
 - 175 N
 - 210 N
 - 425 N
 - Unable to determine from information given.
- How could one redesign the experiment so that M_3 does not bottom out in trial 6?
 - Replace the spring in trials 4–6 with one with a greater k value.
 - Replace the spring in trials 4–6 with one with a lesser k value.
 - Choose a different person to conduct the experiment.
 - Replace the stand holding the spring with a more flexible stand, and release the spring from a higher point.

Passage 3

The glass of a greenhouse traps solar energy, thereby warming the insides of the greenhouse. In much the same way, certain gases in the earth's atmosphere capture the energy from sunlight, keeping the energy trapped on earth as heat. These so-called greenhouse gases, which include water (H₂O), nitrous oxide (NO), methane (CH₄), and carbon dioxide (CO₂), have been increasing in recent years. Will the increases in greenhouse gases caused by human activity lead to harmful global warming? This question is addressed by the following scientists.

Scientist 1

The ice of Antarctica provides a layered record of the history of the earth with the deepest layers representing ancient times. By analyzing ice cores from this ice, scientists have been able to follow the fluctuations in the amount of atmospheric carbon dioxide over the past 160,000 years. These scientists have determined that atmospheric carbon dioxide has increased in the past few years from 280 ppm (parts per million) to 360 ppm, a jump that is significantly higher than historic fluctuations. This jump has been accompanied by a 0.6°C increase over the past 100 years in the average surface temperature of the earth ... a change that is significant enough to affect crop growth. Even if we are able to stabilize carbon dioxide output to current levels, an increase of 2.0°C is predicted over the next 100 years.

Scientist 2

The observed increase in greenhouse gases associated with human activity such as carbon dioxide and methane will not lead to sizable global warming. Water vapor and clouds are responsible for more than 98% of the earth's greenhouse effect. There is convincing evidence that increases in carbon dioxide would lead to changes in feedback factors that would diminish any temperature increase associated with the carbon dioxide increase. In addition, the climate for the past 100 years has shown an irregular pattern in which many of the jumps in temperature were too large to be attributed to the observed increase in carbon dioxide.

11. Scientist 1 and 2 would most likely agree with which of the following statements about atmospheric carbon dioxide levels:
 - A. Increasing carbon dioxide levels affect water vapor levels.
 - B. Atmospheric carbon dioxide is directly linked to global temperature changes.
 - C. Carbon dioxide levels will probably rise throughout the next 100 years.
 - D. Deforestation will lead to an increase in average surface temperature.

12. Which of the following criticisms has been made by scientist 2 in order to undermine scientist 1's argument?
 - F. The carbon dioxide level measurements are from the last 150 years
 - G. The correlation between increased carbon dioxide and temperatures does not hold true for all temperature increases in the past 100 years.
 - H. There is no mention made regarding the types of crops affected.
 - J. The proposed temperature increase for the next 100 years is much greater than the increase over the past 100 years.

13. Which of the following criticisms could scientist 1 make in order to undermine the argument made by scientist 2?
 - A. Feedback systems exist that regulate global climate.
 - B. Humans will be able to adapt to global warming.
 - C. Scientist 2 has failed to provide evidence for a correlation between atmospheric H₂O and global temperatures over time.
 - D. The amounts of methane in the atmosphere have decreased.

**END OF TEST.
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15 Minutes – 13 Questions

Passage 1

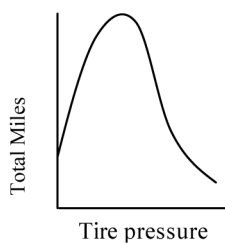
Several identical cars with identical tires and full 20-gallon tanks of fuel were driven on an auto treadmill. The cars differed only in the amount of air in their tires. Researchers recorded how many miles the cars were able to go before exhausting their fuel supply.

The Effect of Tire Pressure on Fuel Economy

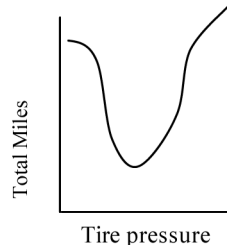
Car #	Tire Pressure (psi)	Range (miles)	Remarks
1	32	500	Factory-recommended tire pressure
2	15	120	Tire failure after 120 miles; ~8 gallons of fuel remained in tank
3	25	380	
4	27	440	
5	35	540	Uneven tire wear noted
6	40	640	Excessive tire wear and vibrations noted

1. If all cars had been driven until the gas had been exhausted, which of the following graphs best represents the relationship between tire pressure and total miles traveled:

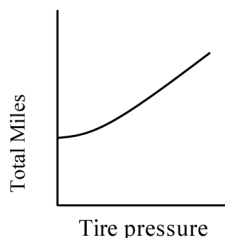
A.



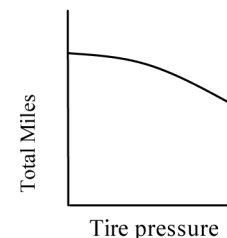
B.



C.



D.



2. Estimate the average gas mileage (miles per gallon) of car 2.
- F. 8 mpg
G. 10 mpg
H. 12 mpg
J. 15 mpg

Passage 2

Pigeons are known to be able to find their way home after being released hundreds of miles away. They can even find their way home when transported in a covered box into unknown land, leading scientists to believe that pigeons use some method other than visual cues to navigate. The following two hypotheses may explain how pigeons find their way:

Hypothesis 1: Sun Compass

Pigeons were placed in a circular cage, and at the same distance outside the cage, identical food cups were put in place, one due east and the other due west. The pigeons were trained to use the feeding cup to the east of the cage. The pigeons still returned to the eastern food cup, even after the cage was rotated and the background scenery was changed. Pigeons failed to go to the east cup on overcast days, or when the scientists used mirrors to alter the apparent position of the sun. These observations have led some scientists to hypothesize that pigeons may use the position of the sun in conjunction with their internal clocks to find their way home. For example, a pigeon's internal clock indicates it is noon. If the pigeon observes that the sun is about to set, it knows that it is very far to the east of its home location, and heads west to home. In a similar manner, the birds can relate how high the sun is in the sky to the time of year, using this information to pinpoint a relative north-south location.

Hypothesis 2: Magnetic Field

If the magnetic field surrounding a pigeon is disrupted, it loses its ability to find its way home. This has led some scientists to hypothesize that pigeons use the earth's magnetic field to navigate. In one experiment, scientists attached bar magnets to their experimental pigeons, causing them to navigate erratically on an overcast day. Then the scientists controlled the direction of the magnetic field through use of electromagnets. The birds flew away from home if the magnetic

field pointed up, whereas they flew towards home if the magnetic field pointed down. These findings show that pigeons are clearly responding to magnetic fields of lesser magnitude than the earth's magnetic field.

3. According to the sun compass hypothesis, which of the following would the pigeons most likely do on a sunny day if there was a disturbance in magnetic fields:
 - A. Fly home.
 - B. Fly away from home.
 - C. Fly erratically in random directions.
 - D. Depending on the time of day fly west.
4. Scientists performed an experiment in which pigeons had their internal clocks shifted. Which of the following results would most strongly favor the sun compass hypothesis?
 - F. The birds were able to find their way back on a cloudy day.
 - G. The birds were able to find their way back on a sunny day.
 - H. The birds were unable to find their way back on a sunny day.
 - J. The birds failed to seek out home.
5. Scientists observed that a large disturbance in the earth's magnetic field on a sunny day affected the pigeons' ability to navigate. Which of the following is the most reasonable statement that can be made:
 - A. The sun compass hypothesis is correct.
 - B. Pigeons do not use the sun to navigate.
 - C. The finding supports the magnetic field hypothesis.
 - D. The finding rejects the magnetic field hypothesis.
6. The author of the magnetic field hypothesis most likely assumes that:
 - F. The mere presence of metal was not the cause of the pigeons' inability to navigate when a bar magnet was attached.
 - G. Time of release does matter.
 - H. Pigeons do not have an internal clock.
 - J. Seasonal changes in daytime hours affect the bird's abilities to navigate.

7. Which of the following throws some doubt on the validity of the magnetic field experiments:
 - A. The magnetic field experiments were performed on sea gulls.
 - B. The magnetic field experiments were performed on a cloudy day.
 - C. The magnetic fields generated by the scientist were greater in magnitude than the earth's magnetic field.
 - D. The scientists conducting these experiments manipulated the pigeons' internal clocks.
8. Some evidence has surfaced that indicates pigeons may use barometric pressure to navigate. How does this evidence relate to either hypothesis?
 - F. This evidence is consistent with the sun compass hypothesis, but inconsistent with the magnetic field hypothesis.
 - G. It disproves both theories.
 - H. This evidence is inconsistent with the sun compass hypothesis, but consistent with the magnetic field hypothesis.
 - J. This evidence does not support either hypothesis.

Passage 3

The following experiments were performed by students studying the decomposition of calcium carbonate (CaCO_3):

Experiment 1

Fifty grams of CaCO_3 were heated to 900°C in an open container in room air, resulting in the release of CO_2 gas. After 30 minutes when no more gas was being expelled, the mass of the sample had been reduced to 30 grams.

Experiment 2

Experiment 1 was repeated, except this time the sample was placed in a sealed, thick-walled container and all air was removed, which created a vacuum, and then heat was applied. The sample was heated to the same temperature for the same amount of time as in Experiment 1. The end mass of the sample in this experiment was 48.7 grams. If a reaction's end products are not removed during the course of the experiment, the experiment will progress much slower and may not reach completion.

Experiment 3

CaCO_3 was dissolved in pure water. As it dissolved it released heat and the solution became basic and cloudy. After the solution cooled back down, a precipitate was formed.

9. Every gram of CO_2 gas fills approximately 0.5 liters of volume. How much volume of CO_2 was released in experiment 1?
- A. 10 L
 - B. 20 L
 - C. 30 L
 - D. 40 L
10. Scientists often combine Greek word roots in their terminology to aid the reader. For example, the Greek terms exo (outward), endo (inward) and thermo (heat) are frequently used in words that describe chemical reactions. Given this information, which experimental observation would suggest that adding water to CaCO_3 is exothermic?
- F. The solution became basic.
 - G. The solution formed a precipitate.
 - H. The reaction released heat, warming up the water.
 - J. None of the observations would suggest that the reaction is exothermic.

11. Which of the following describes the pressure inside experiment 2's container as the experiment progresses?
- A. Pressure decreases over time.
 - B. Pressure remains at zero throughout the experiment.
 - C. Pressure starts at zero and increases as the reaction progresses.
 - D. Pressure starts well above zero and continues to increase as the reaction progresses.
12. If experiment 2 occurred at a higher altitude, how might that affect the results?
- F. It would make the reaction go faster as boiling point decreases at higher altitudes.
 - G. It would slow down the reaction, reducing the decomposition.
 - H. It would make no difference.
 - J. The effects of this cannot be inferred from the passage.
13. Which of the following changes would speed up the reaction in experiment 2?
- A. Pumping in more CO_2 .
 - B. Performing the experiment at a lower temperature.
 - C. Coating the walls of the container with a substance that would react with CO_2 .
 - D. Adding more CaCO_3 .

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15 Minutes – 13 Questions

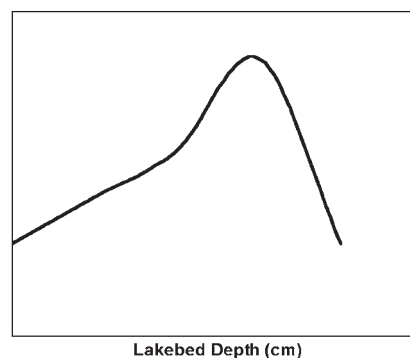
Passage 1

Researchers took samples from the sediment at the bottom of a lake that had formed in the crater of a dormant volcano. The following chart shows the concentrations of ions and dissolved gases in the sediment at various depths. The sediment was sampled at intervals of five centimeters (cm). A temperature measurement was taken prior to the removal of each sample. Ion concentrations were measured in parts per million (ppm) and the acidity levels are represented on the pH scale, which ranges from 1 to 14. A pH of 7 is considered neutral, a pH below 7 is acidic, and a pH above 7 is basic.

Depth (cm)	Temperature (°C)	pH	Ion and dissolved gas concentrations (ppm)					
			SO ₄ ²⁻	S ²⁻	CO ₂	Fe ³⁺	Fe ²⁺	O ₂
0	6	6.8	7.0	0.0	1.0	4.0	0.0	2.0
5	7	6.3	4.0	0.7	1.5	3.0	0.3	1.0
10	9	5.8	3.9	1.9	2.0	2.0	2.0	0.0
15	13	5.3	3.9	3.2	3.0	0.8	3.3	0.0
20	15	4.8	3.7	4.7	1.0	0.0	4.2	0.0

- Assuming the trend continues, what would you predict the pH to be at a depth of 40 cm?
 - 3.8
 - 3.3
 - 2.8
 - 2.5
- A student is given an unlabeled sediment sample. Then the student is asked to run tests to determine the depth at which the sample was taken. Which variable would be the least usable to categorize the depth?
 - pH
 - SO₄²⁻ concentration
 - Fe³⁺ concentration
 - O₂ concentration
- A certain type of anaerobic bacteria (does not require oxygen) thrives in environments with low SO₄²⁻ concentrations, and low CO₂ concentrations. This bacteria requires a temperature between 5–15°C, a basic environment, and avoids Fe³⁺, as Fe³⁺ inhibits its metabolism. Which layer, if any, could sustain this organism?
 - 10 cm layer
 - 15 cm layer
 - 20 cm layer
 - This organism would not thrive here.

- The y axis in the graph below best represents the concentration of which variable in the chart?



- Fe²⁺
 - SO₄²⁻
 - CO₂
 - O₂
- Which of the following statements is NOT true:
 - As depth increases acidity increases.
 - Depth and Fe³⁺ concentration have an inverse relationship.
 - Depth and temperature are positively correlated.
 - As depth increases acidity decreases.

Passage 2

An instructor has designed an experiment for his students to investigate the melting and solidification behaviors of paraffin (candle wax). He is required to perform two trial runs to ensure that the students are able to complete the experiment within the time allotted.

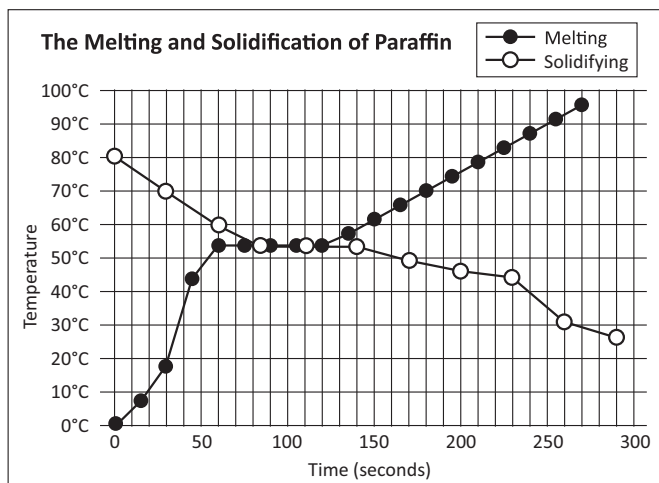
Trial 1

Melting. A large beaker of water was heated to a slow boil. A test tube with 100 grams of paraffin and a thermometer was lowered into the beaker of boiling water (100°C). The temperature was immediately read, and then reread every 15 seconds. Once the paraffin reached 53°C, it began to melt and its temperature remained constant until all the paraffin was melted, after which the temperature began to increase again.

Solidification. The test tube was then removed from the boiling water and left to cool at room temperature (20°C). The temperature was read every 30 seconds. The temperature dropped to 53°C and remained constant. After 23 minutes the paraffin was completely solidified and the temperature began to drop once more. The instructor found 23 minutes to be too long and repeated the experiment in trial 2.

Trial 2

The same test tube from trial 1 was placed in boiling water until all the paraffin was melted. It was then placed in a beaker of ice water at 0°C; the temperature was read every 30 seconds.



6. What is the most significant difference between the two trials performed by the instructor?
- F. The quantity of paraffin.
 - G. The environment used to cool the paraffin.
 - H. The temperature at which the experiment was started.
 - J. The amount of time permitted for the paraffin to fully melt.

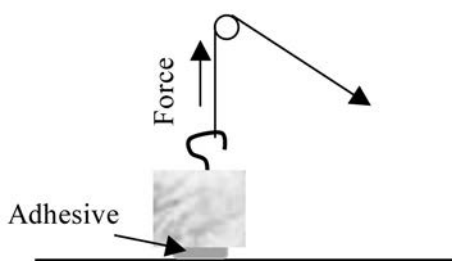
7. If the experiment had occurred in Colorado at 5380 ft above sea level, the water would have boiled at 94°C rather than 100°C, due to the altitude difference. How would this have affected the outcome of the experiment?
- A. More water would have been needed to melt the paraffin completely.
 - B. Less water would have been needed to melt the paraffin completely.
 - C. The paraffin would have evaporated.
 - D. It would have taken longer for the paraffin to fully melt.
8. During trial 1, the paraffin was completely solidified at:
- F. 11 minutes
 - G. 180 seconds
 - H. 75 seconds
 - J. 23 minutes
9. The instructor incorporated the ice bath for the solidification of the paraffin in his write-up for the students. One pair of students used very little ice in their cooling bath, and it completely melted long before the paraffin had completely solidified. How might this have changed their results?
- A. Their results would be identical to those of their classmates.
 - B. The solidification phase of their curve would have a downward slope.
 - C. The solidification phase of their curve would have an upward slope.
 - D. The solidification phase of their experiment would be extended beyond that of their classmates, but still remain flat.
10. Based on the graph, which of the following statements can be made about paraffin?
- F. It takes 100 g of paraffin 60.0 seconds to start to solidify when placed in boiling water.
 - G. The temperature at which paraffin changes phases is different when heating it up than when cooling it down.
 - H. After melting, paraffin increases temperature steadily.
 - J. Paraffin takes more time to completely melt than to completely solidify.

Passage 3

A chemical company's attempt to develop a new sealant resulted in a polymer with a putty-like consistency and some adhesive properties. Rather than discarding the polymer, the company's research-and-development scientists decided to investigate its utility as an adhesive for hanging pictures and posters. They made a number of formulations, and then ran a series of experiments to determine the optimal formulation for this application. Each formulation contained only the polymer and mineral oil.

Experiment 1

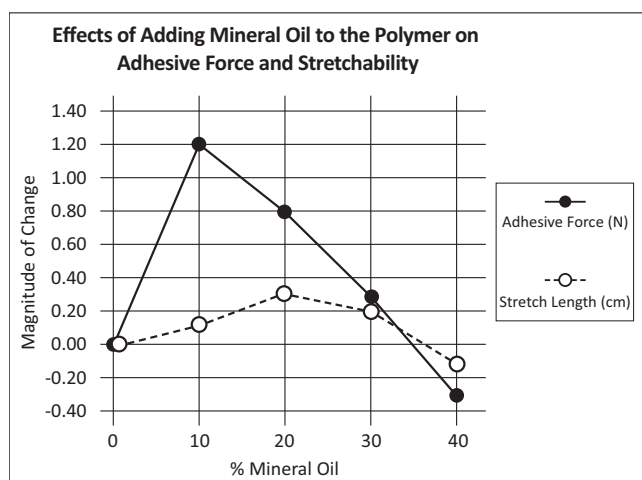
Adhesive force. One hundred grams of each formulation were molded into spheres and placed on a clean metal surface. A 500-g stone cube with a hook was pressed onto each individual sphere with 2 kg of pressure for 5 seconds. A cable with negligible mass and stretchability was then connected to the hook on the cube, along with a force gauge. The adhesive force of each of the formulations was measured only once.



Experiment 2

Tensile strength. One hundred grams of each formulation were molded into cylindrical shapes and stretched until they broke. Each sample was tested 10 times and results were averaged.

The results of the two experiments are shown graphically below:



Note that each point on the graph represents the magnitude of change from the formulation containing no mineral oil. Also, note that the tendency to break would be the inverse of stretch length. The scientists were looking for a formulation that maximized the force of adhesion and minimized the tendency to break when stretched.

11. According to this graph, the percent of mineral oil has the greatest effect on the putty's:
 - A. Ability to hold a picture on a hot day.
 - B. Adhesive force.
 - C. Stretch length before breaking.
 - D. Flexibility.
12. Based on the trends in the data gathered in these initial experiments, the scientists decide to conduct a few more experiments to determine the optimal adhesive formulation for hanging pictures and posters. What would you suggest that they try next?
 - F. No further experimentation is required; it is obvious from the data that formulation 2 with 10% mineral oil and 90% polymer is the best possible formulation for hanging pictures and posters.
 - G. Repeat the experiments with a new set of five formulations that contain between 50 and 100% mineral oil.
 - H. Repeat the experiments with a new set of five formulations that contain between 0% and 20% mineral oil to better define the optimal formulation.
 - J. Repeat the experiments with the same percentages of mineral oil, but at -100°C .
13. The experimental design of the adhesive-strength test differs from that of the tensile-strength test, which might lead one to question the reproducibility of the adhesive-strength test results. What is this difference?
 - A. It is run by different researchers.
 - B. Different units are used (Newtons vs. cms).
 - C. Each sample in the adhesive-strength experiment was only tested once.
 - D. The polymer was molded into a sphere rather than into a cylinder.

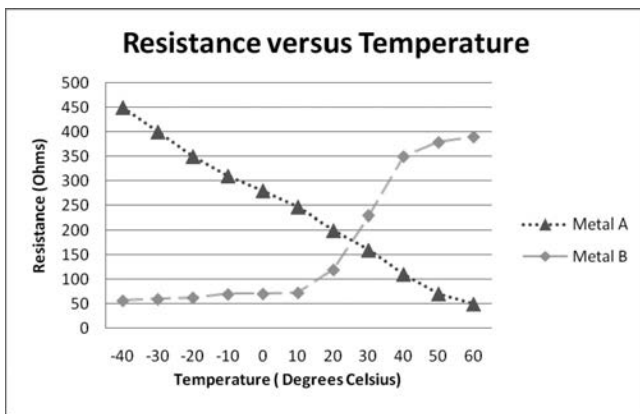
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15 Minutes – 13 Questions

Passage 1

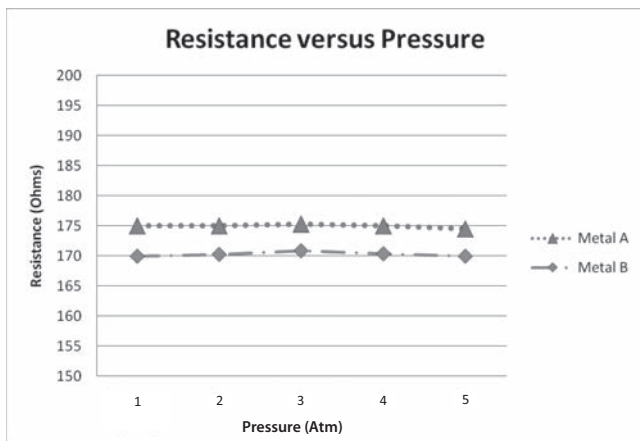
Certain metals undergo a change in conductivity with a change in temperature, making them useful as temperature sensors. A metal's conductivity can be quantified by measuring its electrical resistance. A high conductivity would result in a low resistance and vice versa. In this experiment, the resistances of Metal A and Metal B were measured from -40°C to 50°C as shown in Graph 1:

Graph 1:



A second experiment was conducted to determine the effects of ambient pressure on the resistance of metals A and B. The temperature was held constant and the following results were obtained:

Graph 2:



- Based on the data shown, how does an increase in ambient pressure affect the resistance of the metals?
 - Metal A's resistance goes up; Metal B's resistance goes down.
 - Metal A's resistance goes down; Metal B's resistance goes up.
 - Both Metal A and B's resistances increase.
 - Neither Metal A nor Metal B appears to be affected.
- Most households set their thermostats at about 20° Celsius. Which metal(s) would be most appropriate to use when designing a thermostat for home use? In other words, which metal(s) give the largest change in conductance in response to a change in temperature within the temperature range maintained in the typical home?
 - Metal A
 - Metal B
 - Either Metal A or B would be suitable.
 - Neither Metal A nor B would be suitable.
- A large increase in pressure will cause an increase in temperature in an environment in which the temperature has not been held constant. The researchers kept the temperature constant to make certain that any changes in resistance were solely caused by a change in pressure. Estimate at what temperature the researchers measured the effects of pressure on resistance?
 - 5° Celsius
 - 22° Celsius
 - 45° Celsius
 - 75° Celsius
- Conductors tend to increase in resistance with an increase in temperature. Semiconductors tend to decrease in resistance as temperature increases. Which of the following can you infer from the data?
 - Metal A is a conductor; Metal B is a semiconductor.
 - Metal A is a semiconductor; Metal B is a conductor.
 - Both Metal A and B are semiconductors.
 - Both Metal A and B are conductors.

5. Over the course of a flight, a passenger jet may experience outside temperatures as cold as -40°C and as warm as 50°C . Which metal(s) would be appropriate for a temperature sensor positioned on the jet's outside surface?
- Metal A
 - Metal B
 - Neither would be suitable for this application.
 - Either one of these would be suitable.

Passage 2

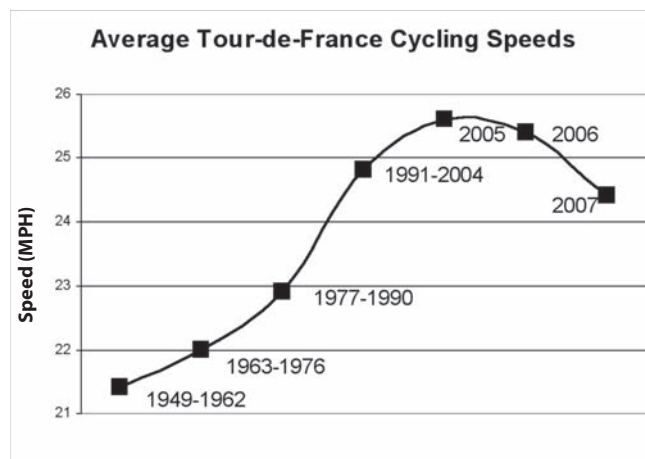
Patients with chronic anemia don't have enough oxygen-carrying red blood cells to meet the body's requirement for oxygen. This causes the patients to suffer from tiredness along with an inability to think clearly. Historically, blood transfusions, which restore red blood cells to normal levels, were used to treat the condition. In the late 1980s, however, pharmaceutical companies began to market a commercially produced protein—erythropoietin, also known as EPO—to treat chronically anemic individuals. EPO is a naturally occurring hormone that induces the body's bone marrow to produce more red blood cells.

Just as a deficiency in red blood cells can cause tiredness, more-than-sufficient levels of red blood cells can enhance athletic performance by increasing both speed and endurance. For instance, competitive cyclists have long been known to enhance their performance by increasing red blood cell loads with blood transfusions or by training at high altitudes. It wasn't long before EPO became the drug of choice for competitive cyclists.

The average earnings among today's cycling professional is approximately \$1 million per year, and according to some analysts, the likelihood of getting caught doping under the current drug-testing regimen is only 10%. Moreover, the penalty for getting caught is primarily suspension from competition, resulting in lost income. These analysts also believe that the likelihood that a nondoping rider will be cut from the team for being noncompetitive is 50%. These assertions lead the analysts to conclude that the likelihood that a doping rider will win the Tour de France under current regulations and testing regimens is 100%.

Although changes in EPO levels are not easily detected using standard scientific methods, the effects of EPO can be measured by determining the percentage (by volume) of red blood cells in the blood. Approximately 45% of blood volume for a normal male consists of red blood cells. With training, endurance athletes can boost this percentage to the low 50

range. EPO usage can push those levels even further, to the high 50s and higher. The following graph suggests that EPO, along with other performance enhancing drugs, came into common use in competitive cycling in the 1990s:



6. The average increase in speed from 1963–1976 to 1977–1990 was approximately 4%. This increase can be accounted for by improvements in equipment, nutrition, and training. What is the approximate increase in speed from 1977–1990 to 1991–2004?
- 2%
 - 8%
 - 20%
 - 35%
7. When the percent of red blood cells in the blood reaches levels of 60% or greater, the blood clots easily, leading to an increased chance of heart attack or stroke. The risk of clot formation is particularly high during sleep when the heart rate slows to its lowest levels. The resting heart rates of endurance athletes are known to be lower than those of the general population. Who in the following list is most likely to form a blood clot that may lead to a heart attack or stroke?
- An EPO-doping cyclist during a strenuous workout.
 - An average person running hard to catch a bus.
 - An EPO-doping cyclist during deep sleep.
 - An average person during deep sleep.

8. To prevent EPO doping, the Union Cycliste International (UCI)—the governing body for competitive cyclists—set the limit for allowable red blood cell percentages in a competing athlete’s blood to 50%. Which of the following is the most likely practice used by EPO-doped cyclists to avoid disqualification?
- F. The use of diuretics to reduce blood volume through excretion of urine.
 - G. Transfusing the blood with saline (isotonic salt water) to increase blood volume.
 - H. The use of aspirin to prevent blood clotting.
 - J. Using a noncompeting individual’s urine sample during routine urine testing.
9. Which of the following strategies would reduce doping to the lowest levels in this sport?
- A. Better methods and protocols for detecting drug use.
 - B. Higher penalties for getting caught.
 - C. Team penalties (disqualification and/or fines) if individual members of the team are caught doping.
 - D. Combining all of the above strategies.
10. Which of the following is a likely explanation for the shape of the curve in the graph?
- F. From 1949 to 1990, more cyclists began doping with EPO and other performance-enhancing drugs, thereby increasing average speeds; public outcry in 2007 reversed this trend.
 - G. Variations in weather conditions can account for the shape of the curve.
 - H. Cyclists started using EPO in the early 1990s, leading to dramatic increases in average cycling speeds; more stringent testing in 2007 led to massive disqualifications, reducing the average cycling speed of the cyclists remaining in the competition.
 - J. Natural selection can account for the shape of the curve.

Passage 3

Saturation of a solution is reached when no further solute can be dissolved. In the following experiment, the saturation point of glucose (the solute) is determined, which then allows students to determine the amount of glucose dissolved in each of three unknown solutions.

Students were given three flasks, each containing 100 mL of water in which unknown quantities of glucose had been dissolved. A fourth flask was prepared with a 100 mL of pure water, labeled D. The students then stirred in incremental quantities of glucose into each flask until no more could be dissolved. Table 1 demonstrates the results:

Table 1

Flask	Grams of glucose that could be dissolved at 20°C:
A	3.0
B	0.0*
C	0.3
D	10.0

*The first incremental addition of glucose could not be dissolved.

11. According to the data in Table 1, the maximum amount of glucose dissolvable in water at 20°C is:
- A. 3 g/L
 - B. 10 g/L
 - C. 2.1 g/L
 - D. 100 g/L
12. Approximately how much glucose was in flask B before the first incremental amount of glucose was added?
- F. 0.0 grams
 - G. 3.0 grams
 - H. 7.0 grams
 - J. 10.0 grams
13. Approximately how much glucose was in flask A before the first incremental amount of glucose was added?
- A. 0.0 grams
 - B. 3.0 grams
 - C. 7.0 grams
 - D. 10.0 grams

**END OF TEST.
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15 Minutes – 13 Questions

Passage 1

A medium-sized sedan was driven at a constant speed on a level road, and its average fuel consumption was measured in miles per gallon (mpg). The procedure was repeated several times; each time the sedan traveled at a different constant speed. The results are shown in Table 1.

Table 1: Effects of speed on gas mileage

Speed (mph)	Average Gas Mileage (mpg)
45	28.2
55	26.6
65	25.3
75	23.9
85	19.3
95	12.7

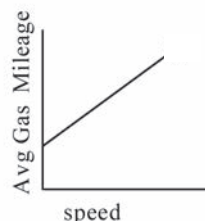
The fuel consumption of this same vehicle was then measured with state-of-the-art sensors as the vehicle was accelerated from 0 mph to 65 mph at various rates of acceleration. The results are tabulated in Table 2.

Table 2: Effects of acceleration on gas mileage

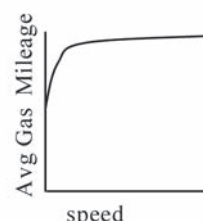
Time 0–65 mph (sec)	Average Gas Mileage (mpg)
30.0	14.7
25.0	10.6
20.0	7.4
15.0	4.2
4.7 (maximum acceleration)	1.4

1. Which of the following charts most accurately reflects the data in Table 1?

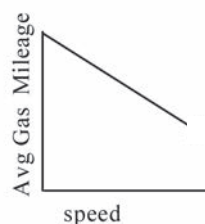
A.



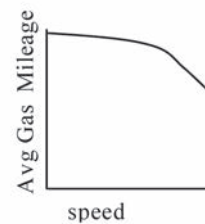
B.



C.



D.



2. A friend, who is driving on the interstate, is running very low on fuel and is 20 miles away from the nearest gas station. What would you recommend?
- F. Drive at the highest speed allowed, thereby spending the least amount of time on the road and getting to the gas station as fast as possible.
- G. Drive at the lowest speed allowed, letting faster vehicles pass you.
- H. Get off the interstate, taking a shortcut that is 90% closer, but with 25 stop lights along the way.
- J. Get off the interstate, taking a road that is the same distance from the gas station and has no stop lights, but with a speed limit of 25 mph, which is 15 mph less than that minimum speed allowed on the interstate.

Passage 2

The effluent from a certain industrial waste site must be 99.5% free of contaminants before it can be released to the adjacent river as required by EPA regulations. The company's chemical engineers have developed a three-step purification system to meet EPA requirements. The temperature of the water is brought to 20°C in a holding tank before it is passed sequentially through the three filtration systems described below.

System 1 utilizes electrically charged plates, which attract impurities from the water as it flows past. Table 1 shows the effect of voltage on contaminant elimination:

Table 1.

Voltage (Volts)	Contaminants removed (%)
25	20
50	50
100	90
500	80
2000	75
5000	60

System 2 further purifies the effluent after it has passed through System 1's 100-Volt plate. System 2 passes the effluent through a filter with a specified pore size. The engineers tested several different filters to determine which filter would be required at this step to meet EPA standards. Table 2 lists the results:

Table 2.

Filter Pore Size (Microns)	Contaminants removed (%)	Filter service life (Gallons)
500	5	200,000
300	20	100,000
200	50	20,000
100	80	2,500
50	90	500

System 3 oxidizes the remaining contaminants with oxygen dissolved in the effluent coming out of System 2. The engineers varied the oxygen concentration to optimize the purification efficiency as shown in Table 3:

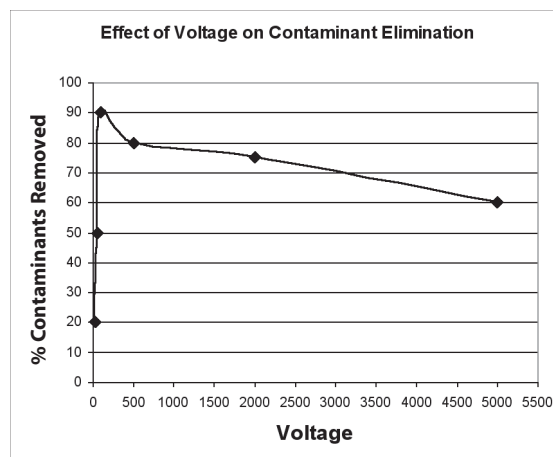
Table 3.

Dissolved Oxygen concentration (%)	Sulfur removed (%)	Nitrogen removed (%)	Phosphorous removed (%)
1	80	60	10
3	90	65	40
5	91	60	35
10	92	50	30
15	93	20	25

- Assume that after the industrial effluent has passed through systems 1 and 2, it is contaminated with equal parts of sulfur, nitrogen, and phosphorus. What percentage of dissolved oxygen in the final step of purification would eliminate the most total contaminants?
 - 3%
 - 5%
 - 10%
 - 15%
- Which of the following statements is least correct regarding system 3?
 - Higher oxygen concentrations enhance the removal of sulfur.
 - Higher oxygen concentrations decrease the removal of nitrogen.
 - Mid-level oxygen concentrations enhance the removal of sulfur.
 - Lower oxygen concentrations enhance the removal of nitrogen.
- The chemical engineers decide to use 100-volt plates (System 1) and 50-micron filters (System 2) in the purification process. What percentage of the contaminants will have been removed from the effluent by the time it reaches System 3?
 - 81%
 - 90%
 - 99%
 - This cannot be determined from the information given in the passage.

6. How would increasing the temperature of the water to 40°C affect the filtration?
- F. It would increase efficiency because it would decrease plate voltage.
- G. It would have no effect on efficiency.
- H. It would increase the pore size of the filters, allowing more particles to slip through.
- J. This cannot be determined from the information given in the passage
7. Continuing the trend in data from Table 1, which of the following would be the LEAST likely result for a plate voltage of 7000 Volts?
- A. 65% contaminant removal.
- B. 55% contaminant removal.
- C. 50% contaminant removal.
- D. 45% contaminant removal.
8. Each of the industrial filters in System 2 costs \$50. One of the engineers has discovered that if the effluent is prefiltered through the 100-micron filter, then the service life of the 50-micron filter can be increased to 2,500 gallons. Then both the prefilter and the 50-micron filter need to be replaced. For each 2,500 gallons of effluent, how much would the company save by installing the 100-micron prefilter?
- F. \$50
- G. \$150
- H. \$200
- J. \$250

9. This same engineer realized the company might be able to save even more money on filters by decreasing the contaminant load in the effluent before it reached step 2 of the purification process. The engineer made a plot of the data from Table 1 to examine if further purification could be achieved by modifying Step 1 of the purification process.



The engineer was most likely to conclude which of the following?

- A. Greater purification could be achieved if they increased the voltage to 500 volts.
- B. The data provides conclusive evidence that the maximum purification that could be achieved in Step 1 is 90% contamination removal.
- C. The graph suggests that it would be worthwhile to gather more data points within the 50 to 500 Volt range to more precisely determine the optimal voltage for purification. If the contaminant removal could be increased by only 2%, this would greatly increase the service life of the filters in Step 2 of the purification process.
- D. The graph suggests that it is unlikely that gathering more data within the 50- to 500-Volt range would increase contaminant removal by more than 2–3%, and that this wouldn't be enough to substantially increase the service life of the filters in Step 2 of the purification process.

Passage 3

Students prepared four different aqueous nitrate salt solutions— AgNO_3 (flask 1), $\text{Pb}(\text{NO}_3)_2$ (flask 2), $\text{Hg}_2(\text{NO}_3)_2$ (flask 3), and NaNO_3 (flask 4). They were also given a fifth flask that was empty. Students added 200 mL of water to each of their four flasks, stirring flasks 1–4 until the salts were dissolved. The molar concentrations of the nitrate salts in flasks 1–4 were equivalent.

Step 1: Students then added incremental amounts of NaCl to each of the five flasks, stirring until each 0.1-gram increment was completely dissolved. They repeated the incremental additions of NaCl to each flask (add 0.1-g NaCl and stir) until a total of 10.0 grams of NaCl had been added or until a precipitate appeared. Students found that after adding 1.2 grams of NaCl to flask 1, a precipitate formed. After adding 0.3 grams of NaCl to flask 3, the students observed a precipitate. Students were able to add 10 grams of NaCl to flasks 2, 4, and 5 without observing a precipitate.

Step 2: The students then added concentrated NH_3 to flask 1 and 3. The NH_3 caused the precipitate in flask 1 to dissolve, but did nothing to the precipitate in Flask 3. When the students added NH_3 to flask 2, it caused a precipitate to form. However, when they added the same volume of NH_3 to flasks 4 and 5, no precipitates were observed.

The students recorded their results in the following table:

Flask #	Initial solution (no precipitate)	NaCl added	NH_3 added
1	AgNO_3	1.2 grams—precipitate formed	Precipitate dissolves.
2	$\text{Pb}(\text{NO}_3)_2$	10.0 grams—no precipitate	Precipitate forms.
3	$\text{Hg}_2(\text{NO}_3)_2$	0.3 grams—precipitate formed	Precipitate remains.
4	NaNO_3	10.0 grams—no precipitate	No precipitate.
5	Pure water	10.0 grams—no precipitate	No precipitate.

10. When salts dissolve in water, they separate into individual ions. These ions can then recombine to form new salts that precipitate. At the end of step 2, the various ions that have been formed during the dissolution processes are the NO_3^- ion, comprising multiple atoms, as well as Ag , Pb , Hg , Na , and Cl ions. Which of the following salts precipitated from flasks 1 and 3 during Step 1?
- F. NaNO_3 precipitated in both flasks.
G. NaCl precipitated in both flasks.
H. Flask 1: AgCl , Flask 3: Hg_2Cl_2 .
J. Not enough information is provided in this passage to identify the precipitates.
11. Which of the following statements can be concluded from the results of Step 1:
- A. NaNO_3 is more soluble than NaCl .
B. NaCl is more soluble than NaNO_3 .
C. AgCl is more soluble than Hg_2Cl_2 .
D. Hg_2Cl_2 is more soluble than AgCl .
12. When the NH_3 was added to the aqueous solutions in step 2, it reacted with water to form ammonium (NH_4^+) and hydroxide (OH^-) ions. These ions can readily recombine with other ions in solution as well as with the ions in the precipitated salts. Based on this information and the results of Step 2, which of the following salts forms a precipitate when in aqueous solution?
- F. AgOH
G. $\text{Pb}(\text{OH})_2$
H. NH_4Cl
J. NH_4NO_3

-
13. The next day, the students observed that the amount of precipitation in flask 3 had increased. Which of the following approaches could the students use to identify the precipitated salt in flask 3 the day after the addition of NH_3 ?
- A. If the students added NH_3 to an aqueous solution containing only $\text{Hg}_2(\text{NO}_3)_2$ and a precipitate formed, it would prove that the precipitate formed in flask 3 was $\text{Hg}_2(\text{OH})_2$.
 - B. If the students added more NaCl to flask 3 and a precipitate formed, it would prove that the precipitate in flask 3 was Hg_2Cl_2 .
 - C. Both A and B above would be required to identify the precipitated salt.
 - D. Not enough information is provided in this passage to design an approach for identifying the precipitated salt.

**END OF TEST.
DO NOT TURN PAGE UNTIL TOLD
TO DO SO.**

Answers: English

Section 1, Passage 1

Innovation Reflects Well on Ingenuity of Magazine Readers

Question 1

Answer: C

Question Type: *Rhetorical Skills: Clarity of expression*

Explanation: This is an example of how the ACT will test your knowledge of idiom—expressions that aren't necessarily grammatically correct, but are acceptable because they are used so commonly. Theatrical scripts often use the term “enter” to designate the entrance of a character on the stage, e.g., “Enter Romeo.” This entrance often has a dramatic effect of some kind. Over time, it has become a common convention for writers to mimic stage directions by beginning a sentence with the word “Enter” and then naming some entity that might “enter” onto the scene for a particular effect (ironic, culminating, funny, etc.). Such is the idiom being suggested here by “Come onto the scene”; only the writer has gotten the idiom wrong. Alternative C corrects this mistake, whereas alternatives B and D are even more awkward than the original.

Question 2

Answer: H

Question Type: *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: In this case, the word “part” in the original version modifies the linking verb “is;” rather than saying the temperature of the earth “is” (i.e., *absolutely* is) a function of its surface color, the sentence says the temperature “part is” a function of its surface temperature. Rewriting the expression in this form makes the error even more blatant; we don't say something “part is” something else, but we *do* say something “partly is” something else. A verb must be modified by an adverb (such as “partly”) rather than an adjective (such as “part”). Alternative H corrects this error. Alternative G is idiomatically incorrect and confusing, and answer J makes no sense at all.

Question 3

Answer: C

Question Type: *Usage and Mechanics: Independent and dependent clauses; Verb tense*

Explanation: This sentence commits a “comma split;” it combines two independent clauses (clauses that can stand on their own as sentences) with only a comma. The clause “Things are now” is actually a complete (although odd) sentence. Unless it is changed to an independent clause, it needs to end in a period—or be combined with the following sentence using an appropriate coordinating conjunction. The

only acceptable option given here is to convert the independent clause to a dependent (subordinate) clause by choosing alternative C. Alternative C adds the subordinating conjunction “As” to the beginning of the clause, allowing it to be combined with the following independent clause with only a comma. Another way to solve this problem is by a process of elimination: alternatives B and D use incorrect verb tense, leaving only A and C—and giving you a 50-50 chance of getting the answer right.

Question 4

Answer: G

Question Type: *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The negative expression “do not come from” in the first clause of the sentence suggests an ensuing contrast; when a sentence tells you what something is not, it nearly always goes on to tell you what that something *is*. Therefore, the transition word introducing the second part of the sentence, the part that comes after the comma, should be a word that denotes contrast. That's why the word “and” doesn't make sense here; it suggests another element in a list of similar things rather than a contrast. Alternative H (“also”) is wrong in the same way. Both alternatives G and J are contrast-signaling transition words, but only one of them fits the sentence. The word we need here is a word that means something like “instead,” but the meaning of the word “although” (J) does not pull this off; it suggests a minor exception, rather than a solid contrast. (It also turns the clause into an incomplete subordinate clause.) The word “but” (G) is a much better synonym for “instead;” it suggests the clear contrast that the author is trying to convey.

Question 5

Answer: B

Question Type: *Rhetorical Skills: Clarity of expression*

Explanation: The ACT writers often test your ability to spot ambiguity in a sentence, and this is an example of one of those questions. The placement of a noun in relation to a preposition can have a significant effect on how a sentence is interpreted. Since the noun that follows the comma in the original sentence is “sofa,” the sentence makes it unclear whether world problems “come from” the sofa or “come from” Joe Six-pack. This ambiguity is unnecessary, and is resolved by placing the correct object of “come from” immediately after the comma, as in alternative B. This makes it clear that the solutions come from Joe Six-pack rather than from his sofa.

Question 6**Answer: F****Question Type:** *Usage and Mechanics: Verb tense*

Explanation: This is a straightforward verb tense question. The only difference between the original version and the alternatives is that the tense of the verb “begin” is different. To make the correct choice, you have to look ahead of the underlined portion to figure out what tense is being used in the rest of the sentence. The verb “led” suggests that the sentence is in the past tense, eliminating alternatives G and J (which are present tense verbs). The difference between past tense verbs “began” (F) and “had begun” (H) is subtle. “Began” is a simple past tense verb; it denotes an action that took place in the past and is no longer occurring. “Had begun” is a past perfect tense verb; it denotes an action that happened in the past and occurred before some other past event. Since no other past event is implied in the sentence, the simple past tense “began” (F) is more appropriate here.

Question 7**Answer: A****Question Type:** *Usage and Mechanics: Subject-verb agreement; Verb tense*

Explanation: Alternatives B through D test your ability to eliminate inappropriate verbs. Alternative D is incorrect, because it is the wrong tense; “will” is future tense, whereas the following verb “led” is past tense. Alternative C is incorrect because it is of the wrong number; the subject of the sentence is “use,” a singular subject, whereas “have” is a plural verb. Alternative B, “had,” is also the wrong tense; it is a past perfect tense verb, implying something happening before some other past event. Since the verb “led” is in simple past tense, the other verbs in the sentence must match. Only the original, “has,” is correct in both tense and number.

Question 8**Answer: G****Question Type:** *Usage and Mechanics: Fragments; Punctuation*

Explanation: The original version and alternatives H and J share the same problem: They create a sentence fragment. The phrase that begins with “A reduction of” in the original version and “Reducing” in alternative H is a noun phrase without a verb, and so cannot stand alone as a sentence. A sentence must have both a noun and a verb. Likewise, an independent clause—such as that indicated by a dividing semicolon (alternative J)—must have both a noun and a verb. Answer G eliminates the sentence fragment by combining it with the preceding sentence. In this way, the phrase becomes an object for the preposition “to” and completes a perfectly legitimate sentence.

Question 9**Answer: B****Question Type:** *Rhetorical Skills: Redundancy*

Explanation: Alternative B is the only replacement for the underlined portion that fixes its redundancy. If added words add no meaning, formal writing dictates that they be eliminated. In this case, merely eliminating one of the synonyms (“clever” or “smart”) is not given as an option. Instead, the alternatives replace one of the synonyms with a different word. Your job is to choose the two words that are different enough to not be redundant. Alternative B (“clever and sensible”) is the best option; something can conceivably be “clever” without being “sensible,” but it would be difficult for something to be “intelligent” without being “smart,” or “brilliant” without being “clever.” Answer B adds new meaning to the sentence, whereas answers C and D do not.

Question 10**Answer: J****Question Type:** *Usage and Mechanics: Pronoun usage; Punctuation*

Explanation: The underlined pronoun “their” refers back to the noun “citizen.” Since “their” is a plural pronoun (i.e., it should only refer back to a plural noun), it does not match the singular noun “citizen.” This is a common error in written and spoken English, so you can be sure the ACT writers will test your ability to spot it. Either changing the singular noun to a plural noun or changing the plural pronoun to a singular pronoun will solve the problem. In this case, since the pronoun is the only thing you can change, you should replace the plural pronoun “their” with a singular pronoun. Alternatives H (“its”) and J (“his”) are both plural pronouns, but a “citizen” is better represented by the pronoun “his” since “its” generally refers back to a non-human noun. Alternative G (“they’re”) is incorrect both because it is plural and because it adds the verb “are”—testing your ability to make sense of contractions.

Question 11**Answer: C****Question Type:** *Rhetorical Skills: Wordiness; Clarity of expression*

Explanation: Here’s a classic example of wordiness—using a bunch of words where just a few would do. Not only does the use of unnecessary words tax patience, it also shifts the focus of a sentence away from important ideas and onto verbiage. All of the alternatives to the original solve the wordiness problem, but alternatives B and D add other problems. Alternative B uses an idiom incorrectly (“for the world” instead of “in the world”) and answer D is ambiguous; it is unclear whether “a roof” refers to a single (presumably very large) roof, or is representative of every roof on earth. Alternative C is short and sweet, idiomatically sound, and unambiguous.

Question 12**Answer: J****Question Type:** *Usage and Mechanics: Adverb vs. adjective; Verb tense*

Explanation: If you notice that the word “darkly” seems out of place here, then it should be easy to find the correct alternative by searching for an answer that changes that word without causing any other problems. Alternative J accomplishes this by changing the adverb “darkly” to the adjective “dark”—which now refers to the tiles rather than to the verb “turn”. Tiles that “turn dark” make more sense in context than tiles that “turn darkly.” The other alternatives, G and H, correct the adverb problem, but also change the tense of the verb “turn” to make it incompatible with the modal verb “would.”

Question 13**Answer: B****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: As with most questions that ask you to put paragraphs in order, look to the first sentences of the paragraphs for clues. Of particular interest are paragraph-opening sentences that begin with transition words like “But” (as with paragraph 5), because they can only follow paragraphs for which the transition makes a good link. It is natural for the contrasting “But other readers expressed misgivings...” to follow the presentation of a central idea. The central idea of the passage is Mike Willenfall’s “white roof” idea, and the paragraph that describes it (paragraph 1) fits well before the contrasting “But” in paragraph 5. Only answer B has paragraph 5 following paragraph 1, and the order, thereof, creates a passage that moves logically from idea to idea.

English Section 1, Passage 2**The Boston Tea Party: Patriotism or Profiteering?****Question 14****Answer: H****Question Type:** *Usage and Mechanics: Verb agreement*

Explanation: This is an example of one of the trickier types of verb agreement questions you’ll find on the ACT. When deciding whether or not a verb is correct, it is very important to identify the noun associated with the verb. In this case, it may at first seem that “facts” is the noun (in which case the plural verb “suggest” would agree in number), but actually “examination” is the noun to which the underlined verb refers, and “of the facts” modifies that noun. Since the singular “examination” is the subject of the sentence, the verb must also be singular. Alternative H, “suggests,” is the only answer that gives a singular verb. Alternative J uses the same mismatched verb, “suggests,” but places it in the future tense by adding “will.” Answer G, “suggestion,” is a noun, which makes little sense in context.

Question 15**Answer: C****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The best option is to maintain the word for the reason given in answer C: “Because the word expresses a contradiction that needs to be emphasized.” The first paragraph sets up the theme of the passage, which is that what you learned in high school about the Boston Tea Party isn’t quite correct. In order to set that theme, the word “however”—or some such expression of contradiction—needs to be there. Otherwise, the two sentences would lose the “punch” of a clear contradiction, and, thus, the theme would be less than clear.

Question 16**Answer: G****Question Type:** *Usage and Mechanics: Fragments*

Explanation: As the passage stands, there is a fragment that begins, “Sold by”. The phrase is a modifier to “Chinese Tea;” it does not contain a subject—just a verb phrase. Without a subject, it is not a sentence and, so, should not be punctuated as one. The best correction to this is represented by answer G: simply eliminate the period and the capitalization of “Sold.” There is no reason to add commas or extra words in this case; the sentence is most clean and sensible without them.

Question 17**Answer: D****Question Type:** *Usage and Mechanics: Redundancy*

Explanation: This is a reasonably clear case of redundancy. Later in the same sentence, it is stated that the occurrence in question took place “in less than a year.” The underlined portion, “within a year,” expresses the same idea, so it is unnecessary. Answer D, to simply eliminate it, is the best answer, because it is the only alternative that removes the redundancy.

Question 18**Answer: G****Question Type:** *Rhetorical Skills: Clarity of expression*

Explanation: This is one of those rare cases where shorter isn’t better. The shortest answer in the batch is alternative H, but its form does not “flow,” and it’s a bit confusing. The same could be said of all of the alternatives but G. Alternative G is so arranged as to put emphasis on the important points—the “Tea Act” and what it allowed. It also flows the most naturally. Sometimes, a sentence that sounds best to your “ear” will be the best sentence, if it has no grammatical errors.

Question 19**Answer: D****Question Type:** *Usage and Mechanics: Independent and dependent clauses; Fragments; Punctuation; Adverb vs. adjective*

Explanation: The first two words of the sentence function as an adverb only and cannot be considered a complete clause. For this reason, the clause to which they are linked must be an independent clause; a dependent phrase, like “Not surprisingly,” can be successfully linked to an independent clause, but linking it to a dependent clause creates a fragment. Unfortunately, the next part of the sentence begins with the subordinating conjunction “as”—which makes it a subordinate (i.e., dependent) clause. Something must be done to either: (1) convert the adverbial phrase into an independent clause, or (2) convert the subordinating clause into an independent clause. Although correction (1) is not one of your options, correction (2) is represented in alternative D; by eliminating the subordinating conjunction “as,” the clause is transformed into an independent clause whose verb (“became”) is now modified by the adverbial “Not surprisingly.” Alternative B commits another dependent clause error: a semicolon should separate two independent clauses, not an adjective and a subordinate clause. Alternative G commits two errors; the adjective “surprising” is not appropriate in its adverbial role here, and the second clause remains an inappropriate subordinate clause.

Question 20**Answer: J****Question Type:** *Usage and Mechanics: Pronoun usage*

Explanation: This is a question that tests pronoun usage—specifically, pronoun case. Pronoun case refers to the different “roles” different pronouns can play. Some pronouns can play the role of subject, but not the role of object - such as “he” or “they.” Other pronouns can play the role of an object, but not the role of subject—such as “him” or “them.” The mistake in the original version of this sentence is that the word “Him” is playing the wrong role; it is playing the role of a subject (the noun that acts upon something in the sentence), when it is only able to play the role of object (a noun that is acted upon in a sentence). Therefore, it needs to be replaced with a pronoun that is suited to the role of subject (i.e., that is of the subject case); it needs to be replaced with “He” (alternative J). Alternative G is incorrect in number (plural instead of singular), and alternative H is another case problem (“One” refers to a non-specific person, whereas this pronoun needs to refer to the specific “Hancock” of the previous sentence).

Question 21**Answer: A****Question Type:** *Rhetorical Skills: Clarity of expression*

Explanation: In this case, the addition is entirely appropriate because it adds a needed explanation to the idea that Hancock and Adams “had little trouble drumming up resistance.”

Without the addition, that statement seems underdeveloped. Answer D, then, is incorrect, because the clause is closely related to the one that precedes it. Answer B is incorrect because the clause does not explain “why the people of Boston preferred Dutch tea.” In fact, the passage implies that it was the price of the tea, not its profitability, per se, that made it attractive to Bostonians. Nor is it true, as answer C implies, that the clause would be redundant if added to the passage.

Question 22**Answer: F****Question Type:** *Usage and Mechanics: Fragments*

Explanation: The underlined portion is best left as is. This is because all three alternatives to the original create a fragment that begins with the word “And.” “And public dissent” has a noun but no verb, so it cannot stand on its own as a sentence.

Question 23**Answer: C****Question Type:** *Usage and Mechanics: Fragment; Punctuation; Independent and dependent clauses*

Explanation: Sometimes the ACT writers will ask you to correct a fragment (an incomplete sentence) by combining it with an adjacent sentence. This is an example of that kind of question. The only grammatically correct way to solve the problem made in the original version is alternative C, which connects with a comma the fragment (a dependent clause) to the independent clause that follows it. The other alternatives either maintain the fragment problem or use incorrect punctuation. (A dash should be used to set off something that comments pointedly on what precedes it, not to separate a dependent clause from an independent clause that follows it quite naturally.)

Question 24**Answer: F****Question Type:** *Rhetorical Skills: Redundancy; Adverb vs. adjective; Clarity of expression*

Explanation: If you try out all of the alternatives besides F, you may notice that none of them quite makes sense. Alternative G uses the adjective “planned” where an adverb should be. Alternative H makes the same mistake, and compounds it by changing “planned” to “plan”—putting two nouns in a row where one should be a modifier. Alternative J is similar. If none of the alternatives besides “omit” makes sense, try omitting the word and see if anything is lost or gained. It turns out that the expression “elaborately prepared” is redundant when the previous “detailed plans” is taken into account—they say almost exactly the same thing. Not only is nothing lost in eliminating the expression, but the sentence becomes cleaner and more precise. In the case of a redundant expression, eliminate it—if that is one of your options.

Question 25**Answer: D****Question Type:** *Rhetorical Skills: Redundancy*

Explanation: Answer D is correct, because it is the only alternative that corrects a problem of redundancy. An act of “civil disobedience”—a willful disobeying of the law—is necessarily an act of “defiance,” so to refer to it as a “defiant” act is to be redundant. The ACT writers are very strict about redundancy; if two words or phrases mean pretty much the same thing, you should choose the option that eliminates one of them.

NOTE: If you are the first to find an error of any type, please send us an email at info@testprepseminars.org and we will send you a \$20.00 gift certificate from Best Buy. Include your name, mailing address, and details about the error.

English Section 2, Passage 1**Explosive Computer Virus****Question 1****Answer: B****Question Type:** *Usage and Mechanics: Punctuation; Independent and dependent clauses*

Explanation: This sentence is really two sentences connected by a comma. This is called a comma splice, and it is incorrect. Commas can be used to link dependent clauses to independent clauses, but they cannot be used to connect two independent clauses. Instead, a conjunction (*and*, *but*, *or*, etc.) and a comma should be used, a semicolon should be used, or the sentence should be rewritten as two sentences. Answer B provides the first of these three fixes. (Answer C is missing a needed semicolon.)

Question 2**Answer: H****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The ACT will frequently test your ability to identify correct and incorrect transition words. The word “but” implies a transition from one statement to some kind of *contradiction* of that statement. That doesn’t seem to fit here. Instead, the author seems to be using two details that have the same thrust: (a) “the post-war Soviet Union had managed to beat the U.S. into space” and (b) “[the Soviet Union’s] prowess in nuclear engineering had led to the Cold War.” Both of these statements suggest that the Soviets had accomplished great things in technology; they do not seem to be contradictory. A better transitional word would be “and”, since it indicates that both things combine in an additive way to support the “Soviets as technological giants” statement being made.

Question 3**Answer: D****Question Type:** *Usage and Mechanics: Punctuation; Clarity of expression*

Explanation: When a modifying phrase precedes an independent clause, a comma should be used to separate them. In this case, the modifying phrase is “In 1981.” It modifies the verb of the independent clause that follows. As such, it should be set off with a comma. Answer D does this. Answer B commits the same error as the original sentence; “in 1981” should be separated out with commas. The commas in answer C make the phrase nonsensical.

Question 4**Answer: J****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: As written, the paragraph doesn’t quite make sense. The “Farewell Dossier” of the first sentence is taken up out of the blue. The second sentence does little to clear things up; it reveals the state of Soviet technology, but it is not clear what that has to do with the “Farewell Dossier.” The most logical ordering of this paragraph—and many paragraphs—is accomplished by putting the sentences in causal chain order: Soviet lack of computer technology (sentence 2) leads to the Soviet attempt to “catch up” (sentence 3) which leads to a specific plan for doing so that had been effective (sentence 1). In this order, each sentence lays the foundation for the next.

Question 5**Answer: A****Question Type:** *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: The ACT will occasionally test your ability to correctly choose between an adjective and an adverb. This is an example of that kind of question. The word being modified by “legitimately” is the verb “purchase,” and so an adverb is needed. “Legitimately” is the adverb form of the word “legitimate,” so it is correct. “Legitimate” is incorrect because it is an adjective, and so should not be used to modify a verb. “Legitimateness” is a noun form, and by itself it makes no sense in the sentence; “computer system legitimacy” (whatever that is) cannot be purchased. Answer D adds the preposition “by,” which begs an object. No object is provided in the sentence, so D is also incorrect.

Question 6**Answer: J****Question Type:** *Usage and Mechanics: Independent and dependent clauses*

Explanation: As written, this sentence uses a subordinate clause where an independent clause should be. Conjunctions like “and” can be used to link two complete, independent clauses, but cannot be used to link a dependent, subordinate clause to an independent clause. In this sentence, the adverb “As” makes the first clause a subordinate clause, so it cannot be linked to another clause with just “and.” Answers G and H retain the subordinate clause status of the original clause,

so they fail to solve the problem. The best answer is answer J, which converts the subordinate clause into an independent clause.

Question 7

Answer: D

Question Type: *Usage and Mechanics: Clarity of expression*

Explanation: This is an example of a misplaced modifier, a situation in which a modifier seems to be modifying the wrong thing. In this case, the wrong thing is “the Farewell Dossier,” which seems to be modified by the phrase “More than willing to assist a traditional ally.” Clearly, a dossier—a bunch of documents—cannot be “willing” to do anything. The modifying phrase refers to “the French,” but its close proximity to “the Farewell Dossier” confuses things. Instead, “the French” should be shifted so that it immediately follows its modifying phrase; then the relationship between the subject and its modifying phrase becomes clear. Answer D is the only option that does this.

Question 8

Answer: J

Question Type: *Rhetorical Skills: Clear and appropriate transitions*

Explanation: This is another example of an ACT transition question. Using the transition “also” (which introduces another example of something) before “ejecting all of the KGB agents it named immediately” makes no sense in conjunction with “the U.S. elected to use them in a counter-operation of its own;” it would have been impossible to have done both. Careful consideration will reveal that an immediate ejection of the spies must have been *rejected* as a tactic—an idea best expressed with the transitional phrase “Rather than”. None of the other transitions make sense.

Question 9

Answer: B

Question Type: *Usage and Mechanics: Correct verb tense*

Explanation: This is an example of a sentence in which two past tense verbs are combined to create an inappropriate verb. The auxiliary verb “had” can be combined with the verb “taken” to form the past perfect tense (indicating an action in the past that preceded another action in the past), but to combine the past perfect “had” with the simple past tense “took” is just wrong. Answer B constructs the past perfect tense correctly. Answer C leaves out the necessary “had.” Answer D converts the verb to the future tense, which makes it inconsistent with the first clause’s past perfect “had not acquired”.

Question 10

Answer: H

Question Type: *Rhetorical Skills: Redundancy; Pronoun usage; Verb tense*

Explanation: One of the ACT writers’ favorite things to test is whether or not you can identify redundancy in a sentence. If two synonymous words or phrases are used in close proximity, it is usually an error of redundancy. After the modify-

ing phrase “was designed” is used, the modifier “formulated” adds little or nothing to the reader’s understanding of the subject (“The planted software”). Simply take it out, and the sentence is cleaner and clearer. Answer G retains the redundancy, and adds an error of number with the pronoun “were.” Answer J retains the redundancy, and adds an error of tense with the verb “would be.”

Question 11

Answer: A

Question Type: *Rhetorical Skills: Wordiness; Clarity of expression*

Explanation: The ACT will expect you to identify and reject wordiness—the unnecessary (and often awkward) use of excess verbiage. The best answer here is the one already in the passage because it is concise. It gets the point across without taxing the reader unnecessarily, and it also delivers more “punch.” The alternatives are overly wordy and awkward.

Question 12

Answer: H

Question Type: *Usage and Mechanics: Parallel sentence structure; Verb tense*

Explanation: The original version of this sentence has a problem with parallel construction. Lists that include multiple nouns or verbs must use nouns and verbs of the same form. For instance, the first verb of the sentence in question (“caused”) is a past tense verb, so any other verb listed must also be a past tense verb. In this case, the next verb is “ushers,” which is a present tense verb. It needs to be changed to the past tense “ushered” to maintain the form that was established by “caused.”

Question 13

Answer: B

Question Type: *Rhetorical Skills: Theme and voice*

Explanation: This is a question that asks you to identify a major theme in a passage that would make it fit in one of these publication types. A good place to start when answering theme questions is to ask the question, “What was this passage all about?” You might come to the conclusion that this passage was about a scheme that went awry due to some clever counter-scheming. Answer B captures this because scheming and counter-scheming are implied by the word “intrigue.” Answers A and C represent relatively trivial aspects of the passage—certainly not major themes that would unite this essay with others in a collection. Answer D would represent a central topic, if it weren’t a misinterpretation of the passage; the essay details a case in which the KGB was decidedly unsuccessful.

English Section 2, Passage 2

Freud's Dream Analysis

Question 14

Answer: F

Question Type: *Rhetorical Skills: Wordiness*

Explanation: This is a style question. Sometimes the ACT will present you with several versions of a phrase or clause, none of which contains any grammar or punctuation errors. Instead, you must decide which version is most appropriate and effective on the basis of style. In this case, answers G and H are overly wordy; they are made awkward and lose their power by the addition of many unnecessary details—details that can be inferred from the single word “experiments” at the end of the sentence. Answer J also adds unnecessary details that can be inferred easily from the expression “Human life.” The best version is the original; it is more concise and allows the reader to focus on the theme the author is developing rather than unnecessary details.

Question 15

Answer: B

Question Type: *Usage and Mechanics: Pronoun usage*

Explanation: A pronoun should always agree with the noun to which it refers. In this case, the pronoun “itself” refers back to the noun “minds.” “Minds” is a plural noun that should refer to people; “itself” is a singular pronoun that refers to a non-human entity. What is needed is a plural pronoun appropriate for a human antecedent—“themselves.”

Question 16

Answer: H

Question Type: *Usage and Mechanics: Parallel sentence structure*

Explanation: This is an example of an ACT question that tests your ability to spot non-parallel construction in lists. Every item in a list (even if it's only two items long, like this one) should take on the same form. The two items in the list are preceded by “first” and “then.” The first item is “laughed at”—an adjective construction. Since the first item is an adjective, any other item in the list should also be an adjective. However, the second item in this list (“he was avoided”) consists of a pronoun, verb, and adjective; it breaks with the form set by the first item. The answer that maintains the established form is answer H.

Question 17

Answer: D

Question Type: *Rhetorical Skills: Redundancy; Punctuation*

Explanation: Although this question is really about redundancy, it also helps if you can identify correct punctuation. There is nothing wrong with the punctuation of the original, but the word “displeasing” is redundant because it adds nothing to the already stated “unpleasant.” Answers B and C add errors in comma usage to the redundancy problem. Answer D is correct because it removes the unnecessary and distracting word “displeasing” and maintains correct punctuation.

Question 18

Answer: F

Question Type: *Usage and Mechanics: Independent and dependent clauses; Punctuation; Clear and appropriate transitions*

Explanation: The original is fine the way it is, because two independent clauses—sentences that can stand on their own—are combined with a comma and an appropriate conjunction. G and H are incorrect, because they create a run-on sentence; two independent clauses are combined without a conjunction. Answer J is incorrect, because the conjunction “and” is inappropriate; the second statement is clearly an exception or qualification of the first, requiring a conjunction that expresses contradiction (“but” rather than “and”).

Question 19

Answer: D

Question Type: *Usage and Mechanics: Fragments; Independent and dependent clauses; Pronoun usage*

Explanation: The problem here is that the sentence beginning “Besides” and ending “subject” is a sentence fragment; it cannot stand on its own because the subordinating conjunction “Besides” makes it a dependent clause. Your only acceptable choice among the alternatives is to combine the dependent clause with the independent clause that follows it using a comma (answer D). (Note that answer B changes the adverb “there” to the possessive pronoun “their”—which makes no sense in the sentence.)

Question 20

Answer: J

Question Type: *Rhetorical Skills: Clear and appropriate transitions; Punctuation*

Explanation: The sentence, as written, has a problem with the use of a transition. “Since” is a common transition word that implies a causality relationship between what was said before and what will be said next. Specifically, the information after “since” should explain the existence of the information before “since.” It seems unlikely that “very few minds can thrive on [unpleasant truths]” would lead to “dreams tell[ing] us many unpleasant truths about ourselves.” Instead, the author’s intention must have been that the two conditions, when combined, lead to people who “don’t dare to face facts revealed by dream study.” This combining, additive relationship is best expressed by the transition word “and”—answer J. Answer G would also express such a relationship, if the punctuation used were a semicolon; two independent clauses should not be combined with merely a comma.

Question 21

Answer: C

Question Type: *Rhetorical Skills: Clarity of expression*

Explanation: Only answer C “sounds good to the ear,” makes sense in context, and places emphasis effectively. Getting this question right involves placing nouns, verbs, and modifiers so that they are unambiguous. Answer B, for instance, at first seems to indicate that “Dream investigation”

is being “withered” by something. In fact, “Dream investigation” is *doing* the withering, but its position at the beginning of the sentence makes this unclear. Similarly, it is difficult to mentally parcel out the modifying phrase “in the pellucid atmosphere of dream investigation” because of its placement in the sentence. Arrange modifiers to make their meanings and references clear, and you’ll have gone a long way toward choosing the right alternative on “rearrangement” questions like this one.

Question 22

Answer: G

Question Type: *Usage and Mechanics: Subject-verb agreement; Pronoun usage*

Explanation: Here’s another pronoun agreement question. In the sentence under scrutiny, the antecedent of the possessive pronoun “his” is “the faint of heart.” Although it may seem odd, “the faint of heart” is actually a plural subject—which is why it is followed by the plural verb “are.” With that in mind, any pronoun that refers to it must also be plural, but “his” is singular. The two answers that provide plural pronouns are G and J. Alternative G (“their”) makes more sense than J (“our”) since J seems to imply that the “faint of heart” are reluctant to turn a psychological searchlight on us—a situation that is less likely than the faint of heart fearing to turn the searchlight on *themselves*.

Question 23

Answer: B

Question Type: *Rhetorical Skills: Theme and voice*

Explanation: The ACT will occasionally test your ability to identify slang and judge its appropriateness. The word “diss” is a slang word meaning “disrespect.” In this question, you have to decide whether or not a slang word is appropriate in context. Is this formal or informal writing? Use the rest of the passage as a guide. Its tone seems quite formal, with the possible exception of the expression “sneer at” in the fourth paragraph. However, “sneer”—although mildly informal—is not a slang term, per se. In short, “dissing” seems out of place in context (as does “knocking,” another slang term), and should be replaced by “deriding”—a more formal term with a similar enough meaning.

Question 24

Answer: H

Question Type: *Usage and Mechanics: Verb tense; Theme and voice*

Explanation: The tense of verbs should be consistent. As it stands, this sentence breaks that rule, because the first verb used to describe “them” is the present tense “reach,” and the second verb is the past tense “failed.” To make the verbs consistent, the second verb should be changed to the present tense “fail.” (Note that although answer G, “failing,” is in the present tense, it is incomplete without the addition of the verb “are” as in “are failing.” Even with this addition, “are failing” would change the voice of the verb to the passive, which is inconsistent with the active voice of the first verb, “reach.”)

Question 25

Answer: B

Question Type: *Rhetorical Skills: Overall organization*

Explanation: The key to getting this answer right is recognizing that the transition phrase beginning paragraph 4 (“Besides those who sneer at dream study, because they have never looked into the subject”) refers very specifically to the first sentence of paragraph 5 (“This is why we still encounter people totally unfamiliar with Freud’s writings...dissing Freud’s theories...”). The use of the words “Besides” is like the introduction to the second item in a list after the first one *has already been introduced*. In order to arrange things so that the first item has already been introduced, paragraph 5 must precede paragraph 4. Since answer B is the only answer that does that, you can quickly eliminate the other answers.

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English Section 3, Passage 1

Baseball

Question 1

Answer: B

Question Type: *Rhetorical Skills: Clarity of expression*

Explanation: The problem that alternative B solves is that the original sentence puts the adverbial phrase (“Having...plate”) next to the pronoun “I,” giving the impression that the phrase describes the narrator’s behavior. This is incorrect, since the narrator is the pitcher and, therefore, is unlikely to walk up to the plate; “Having...plate” must refer to the batter, but this is ambiguous as the sentence stands. By separating the modifying phrase from the pronoun “I,” alternative B resolves this ambiguity problem. Alternatives C and D do not.

Question 2

Answer: G

Question Type: *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: The correct answer, “easily,” is an adverb—a word that modifies a verb. In this case, “easily” modifies the preceding phrasal verb, “struck out.” The adjective form, “easy,” should not be used to modify a verb, so the sentence is incorrect as it stands. “Easy like” is an idiomatic expression that means “gently” or “with care,” which—although grammatically appropriate—does not fit the meaning of the sentence. “Easeful” is an adjective rather than an adverb, so it has the same problem as “easy.”

Question 3**Answer: C****Question Type:** *Usage and Mechanics: Fragments; Punctuation*

Explanation: The correct answer, C, uses no punctuation because “as a new victim entered the batter’s box” is essentially a long adverb. This adverb phrase modifies a linking verb and predicate adjective combination—“was supreme”—by indicating the *time* in which his faith was supreme. Adverbial phrases that are restrictive (i.e., essential to the meaning of the sentence) should not be set off with punctuation from the verb they follow, just as an adverb (for example, “yesterday”) should not be set off from the verb it follows. (Think of replacing the “as...box” phrase with “yesterday”: “My faith was supreme yesterday.”) Furthermore, using a period to separate the independent clause (“My faith was supreme”) from the adverb phrase (“As...box”) turns the phrase into a fragment; it is an adverb with no subject or verb, so it cannot stand alone as a sentence. Alternative B separates the independent clause and the adverbial phrase with a colon, but colons should not be used in this way. A colon is generally used to introduce an example or examples—not a modifier. Answer D makes the same mistake as the original, but adds a confusing comma.

Question 4**Answer: F****Question Type:** *Usage and Mechanics: Punctuation; Fragments; Independent and dependent clauses*

Explanation: Dashes are used to indicate either an abrupt or dramatic break in thought or an afterthought. In this case, “the same shoes my wife had worn the day she died” is a dramatic break from the preceding clause, so the dash is used correctly. The use of a colon in answer G is incorrect, because a colon introduces examples of an idea rather than an explanation of the significance of an idea. Answer H produces a sentence fragment in “The...died,” so it is incorrect. Answer J produces a run-on sentence because the explanatory phrase is not appropriately coordinated with the clause that precedes it.

Question 5**Answer: D****Question Type:** *Usage and Mechanics: Verb tense; Punctuation*

Explanation: This sentence uses a series of verbs separated by commas—all of which refer to the subject “I.” When a sentence has more than one verb referring to the same subject in the same situation, all of the verbs must be of the same tense (e.g., past, present, future). The change in answer D from “pivot” to “pivoted” achieves this since “pivoted” is a past tense verb and the other verbs in the list are past tense verbs (e.g., “lifted” and “crawled”). Answer C also makes that change, but it eliminates a necessary comma that separates the verbs in the list. Answer B retains the incorrect verb and eliminates the needed comma.

Question 6**Answer: F****Question Type:** *Usage and Mechanics: Punctuation: Independent and dependent clauses*

Explanation: The original version is correct, because it separates two independent clauses with a conjunction and a comma. Answer G separates the independent clauses with only a comma, a mistake that is called a “comma split.” Answer H combines a semicolon and a conjunction, but this is not standard usage; a semicolon generally separates two independent clauses without the addition of a conjunction. Answer J uses neither a comma nor a conjunction, so it is wrong in two ways.

Question 7**Answer: C****Question Type:** *Rhetorical Skills: Redundancy; Clarity of expression; Punctuation; Independent and dependent clauses*

Explanation: The original sentence is redundant since “stationary” and “motionless” are close synonyms; one can be eliminated without changing the meaning of the sentence. Answer C eliminates the unnecessary word “stationary,” and thus makes the sentence shorter and cleaner. Answer B fails to eliminate the redundancy problem, and uses the verb “hanged,” which is idiomatically incorrect in this context; we say that something “hung” in the air, but not that something “hanged” in the air. Answer D maintains the redundancy and adds a punctuation problem; the modifying phrase “Stationary and motionless” should be set off from the independent clause with a comma.

Question 8**Answer: G****Question Type:** *Usage and Mechanics: Subject-verb agreement; Verb tense*

Explanation: The plural noun “bases” demands a plural verb. Additionally, since the sentence has been established as past tense by the verb “had,” the verb associated with “bases” must also be in the past tense for consistency. Answer G provides the plural, past tense verb that is needed: “were.” The original verb, “was,” is incorrect, because it is singular. Answer H, “are,” is incorrect, because it is present tense. Answer J, “is,” is incorrect, because it is both singular and present tense.

Question 9**Answer: D****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The correct answer, D, uses a conjunction that makes logical sense between the two ideas it separates. The first idea is that the narrator closed his eyes in order to concentrate, and the second idea is that he attempted to pitch a baseball as well as he could. The conjunction “and” is used to connect two ideas that fit together well, as these two ideas do. The conjunction “but” introduces a contradiction or

exception, but these two ideas do not seem to contradict each other. The conjunction “for” (as in alternative B) indicates that the second idea led to the first—an unlikely situation in this case. The conjunction “or” (as in alternative C) separates alternatives that are mutually exclusive, which does not fit the two ideas well; the pitcher obviously did both things.

Question 10

Answer: H

Question Type: *Usage and Mechanics: Pronoun usage; Punctuation*

Explanation: As written, the underlined portion uses an incorrect pronoun, “they,” which is replaced in answer H with a correct pronoun, “he.” This is necessary, because the subject of the sentence, “batter,” is a singular noun, so any pronoun that refers back to it must also be singular. Since “they” is plural, it should be replaced by a singular pronoun—“he” or “she.” Answer J is also incorrect, because of its plural pronoun. The punctuation of the original is correct; it is correct to separate two independent clauses with a comma and a conjunction. Answer G is incorrect, both because it is missing a needed comma and because of its plural pronoun.

Question 11

Answer: A

Question Type: *Rhetorical Skills: Wordiness*

Explanation: The point of this sentence is the narrator’s escape from a painful situation—not the parking lot—so the short and sweet “parking lot” is the best answer. Adding information about the parking lot distracts from the theme of the sentence and story, unless that information in some way enhances the theme (which it does not seem to do in any of the alternatives given).

Question 12

Answer: J

Question Type: *Rhetorical Skills: Overall organization*

Explanation: Narratives, as opposed to expository texts, are generally told in chronological order. This story is no exception. As written, every sentence in the story seems to be presented in an ordered time sequence, so it would make sense that any added sentence would maintain such a sequence. Since it would be illogical for someone to stop at a liquor store and go to sleep *anywhere* but at the end of this sequence of events, answer J maintains the logic of the story best.

Question 13

Answer: C

Question Type: *Rhetorical Skills: Theme and voice*

Explanation: “Narrative tone” refers to the manner of expression used by the writer. Since the narrator is also the main character in this story, that character’s emotions set the narrative tone of the passage. The narrator/character is upbeat and driven to achieve the goal of winning the game at the beginning of the story, as indicated by such expressions as “My faith was supreme” (line 8). This optimism changes to desperation after he is reminded of his dead wife, as indi-

cated by such expressions as “I...desperately tried to deliver a respectable pitch.” There is nothing “witty” or “ironic” in the passage, eliminating alternatives A and D. Neither does there seem to be a “detached” (alternative B) quality to the story since the narrator is very “into” the game at the beginning and clearly failing to detach himself from his deep emotions by the end.

English Section 3, Passage 2

Vacation in Washington D.C.

Question 14

Answer: G

Question Type: *Usage and Mechanics: Parallel sentence structure*

Explanation: Answer G is best, because it maintains parallel structure in the sentence. Items in a list have to be consistent in the way they’re presented. The sentence lists two things that make up Washington D.C.: an airport attendant and a cab driver. But instead of presenting the cab driver as merely “a cab driver” to keep it consistent with the first item in the list—“an airport attendant”—the item is presented as “it also consisted of a cab driver.” This restates things unnecessarily and breaks from parallel form—making the list inconsistent. Alternatives H and J also add words to the second item that make it inconsistent with the way the first item was presented.

Question 15

Answer: B

Question Type: *Rhetorical Skills: Clarity of expression; Punctuation*

Explanation: Alternative B gets the idiom right, which is why it’s the correct answer. Idioms are common ways of expressing things. They don’t necessarily follow rules of grammar. In this example, we don’t say “_____ for a place” when describing something—we say “_____ of a place.” It’s that simple. (For example, “big hulk of a guy” or “slimy worm of a lawyer.”) Answer C also uses the idiom incorrectly by deleting the “a”, and answer D gets the idiom wrong as well as adding a comma that makes no sense.

Question 16

Answer: G

Question Type: *Usage and Mechanics: Parallel sentence structure*

Explanation: The correct alternative, G, eliminates extra words that spoil the consistency (“parallel structure”) of a list. The narrator lists three things he has to do in regard to his baggage, and separates each thing with a comma. The first thing in the list is stated in terms of a verb and an object (“find it”). The original sentence does not remain consistent with that pattern when it presents the last item as “and then I had to lug it back to the airport”. This adds “and then I had to”—which the first item didn’t have. Alternatives H and J are also inconsistent with the original setup. Alternative H omits a needed comma.

Question 17**Answer: C****Question Type:** *Usage and Mechanics: Verb tense; Parallel sentence structure*

Explanation: A problem of verb tense is corrected in alternative C. The first part of the original sentence is in the past tense—“have had”. But the second part uses the present tense—“have”. In order to be grammatically correct, verb tense must be consistent throughout a sentence. Answer C fixes the problem by changing “have” to the past tense verb “had.” Alternative B also uses a past tense verb, “did have”, but doesn’t maintain parallel structure (consistency) in the way it lists the two things. Alternative D makes both a parallel structure error and a tense error with “will have”.

Question 18**Answer: G****Question Type:** *Usage and Mechanics: Subject-verb agreement; Adverb vs. adjective*

Explanation: Alternative G corrects a very common error in grammar: using the plural pronoun “their” in reference to a singular noun. Although we might use it informally, a sentence like “Someone should put their foot down” is incorrect. It should be rewritten as “Someone should put his foot down.” The noun (“Someone”) is singular, so the pronoun (“his”) must be singular too; “their” is a plural pronoun, so it doesn’t match the noun. That is the problem with the original sentence: “their” should be changed to “his” since the original noun (“a professional”) is singular. Alternative H’s use of the pronoun “one’s” is also incorrect—not because it is plural, but because “one” should be used to refer to the speaker and people like him; the narrator is not referring to himself here, but a man, any man who makes him feel inferior. Alternative J is incorrect, because of its use of “their” and because it uses “superior” (an adjective) where a noun should be.

Question 19**Answer: A****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: Alternative A places the sentence in such a way that it completes the contrast established by sentence 1. Sentence 1 states that the struggle is “**not**” with Washington D.C. It seems natural that the next sentence would explain what the struggle **is** with. The word “struggle,” itself, is a clue that the two sentences might go together, since it is used in both sentences. On the other hand, the sentence in question would be out of place and unnecessary, if located in the positions given by alternatives B, C, and D; it is not closely related to the ideas that would surround it.

Question 20**Answer: G****Question Type:** *Usage and Mechanics: Pronoun usage; Clarity of expression*

Explanation: The original sentence uses the wrong pronoun case—a form of the pronoun that doesn’t fit its role in the sentence. The word “they” should only be used as a subject, but it’s being used in the sentence as an object—the direct object of “analyzed”. Instead, the pronoun should be replaced with a form that can be used as an object—“them”—as is done in alternative G. Alternative H makes the same mistake as the original and adds the inappropriate present tense “analyze”. Answer J uses the possessive case (“their”), which is also incorrect.

Question 21**Answer: A****Question Type:** *Rhetorical Skills: Wordiness*

Explanation: The original version is the best, because the alternatives are all unnecessarily wordy. None of the alternative expressions adds much to the concept of “artificial”. They seem to be definitions of the word, instead of the word itself, and they break up the flow of the sentence. If a single word will do the job, always use the single word. The original has more “punch” because it adds no extra baggage.

Question 22**Answer: F****Question Type:** *Rhetorical Skills: Redundancy*

Explanation: The original is correct, because it is not redundant—it doesn’t say the same thing twice. Since the phrase “at this time” already has been used, added phrases such as those presented in the alternatives—which mean roughly the same thing as “at this time”—would just say the same thing over again. They would add nothing new to the sentence, and so they should be left out.

Question 23**Answer: D****Question Type:** *Usage and Mechanics: Adverb vs. adjective; Subject-verb agreement; Verb tense*

Explanation: Alternative D corrects a mistake by replacing an adjective with an adverb. Since the word “deep” modifies the verb “absorbed,” it needs to be an adverb (“deeply”) rather than an adjective (“deep”). Alternative B solves this problem, but it uses the wrong verb tense. The rest of the sentence is in the past tense, so the present tense verb “absorb” is out of place. Alternative C has the same adjective problem as the original. It also has a verb tense problem, since “absorbs” (like “absorb” in alternative B) is a present tense verb. Plus, “absorbs” (as opposed to “absorb”) fits with a singular noun, but this noun (“They”) is plural.

Question 24**Answer: H****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: Sometimes the word “and” can imply that one thing causes another. That’s why answer H is correct here. The fact that the cab driver and the airport attendant “deeply absorbed” the narrator leads to (“causes”) the fact that he wasn’t interested in the famous landmarks of Washington D.C. Alternatives G and H use the words “nevertheless” and “but”, which imply that two things contrast with one another—not that one thing causes another. Using them as transitions implies that the second statement about the landmarks is an exception to the first statement about the cab driver and the airport attendant, and this makes no sense.

Question 25**Answer: C****Question Type:** *Rhetorical Skills: Theme and voice*

Explanation: Themes (the “messages” of a story) generally emerge out of an entire text, rather than just part of it. Also, most themes have broad implications. They are rules or observations that can be taken away from the story and contemplated or applied to one’s own life. Answer C delivers on both accounts: it is an idea that runs through the entire passage, and it is a rule that can be applied outside the situation of the story. Alternatives A, B, and D fail on one or both of these accounts.

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English Section 4, Passage 1

Intelligence

Question 1**Answer: A****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The transition word “nevertheless” flags a contradiction or exception, so your job here is to decide if the idea of the first sentence stands in contradiction or exception to the idea in the second sentence. A paraphrase of the first sentence might be, “Defining intelligence is hard, so explaining intelligence is really, really hard.” A paraphrase of the second might be, “People often claim that intelligence is genetic.” The first sentence says that intelligence is next to impossible to explain, and the second sentence says that some people explain it in a certain way. There *does* seem to be a contradiction here and “nevertheless” is a good way of expressing it. “Likewise” and “moreover” imply similarity

between two things, and “therefore” implies that the first thing causes the second thing. None of those meanings seems to make sense here.

Question 2**Answer: J****Question Type:** *Rhetorical Skills: Wordiness; Punctuation*

Explanation: The maxim “shorter is better” can be applied quite fruitfully to the ACT English test. Like redundancy, wordiness distracts the reader from the important ideas of a passage. Is the important idea of the sentence in question the credentials of experts? No! So there’s no need to fill up the sentence with that information. Instead, the pithy “including some experts” makes its point quickly and lets you get back to the important topic of a genetic explanation for intelligence. Answer H makes the same wordiness mistake in rearranged form, and answer G adds a comma error to its wordiness.

Question 3**Answer: C****Question Type:** *Usage and Mechanics: Punctuation*

Explanation: The question is merely a check of your ability to use adjectives correctly. Adjectives are not separated from the rest of the sentence with commas, so there is a problem here. In English, an adjective is merely placed before the noun it modifies without adornment. Answer C demonstrates this nicely.

Question 4**Answer: G****Question Type:** *Usage and Mechanics: Fragment; Punctuation; Independent and dependent clauses*

Explanation: This question tests your ability to link two independent clauses correctly. (Remember that an independent clause is a clause with a subject and a verb that can stand alone as a sentence.) As it stands, the sentence combines them with a comma only, which is incorrect. Two independent clauses must be separated into two sentences, linked with a conjunction (e.g., *and*, *but*, *or*), or linked with a semicolon (with no conjunction). Of the alternatives, only G uses one of these fixes; it combines the independent clauses with a comma and a conjunction (as well as an added pronoun, “that,” for clarity).

Question 5**Answer: B****Question Type:** *Rhetorical Skills: Overall organization; Clear and appropriate transitions*

Explanation: When you're faced with a question about the correct order of sentences, check if any of the sentences start with transition words or phrases like "Nevertheless" or "On the other hand." A transition generally relates back to the sentence that precedes it, so it is a great clue for putting sentences in order. Since sentences 1 and 2 do not vary among the alternatives, there are only three sentences (3, 4, and 5) to reorder and each of them starts with an obvious transition relating back to the sentence that should precede it. "But" is a contrastive transition, so sentence 3 should follow a sentence that contrasts with the idea that we are "no closer" to something having to do with intelligence tests than we were "over a hundred years ago". This idea seems to contrast with the "heated debate" that exists over whether or not intelligence is "nature" or "nurture"—the subject of sentence 4. So we know the order of these two sentences should be 4, 3. Now that 4 and 3 are in order, you have only to decide whether they should precede or follow sentence 5. Sentence 5's transition phrase, "Other experts," suggests that it should follow the sentence that first mentions "experts"—sentence 2. If sentence 5 follows sentence 2, then sentences 4 and 3 have to follow sentence 5. Voila! The sentences are in order!

Question 6**Answer: H****Question Type:** *Rhetorical Skills: Redundancy; Adverb vs. adjective*

Explanation: Keep a careful eye out for words and phrases that don't add anything to a sentence. If you don't see anything else obviously wrong with an underlined portion, try taking out a word that seems like a synonym for another word nearby in the passage; if the sentence benefits by your taking it out, it's probably redundant. Such is the case with the word "genuine" in the underlined portion here. In context, "true" does the same job that "genuine" does, so "genuine" is unnecessary. Answer H takes it out and makes the sentence cleaner. Answer J commits the same redundancy error, and also uses the adverb "truly" where the adjective "true" should be.

Question 7**Answer: B****Question Type:** *Rhetorical Skills: Clarity of expression; Theme and voice*

Explanation: Writing becomes awkward and unclear when idiomatic expressions (expressions that are natural to our culture) are bungled. The ACT will test you on these occasionally. There is no hard-and-fast grammatical rule that says we should write that something "lights up", rather than that something "lights on". Instead, we employ a less formal rule

of thumb: "It's just the way we do it, so it's confusing when we don't." Also odd and confusing are "the buttons glows up" and "the buttons issue light" (which is too formal for the tone of this piece anyway). Stick to the expression that sounds right to your ear, and you'll usually get these right.

Question 8**Answer: H****Question Type:** *Usage and Mechanics: Parallel sentence structure; Clear and appropriate transitions*

Explanation: Even though there are only two items in this list ("Joseph Glick" and "Michael Cole"), it is still a list—and it has to employ parallel form. The list is meant to specify "developmental psychologists". Since the first item in the list is a noun (the proper noun "Joseph Glick"), the second item should also be a noun. Instead, the second item consists of a possessive adjective phrase ("his colleague"), in addition to a noun ("Michael Cole"). Answer G breaks form by adding the adverb "also" to the noun. Answer J maintains parallel form, but uses an inappropriate transition word, "but," which makes no sense in context. Only answer H maintains parallel form by employing a bare noun as its list item ("Michael Cole") and maintains the appropriate transition word "and."

Question 9**Answer: B****Question Type:** *Usage and Mechanics: Subject-verb agreement; Punctuation*

Explanation: For a verb to agree with its subject, it must match the number (*singular* or *plural*) of the subject. When judging the correctness of an underlined verb, the first step is to determine what the subject of the verb is—what the verb describes. In this case, the linking verb "are" describes the subject, "ability". Ability is a singular noun, but "are" is a plural verb, so the two do not match (agree) in number. Instead, you must choose the singular verb "is". The verbs in the other options are all plural, and answer C also has an inappropriate comma.

Question 10**Answer: J****Question Type:** *Usage and Mechanics: Punctuation*

Explanation: The ACT writers are fond of questions about the proper use of colons. The thing to remember about colons is that they should follow complete statements. Generally, a colon is used to separate a complete statement and a list of examples.

Question 11**Answer: A****Question Type:** *Usage and Mechanics: Verb tense*

Explanation: The purpose of a question like this is to test your attention to consistent verb tense. In general, the verbs

of a sentence should have the same tense (past tense, future tense, present perfect tense, past perfect tense, or future perfect tense). The first verb in this sentence is “inquired”—a past tense verb. Therefore, the underlined verb should also be past tense. This verb passes the consistency test: “said” is the past tense form of “say.” Any of the changes offered would make the tense inconsistent with that established in the initial dependent clause. (Actually, answer D, “will said,” would be inappropriate anywhere; it is not an acceptable verb construction.)

Question 12

Answer: J

Question Type: *Usage and Mechanics: Independent and dependent clauses; Clarity of expression*

Explanation: The underlined word is called a “subordinating conjunction.” It makes the clause that it introduces a subordinate—or “dependent”—clause, which is inappropriate in this case. A subordinate clause is not a complete sentence, so it cannot stand on its own. It needs to be linked to an independent clause—a clause that *can* stand on its own as a sentence. Instead, this subordinate clause is linked to the expression “Needless to say”—a phrase that has no subject or verb, and so does not qualify as an independent clause. Answers G and H offer alternative subordinating conjunctions (“while” and “after”), which produce the same problem. Eliminating the subordinating conjunction “although” (as in answer J) converts the subordinate clause to an independent clause—which *can* be linked with “Needless to say” to make a complete sentence. (Note, also, that the meanings of “although,” “while,” and “after” do not make much sense in context—another clue that they might be eliminated.)

Question 13

Answer: C

Question Type: *Rhetorical Skills: Theme and Voice*

Explanation: The title of a text almost always relates to its major theme, which makes this a “theme” question. What, ultimately, is this passage trying to “say” to us? It has an introduction suggesting that, although they try, people fail to prove that intelligence is either genetic or learned. The first paragraph gives an example of someone who tried to show that intelligence is purely genetic, but who ended up circling back to learned intelligence. The second paragraph gives an example of people who tried to show that intelligence was learned, but who ended up more confused than when they started. The theme, then, seems to involve the difficulty in proving that intelligence is either pure “nature” or pure “nurture”—that it comes from a “single source.” Only answer C suggests the main theme. Answer A is a misunderstanding of the passage’s meaning; answer B focuses on only a portion of the text rather than the overall theme, and answer D is both a minor point and a bit off the mark.

English Section 4, Passage 2

House Flies

Question 14

Answer: H

Question Type: *Rhetorical Skills: Redundancy; Adverb vs. Adjective; Clarity of expression*

Explanation: This is a case in which eliminating the underlined phrase (alternative H) makes the sentence cleaner and clearer. The adjective phrase “frequently seen” adds nothing meaningful to the sentence, since it is clearly implied by “found commonly in houses.” On the ACT (and in most formal written English), portions of a passage that add little or nothing to its meaning are considered redundant, and should be omitted. (However, if “Omit” is one of the alternatives, it will NOT always be the correct choice.) Answer G should be eliminated both for its redundancy and on the grounds that it uses an adjective (“frequent”) where an adverb (“frequently”) should be. Answer J is a case in which an adjective is used inappropriately (and is superfluous anyway).

Question 15

Answer: C

Question Type: *Usage and Mechanics: Pronoun usage*

Explanation: This question focuses exclusively on correct pronoun usage. The noun to which the pronoun “their” refers is “the cluster fly” (from the previous sentence), which is a singular, non-human subject. Because it is singular and non-human, the pronoun “their” does not agree with it; “their” is a plural pronoun that is generally reserved for people. (Note that in common speech we often use “their” as a singular pronoun, but the ACT wants formal written English.) Alternative B (“one’s covering of”) is incorrect because “one’s,” again, refers to a human subject. Alternative D is incorrect not only because “your” generally refers to a human subject, but also because it is a second person pronoun where a third person pronoun (or you might say a *third insect* pronoun) is needed. Alternative C, with its third person possessive non-human pronoun (“its”), is the only alternative that works.

Question 16

Answer: G

Question Type: *Usage and Mechanics: Adverb vs. adjective*

Explanation: In this question, you must (1) identify the part of speech of “occurs” and (2) know whether that type of word is modified by an adjective or an adverb. The word “occurs” is a verb, and, therefore, the underlined word that modifies it must be an adverb (since adverbs modify verbs). The word “frequent” is an adjective, or occasionally a verb, and either way it doesn’t work. “Infrequent” is also an adjective, so it can be eliminated. “But frequent” makes no sense at all, so you’re safe to go with the plain old adverb “frequently.”

Question 17**Answer: D****Question Type:** *Rhetorical Skills: Wordiness*

Explanation: Alternative D is the best answer, because it is concise. Here is another example where a policy of “shorter is better” pays off. In the original version, the modifying phrase “by nature” is out of place, because this passage is not really about *how* different species of fly develop; its focus is on differences between flies only. Also, that the structure in question is constructed “by nature” is easily inferred, so it doesn’t need to be stated explicitly. Alternatives B and C suffer from the same inappropriate wordiness. Only answer D, the simple “designed,” is consistent with the focus and style of its context and avoids wordiness.

Question 18**Answer: G****Question Type:** *Usage and Mechanics: Subject-verb agreement; Fragments*

Explanation: The verb of a sentence must agree with its subject, and this verb does not. The subject is the plural pronoun “These,” but the verb is the singular “includes.” Answer H retains the same error, merely replacing the article “the” with “a.” Answer J suggests the beginning of a non-restrictive modifying phrase (“including the bluebottle fly”), but this turns the sentence into a fragment since the verb is replaced with a gerund (i.e., the -ing form of a verb). Only answer G fixes the agreement problem—by replacing the singular “includes” with the plural “include”—without creating any new problems.

Question 19**Answer: C****Question Type:** *Usage and Mechanics: Parallel sentence structure; Clear and appropriate transitions*

Explanation: This is an example of a sentence in which parallel structure is not maintained. Specifically, there is a list in which the last item strays from the form set by the first two items. The first two items in the list are composed of an article and a noun: “the bluebottle fly” and “the black blowfly.” The third item strays from this form, because it is composed of a pronoun, a verb, an article, and a noun: “they include the green-bottle fly.” Alternative B also strays from parallel form; rather than maintaining the article-noun pattern, it presents a list item that is composed of an adjective (“included”), a linking verb (“is”), an article (“the”) and a noun (“green-bottle fly”). Answer D maintains parallel form, but it is missing the necessary conjunction “and.” Only answer C maintains parallel form by presenting a list item with an article and a noun (“the green-bottle fly”), while adding the necessary conjunction (“and”).

Question 20**Answer: J****Question Type:** *Usage and Mechanics: Subject-verb agreement; Clarity of expression*

Explanation: Answer J is the correct answer, because it has a verb that agrees with its subject in number. The subject of

the sentence is the plural noun “All,” so the verb must also be plural. That eliminates F, G, and H, which all contain singular verbs (in various tenses): “is,” “was,” and “is not” (whose adverb “not” would make the sentence nonsensical anyway).

Question 21**Answer: A****Question Type:** *Usage and Mechanics: Fragments*

Explanation: The sentence is fine the way it is. Choosing any of the alternatives would turn it into a sentence fragment—a string of words that cannot stand alone as a sentence, but is, nonetheless, presented as one. For instance, alternative B (“Including the imposters mentioned above”) is composed of a gerund (that is, the -ing form of a verb, “Including”) and a modified object of that preposition (“the imposters mentioned above”); it does not have a verb, and, therefore, cannot stand alone as a sentence. Alternatives C and D make a similar error by presenting an adjective phrase as a sentence; they do not have a verb either.

Question 22**Answer: H****Question Type:** *Rhetorical Skills: Clarity of expression*

Explanation: The best alternative is H, because it disambiguates the modifying phrase “With its paler and more pointed body.” In the original sentence—as well as alternatives G and J—the close proximity of the modifying phrase and “housefly” makes it seem as if the phrase refers to the housefly. This makes no sense in context, since the housefly is “dark and relatively blunt,” rather than pale and pointy. Answer H places “this insect” (the “lesser house fly”) immediately after “Because of its paler and more pointed body,” making it clear that the phrase refers to the “lesser house fly.” (You could also eliminate F based on the fact that the original sentence does not “flow” very well, another style characteristic considered relevant on the ACT English test.)

Question 23**Answer: D****Question Type:** *Usage and Mechanics: Independent and dependent clauses; Punctuation*

Explanation: As it stands, this is a run-on sentence. It is an independent clause (“The male...female”), linked with a comma to an inappropriately constructed subordinate clause (“has large...abdomen”) with its own subordinate clause (“which are...windowpane”). However, it doesn’t have to be that way. The inappropriately constructed subordinate clause becomes part of an appropriately constructed independent clause when alternative D is chosen. With this change, the sentence has a clear main clause: “The male has large pale patches at the base of the abdomen.” Alternative D does this by adding two key things: a comma and a relative pronoun (“which”). The comma and the relative pronoun create a non-restrictive (i.e., non-essential) subordinate clause (“which is commoner than the female”) set off with commas, which is exactly how a mid-sentence subordinate clause should be punctuated. Alternatives B and C retain the run-on problem.

Question 24**Answer: F****Question Type:** *Rhetorical Skills: Theme and Voice*

Explanation: To determine the “type” of writing a passage represents, ask yourself, “What is this piece of writing trying to accomplish?” In this case, it seems that the essay is trying to inform us about flies that are sometimes mistaken for the common housefly; therefore, it is an “Informative essay.” It does not seem to be persuading us to take a side on a controversial issue, so it really isn’t a “Persuasive essay.” Answer H, “Personal essay,” is an essay about the writer that uses first person narrative, which this does not; nor does this piece take the form of a series of chronological events, which eliminates any kind of “story.”

Question 25**Answer: D****Question Type:** *Rhetorical Skills: Overall organization; Clear and appropriate transitions*

Explanation: As paragraphs 2 and 4 are listed as the third and fourth paragraphs, respectively, in every answer alternative, you can assume that this is correct and turn your attention to the other four paragraphs. Once again, transition words and phrases—such as “One of these” and “another”—are helpful in finding a logical order. Only one of the paragraphs, #1, does *not* use a backward-referring transition in its topic sentence. Therefore, it is an excellent bet that this paragraph should be the first one in the passage. This eliminates answer choice C. Answers B and D only differ in whether the final paragraphs are in order 6, 5 or 5, 6. The transition “All of these species” in paragraph 5 seems to suggest a “capper” to the entire passage. Another indication that paragraph 5 would work well as the last paragraph is that it returns to the opening topic—the “common housefly.” So there you have it: 1, 3, 2, 4, 6, and 5 is the order that makes most sense.

NOTE: If you are the first to find an error of any type, please send us an email at info@testprepseminars.org and we will send you a \$20.00 gift certificate from Best Buy. Include your name, mailing address, and details about the error.

English Section 5, Passage 1
Cell Walls**Question 1****Answer: D****Question Type:** *Usage and Mechanics: Verb tense; Wordiness*

Explanation: The main verb of this sentence is “came,” which is in the past tense. In order for a sentence to be grammatically correct, it must maintain consistent verb tense; if the past tense is employed in the main verb, it must also be used in any modifying verbs. In this case, the phrase “a barrier of white egos that he will never be able to surmount” is the object of the preposition “against,” and it uses the future tense verb “will be.” To maintain consistency, this verb needs to be in the past tense—like “came.” Both alternatives C and D use the past tense verb “was,” but alternative C is wordy and awkward. Alternative D agrees in its verb tense with the main verb, and is clean and precise.

Question 2**Answer: H****Question Type:** *Usage and Mechanics: Fragments; Punctuation*

Explanation: This is one of the standard ways the ACT will present a fragment: with the end of one sentence and the beginning of another underlined, so you have the option of linking the two sentences together and fixing the fragment. The sentence that begins “Celebrated as a...” is not a complete sentence; it contains no subject. Therefore, the fix for it will be either to add a subject or link it to a complete sentence or clause that has one. Alternative H accomplishes the second fix by incorporating the fragment into the sentence before it, providing a subject—“Just”—for the description. Alternatives G and J fail to truly incorporate the fragment into the preceding sentence, and so maintain the fragment problem.

Question 3**Answer: D****Question Type:** *Usage and Mechanics: Independent and dependent clauses; Clear and appropriate transitions*

Explanation: The problem with the original is that two complete clauses are connected with only a comma—sometimes called a “comma split.” Two complete clauses should be punctuated as two sentences, have a coordinating conjunction between them (such as “and”), or be connected with a semicolon. In this case, you don’t have the option of any of these, so you have to change one of the complete clauses into an incomplete, subordinate clause that can be combined with the other sentence. Two of the alternatives—C and D—accomplish this by placing a subordinating conjunction in front of the word “other.” However, one of the coordinating conjunctions makes sense in context and the other doesn’t—so you are forced to draw on your rhetorical skills. The subordinating conjunction “Just as” implies two things that are alike, but concentrating efforts on “the cell nucleus” is unlike concentrating efforts on “the nuclear membrane.” What is needed is a subordinating conjunction that implies contrast, and “Whereas” fits the bill.

Question 4**Answer: H****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: When a transition word is underlined, try to determine whether or not the meaning of the word makes sense in context. The word “but” connects an idea to something that is a contradiction or exception to that idea. The fact that Just was an “expert in methods of cell research” does not seem to find a contradiction or an exception in the idea that he was “much in demand as a consultant and teacher of those methods,” so “but” seems incorrect. The word “yet” is synonymous with “but,” so answer J is also out. Nor does it make sense that he would be either an expert “or” a consultant; there doesn’t seem to be anything mutually exclusive about the two things. The word “and,” alternative H, is the kind of word that connects things together that are naturally compatible, which is exactly what is needed here.

Question 5**Answer: D****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: Using the “establishing logical transitions” and “establishing a logical progression of ideas” strategies, you should be able to easily put these three sentences in order. The first step is to arrange sentence 1 so that the transition word “Additionally” makes sense. Being unable to draw research money does not seem to be an “addition” to the topic of becoming an “expert in methods of cell research,” so sentence 1 seems not to follow the last sentence of paragraph 2 very well. What it *does* seem to be is an “addition” to the topic represented by sentence 3, that Just had too many responsibilities to do much of his own research; together, these two ideas fit the theme that there were many

“drawbacks” to Just’s position. Now it’s simply a matter of deciding whether sentence 2 should begin the paragraph or end it. It seems incongruous immediately following a paragraph on Just’s successes at Howard, but it follows, naturally, sentence 1’s idea that Howard was unable to draw research money. Voila! 3, 2, 1.

Question 6**Answer: G****Question Type:** *Rhetorical Skills: Redundancy; Clarity of expression*

Explanation: There is nothing grammatically wrong with any of the alternatives here, so you can assume this is a question about rhetorical skills. Using the rule of thumb “shorter is better” may lead you to answer G. And you’d be right, because eliminating “between May and August” doesn’t just eliminate excess words—it eliminates a problem with redundancy. Already knowing that Just left Howard University “during the summer months,” you gain nothing by learning that he left it “between May and August.” That information is redundant, and the ACT writers will want you to eliminate it.

Question 7**Answer: D****Question Type:** *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: The important thing in making sense of this question is to understand the expression “as one of _____.” In this context, the expression can be read as, “in the manner of a relationship characterized by _____,” where the blank is filled in with a noun that in some way exemplifies the thing being discussed. “Respect” is a noun that makes sense here, but, in the original sentence, it is modified by the adverb “mutually.” A noun should be modified by an adjective, not an adverb. Either a noun or a noun modified by an adjective is needed in place of the underlined portion. The only answer that fulfills this need is answer D. Answer B maintains the misused adverb, which is used to modify the adjective “respectful” instead of a noun. Answer C gets the adjective modifier right, with “mutual,” but, again, uses it to modify the adjective “respectful” rather than the noun “respect.” Only alternative D caps the expression with the proper adjective-noun combination—“mutual respect.”

Question 8**Answer: H****Question Type:** *Usage and Mechanics: Verb tense; Subject-verb agreement*

Explanation: Here’s another example of a verb tense question. This one’s pretty straightforward; the verb tense is established as past tense with the verbs “began” and “turned,” but the underlined word switches to the present tense—“demonstrates.” To match the established tense, the past tense verb “demonstrated” must replace the original verb, as in alternative H. Alternative J, “will demonstrate,” uses another inconsistent tense—future tense. Alternative G, “demonstrate,” is both the wrong tense (present) and the wrong number (plural) for the singular subject of the clause, “Just.”

Question 9**Answer: B****Question Type:** *Rhetorical Skills: Clarity of expression*

Explanation: This is an example of a question where ambiguity is created by the placement of a modifier and the thing it modifies. It is not clear in the original version of the sentence if the modifying phrase “Frustrated and resentful” refers to the universities and institutes or to Just. Placing “European universities and institutes” immediately after the modifying phrase gives the impression that the phrase applies to them, but there seems to be no reason to suspect that the universities and institutes would be “frustrated.” Instead, it makes sense that Just would be frustrated. To disambiguate the sentence, “Just” should be placed next to the phrase that modifies him, immediately after “Frustrated and resentful,” as in alternative B.

Question 10**Answer: H****Question Type:** *Rhetorical Skills: Wordiness*

Explanation: An excellent example of “shorter is better.” Most of the details in the underlined portion of the sentence can be inferred from other information in the paragraph, so making them explicit taxes the reader’s resources and shifts the focus away from the topic of Ernest Just. Alternative G isn’t much better in that regard. Alternative J is short and sweet, but it’s the wrong part of speech—a noun where a verb is needed. Alternative H, “speak,” says all the reader really needs to know.

Question 11**Answer: C****Question Type:** *Usage and Mechanics: Parallel sentence structure*

Explanation: When writing a list, each item in the list must be in the same grammatical form. This is one aspect of writing with parallel sentence structure. So, when a list begins with the stand-alone adjective “broke,” the next items in the list should also be adjectives. The problem with the underlined portion is that one of the two list items has a noun, a verb, and an adjective—not an adjective alone—so it is not consistent in its form with the other list items. Of the alternatives, the only one in which both items are adjectives (and only adjectives) is answer C. Alternatives B and D make the problem worse; B maintains the same non-parallel form as the original, but changes the pronoun to an even-more-jarring proper noun, and D uses an adverb (“unhappily”) in its first item and a noun (“physical illness”) in its second—totally straying from the adjective items in the rest of the list.

Question 12**Answer: J****Question Type:** *Usage and Mechanics: Pronoun usage; Verb tense*

Explanation: One of the toughest problems of grammar is whether to use “who” or “whom.” It is simplified if you understand that this is a question of proper case—the role the word is playing in the sentence. The word “who” should only be used as a subject, the main “character” in a phrase or clause. The word “whom” should only be used as an object of a verb or preposition that modifies something, such as in the expression, “To whom should I address the letter;” “To” is a preposition, so “whom” is the object of a modifying prepositional phrase. Once you figure out which of these two cases is needed (the tricky part), you simply put the proper word in place. In the underlined portion of the sentence in question, the word “whom” is really the main character (the “subject”) of the clause following “but.” Since it is a subject, it must take on the subject form of the pronoun—“who.” That eliminates both answers F and G. Of the two remaining alternatives, H uses a verb tense, future perfect, which is inconsistent with the established verb “had,” which is simple past. Answer J uses both the proper pronoun case and the proper verb tense.

Question 13**Answer: D****Question Type:** *Rhetorical Skills: Theme and voice*

Explanation: The “main point” of a piece is pretty much synonymous with its “theme,” so this is a question about theme. When identifying a theme, the entire passage must be taken into account. Also, the opening paragraph often establishes the theme of an essay, while the body of the essay elaborates that theme. Alternatives A and C are elaborating points that support the main theme, not the main theme itself; they explain the opening paragraph’s points that Just was “brilliant” and that he “came up against a barrier of white egos.” Alternative B seems to be a misreading of the passage, which attributes Just’s troubles to racism rather than to his “bitterness.” Only answer D could be called a summary of the entire passage that matches well with the thesis established in the first paragraph.

English Section 5, Passage 2

Predatory Love

Question 14

Answer: G

Question Type: *Usage and Mechanics: Subject-verb agreement*

Explanation: The trick here is to determine whether the subject of the sentence is singular or plural, because the underlined verbs have to agree in number with the subject. The subject is “species,” which under some circumstances (e.g., when combined with a singular article like “a”) will be singular, and under others will be plural. In this case, the lack of a singular article and the pronoun “their” suggests that “species” is a plural noun. Therefore, the singular verbs of the original, “lives or dies,” are not in agreement with the subject. Instead, answer G’s plural verbs (“live or die”) should be substituted. Alternatives H and J combine a singular and a plural verb, failing both the “subject-verb agreement” test and the “verb-verb agreement” test.

Question 15

Answer: A

Question Type: *Rhetorical Skills: Clear and appropriate transitions*

Explanation: The ideas expressed by the second and third sentences seem to be causally related. Specifically, the idea of the second sentence seems to lead to the idea of the third sentence; that hunting is very important to cat survival would lead to much of their behavior being related to hunting. The transition word “Therefore” captures this causal relationship perfectly. The transition words “But,” “However,” and “Nevertheless” suggest that the idea of the third sentence contradicts the idea of the first, which it clearly does not do. To sum up, leaving “Therefore” in place (alternative A) is the best answer.

Question 16

Answer: F

Question Type: *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: The original version (alternative F) is correct because the underlined word modifies the adjective “related.” Adverbs like “closely” are just what are needed to modify adjectives. It is incorrect to modify one adjective with another adjective, such as “close” (alternative G) and “closed” (alternative H); also neither can adjectives be modified by nouns, like “closeness” (alternative J).

Question 17

Answer: A

Question Type: *Usage and Mechanics: Parallel sentence structure; Wordiness*

Explanation: One of the alternatives to the original version can be eliminated on the basis of wordiness (alternative D), but the main problem with all of them is non-parallel sentence structure. The original (alternative F) maintains the form of the first two items in the list, which is to dispense with the “of” and just list the nouns (“lions, tigers, and other large felines”). All three of the alternatives to the original break from that form by putting the preposition “of” back in (e.g., “of other large felines”), creating non-parallel sentence structure.

Question 18

Answer: J

Question Type: *Rhetorical Skills: Redundancy*

Explanation: The key to getting a redundancy question such as this correct is knowing the meaning of the word that’s redundant. Although the ACT doesn’t test vocabulary per se, the English section will occasionally use difficult words that will need to be understood to get an answer right. If you know that “idle” means pretty much the same thing as “lazy,” you’ll know that it can be removed without compromising the meaning of the sentence. And, given the ACT writers’ love of economy, that will be the way to go. So, alternatives F, G, and H are out.

Question 19

Answer: B

Question Type: *Usage and Mechanics: Fragment*

Explanation: This is a classic example of a fragment. The ACT writers will give you a sentence fragment that is punctuated as a complete sentence or an independent clause (in this case, it’s the latter), and you have to spot it and make it a complete sentence or clause with the right alternative. In this case, the phrase has a verb but no noun; “resting up for the hunt” does not tell you who is resting up for the hunt. The alternative that fixes this problem is alternative B, since “they’re” gives you a subject: cats.

Question 20

Answer: J

Question Type: *Rhetorical Skills: Redundancy*

Explanation: This underlined portion should jump out at you as a bit forced, as if it’s been jammed in there for no reason. That’s because it’s redundant. The sentence has just stated the idea that you’re coming home “from a long day,” so to add “after a seemingly endless day” is to add nothing new. The ACT writers will want you to eliminate all unnecessary repetition of ideas. The best answer is answer J: just get rid of it.

Question 21**Answer: C****Question Type:** *Rhetorical Skills: Theme and Voice*

Explanation: Determining the “purpose” of a sentence is related to understanding the theme of the paragraph in which it appears. Each paragraph serves a purpose, and this one seems to establish the idea that some cat behavior that may seem negative is actually an expression of positive emotion through hunting-like behaviors. All of the sentences in the paragraph are likely to be related to this idea. Alternative C, then, is the best answer since it is in keeping with this theme-development idea.

Question 22**Answer: F****Question Type:** *Usage and Mechanics: Fragments; Independent and dependent clauses; Punctuation; Redundancy*

Explanation: The subordinating conjunction “although” does just what its title would suggest: it subordinates the clause that follows it, i.e., turns it into a subordinate (dependent) clause that can’t stand on its own as sentence. Therefore, to cap a clause that begins “Although” with a sentence is to create a sentence fragment. Likewise, to link such a clause to another with a semicolon is to create a fragment since semicolons link independent clauses, not subordinate clauses. This makes all of the alternatives to the original sentence (G, H, and J) incorrect. Alternative J can also be eliminated on the basis of redundancy; the word “Although” already suggests a contradiction, so the word “but” is unnecessary and confusing.

Question 23**Answer: D****Question Type:** *Rhetorical Skills: Redundancy*

Explanation: Whenever there is an option to “DELETE the underlined portion,” it’s a good idea to imagine the sentence without it and determine whether or not the deletion changes its meaning in any major way. If not, then the “DELETE” option is the way to go. In this case, eliminating “youthful” doesn’t seem to change the meaning much, since the sentence goes on to describe the kittens as “too young to hunt for themselves.” One of the two ideas, “youthful” or “too young,” needs to be eliminated—because the sentence is redundant with them both. Since your only option here is to eliminate the former (by choosing answer D), that’s the way you should go.

Question 24**Answer: F****Question Type:** *Usage and Mechanics: Fragments; Independent and dependent clauses*

Explanation: Sometimes the best way to make a sentence grammatically correct on the ACT is to leave it the way it is. All of the alternatives to the original here create a fragment—a phrase punctuated as a full sentence or independent clause that is actually not a full sentence or independent

clause. The word “when” in sentence 6 marks a dependent clause; the phrase in which it occurs must be linked to an independent clause because it cannot stand on its own. The three alternatives effectively separate the dependent clause from the independent clause, so they should be avoided in favor of the alternative that leaves the clause connected—alternative F.

Question 25**Answer: C****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: You can use the transition word “However,” along with the topic of the sentence in question, to locate the sentence effectively within the paragraph. The word “however” denotes a contradiction or exception to what came before it. Your job is to figure out what the “non-human-as-parent” behavior described in the sentence contradicts. What it seems to contradict most clearly is the idea presented in sentence 3 that certain cat behavior suggests that they “see their owners as parents”—which would locate the sentence after sentence 3 (giving us alternative C). If you check with your “ear” how the sentence fits in the other three alternative spots, you will “hear” that it doesn’t fit very well. Answer C is the best answer.

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English Section 6, Passage 1

Lincoln and the Black Hawk War

Question 1

Answer: B

Question Type: *Usage and Mechanics: Punctuation*

Explanation: The underlined noun should be a plural, non-possessive noun. Adding either /'s/ or /s'/ makes the noun possessive - not plural. To make it plural, just an /s/ should be added. Alternatives B and D get that right, but alternative D changes the comma to a dash. It's okay to separate a mid-sentence phrase by putting a dash at both ends of it or a comma at both ends of it (à la answer B), but it's not okay to put a dash at one end and a comma at the other end ((à la answer D).

Question 2

Answer: H

Question Type: *Rhetorical Skills: Wordiness*

Explanation: To bring in "Lee" and "Patton" seems to stray from the style and message of the passage, which is not about the Sauk's military prowess, but about Lincoln and his character. The idea that Black Hawk had a sound military reputation is a point made mainly to establish him as a threat worthy of war; this point can be made concisely, as in alternative H. The other alternatives vary in style, but are all too wordy.

Question 3

Answer: D

Question Type: *Usage and Mechanics: Verb tense; Subject-verb agreement*

Explanation: The tense of a sentence—present, past, future, future-perfect, etc.—should be consistent throughout the sentence. In this case, the tense of the sentence is set by the verb "was"—a past tense verb. The underlined portion of the sentence is a verb in the present tense ("is marked"), so it must be replaced with a past tense verb to make it consistent with the rest of the sentence. Answers C ("were marked") and D ("was marked") are both past tense verbs, but answer C's past tense verb is plural—causing a subject-verb agreement error; the subject to which the verb refers is the singular "march." Answer D uses both the correct case (past) and the correct number (singular).

Question 4

Answer: F

Question Type: *Usage and Mechanics: Independent and dependent clauses; Punctuation*

Explanation: The problem with the three alternatives to the original—G, H, and J—is that they create two independent clauses with only a comma between them. In order to link two independent clauses, either a comma or a coordinating conjunction (such as "and") must be used, or a semicolon must be used. You don't have the option of changing the way the two clauses are linked together, but you don't need it; the original version of the sentence begins with a dependent clause that can be connected to an independent clause with just a comma.

Question 5

Answer: C

Question Type: *Usage and Mechanics: Adverb vs. adjective; Clarity of expression*

Explanation: Here's a favorite of the ACT writers: having you decide between an adjective and adverb. First of all, you should figure out which word the modifier in question modifies. The adjective "successful" clearly modifies "executed" here—a verb. An adverb, not an adjective, should modify a verb, and the only alternative that replaces the adjective with its adverb form ("successfully") is answer C. Alternative B just rearranges the same mismatched words from the original. Alternative D replaces the modifier with a noun ("success"), leading to a confusing sentence.

Question 6

Answer: F

Question Type: *Usage and Mechanics: Subject-verb agreement; Verb tense*

Explanation: You may remember from English class that a "Neither, nor" subject with singular subjects demands a singular verb. Both "Lincoln" and "company" are singular nouns, so, to establish subject-verb agreement, the verb associated with them must also be singular. The original verb, "was," fits the bill—both in terms of being singular and in terms of matching the tense (past) of the sentence. Alternative G uses the incorrect plural verb "were," alternative H uses the incorrect future tense "will be," and alternative J uses the incorrect future perfect tense "will have been."

Question 7

Answer: D

Question Type: *Rhetorical Skills: Overall organization*

Explanation: The first thing to notice about the alternatives in this question is that the only sentences that vary their position from alternative to alternative are 1, 2, and 4; sentences 3, 5, 6, and 7 are invariant. You know that the paragraph begins "6, 7" and ends 3, 5; you just have to figure out how to fill in the middle with 1, 2, and 4. Remember that when an incident is being related, the first sentence or sentences often "set the scene"—create an overall picture of the situation, so that you can make sense of the forthcoming details. Sentence 4 fulfills that role by describing Lincoln's location, how many men he had, and the obstacle he confronted; this would make a good "set the scene" sentence to follow sentence 7. From there, sentences 1 and 2 can be placed in chronological order, in keeping with the narrative form of the passage. In sentence 1, Lincoln describes his inability to remember the necessary command, and, in sentence 2, he describes what he did to solve the problem and get his men through the gate; this seems like a natural, chronological order. The result is "4, 1, 2," alternative D.

Question 8**Answer: H****Question Type:** *Rhetorical Skills: Theme and Voice*

Explanation: The question stem is quite specific, and you should pay close attention to what it's asking for. The criteria for the sentence is (1) has "appropriate theme" and (2) maintains "the essay's style." Sometimes, it helps to determine the passage's overall theme before trying to nail down the theme of a particular paragraph. The theme of the passage is revealed in its first sentence, which suggests that Lincoln's experience in the war is a window into his character. We can expect that this overall theme will be recapitulated in some way within each paragraph. Alternatives F, G, and J follow this pattern, by referring to Lincoln's character. The "stovepipe hat" emphasis of alternative G, by contrast, seems to be a bit off-topic. If you look at what the paragraph is really about, you'll see that it exposes Lincoln as a brave, principled person; it does not seem to show the deep "flaws" suggested in alternative F. The tone of alternative J is too informal to fit the rest of the passage. That leaves alternative H, which provides an appropriate theme for the paragraph in an appropriate style.

Question 9**Answer: A****Question Type:** *Rhetorical Skills: Clear and appropriate transitions; Independent and dependent clauses*

Explanation: Although some teachers may tell you that it is incorrect to begin a sentence with a coordinating conjunction (such as "But"), modern usage allows it. What is *not* allowed is punctuating a subordinate clause (a clause that begins with a subordinating conjunction like "Although") as a complete sentence, so alternative D can be eliminated. Of the three transition words offered, the original ("But") makes the most sense because it denotes a contradiction or conflict, and a "letter of safe conduct from a general" seems to conflict with a "feeling of great irritation against the Indians." The words "And" (alternative B) and "So" (alternative C) fail to convey that conflict.

Question 10**Answer: H****Question Type:** *Rhetorical Skills: Clarity of expression; proper spelling*

Explanation: All of the alternatives except H suffer from two problems: Pronoun ambiguity (e.g., it is hard to tell whether pronouns like "him" or "his" are referring to Lincoln or the Indian) and lack of sentence "flow." In this case, eliminating the sentences that don't make much sense leaves you with only one alternative. The word "defenseless" is misspelled, and should contain an "e" between the "s" and "l" (defenseless).

Question 11**Answer: D****Question Type:** *Usage and Mechanics: Parallel sentence structure; Subject-verb agreement, Verb tense*

Explanation: There's a problem with parallel sentence structure in this sentence. The subject of the sentence,

"They," is associated with a list of verbs; in order to maintain parallel structure, the verbs must all take on the same form. The underlined verb, as you may have guessed, strays from that form. Specifically, it restates the noun ("they") along with the verb ("listened"), while the other verbs in the list do not restate the noun (e.g., "fell back"). To fix things, the inconsistently used noun must be eliminated, à la alternatives C and D. Alternative C, unfortunately, has problems with subject-verb agreement (it is a singular verb referring to the plural subject "They") and verb tense (it is a present tense verb surrounded by past tense verbs). Alternative D ("listened") establishes parallel form, agreement in number, and consistent verb tense.

Question 12**Answer: J****Question Type:** *Usage and Mechanics: Fragments, Verb tense*

Explanation: Sometimes the ACT writers will give you the opportunity to fix sentence fragments by eliminating subordinating conjunctions. A subordinating conjunction can take a perfectly good sentence and turn it into a fragment merely by attaching itself to the beginning of the sentence. In fact, that's exactly what a subordinating conjunction (like the "Although" of this sentence) is designed to do. When two clauses are separated by a comma and a coordinating conjunction (e.g., "and the"), the two clauses must be independent clauses. Unfortunately, the pesky subordinating conjunction "Although" turns the first clause of this sentence into a subordinate (dependent) clause. In order to make things right, your only option is to turn the clause into an independent clause by removing "Although." Alternative G replaces "Although" with another subordinating conjunction, "Whereas," making no improvement. Alternatives H and J remove the subordinating conjunction, but alternative H messes up the verb tense by using the present tense verb "ends" when the rest of the sentence is in the past tense. Only alternative J removes the subordinating conjunction, eliminating the fragment, and uses the correct verb tense.

Question 13**Answer: A****Question Type:** *Rhetorical Skills: Theme and voice*

Explanation: The specific criteria by which to judge each alternative is established in the answer stem. First of all, the essay must be about (i.e., its theme must be) Lincoln's "mental and moral qualities." Second of all, the essay must reveal those qualities as they existed when Lincoln was President. Since the essay explicitly states that the events took place "before he ran for the office of President," it does not meet the criteria, and the answer is either A or B. What must be decided next is whether or not the essay's theme is Lincoln's "mental and moral qualities." His mental qualities seem to be revealed in paragraph 2, and his moral qualities seem to be revealed in paragraph 3, so the answer is A.

English Section 6, Passage 2

Black Hawk

Question 14

Answer: H

Question Type: *Usage and Mechanics: Fragments; Punctuation*

Explanation: As it stands, this sentence is a fragment. A sentence must contain a subject and a verb, but this one has only a subject, “The commander of the U.S. troops.” There is no option to add a verb onto the sentence, so you have to incorporate it into the sentence that follows. This is not done by alternative G, which connects the fragment to the sentence that follows it with a semicolon—a type of punctuation that should connect two independent clauses, not a fragment and an independent clause. Alternative J creates a very awkward run-on by making an independent clause that ends with the word “Atkinson” and a comma, only to be followed by a verb with no subject. Alternative H gets it right by using a comma that, when taken with the comma after “Atkinson,” separates “General Atkinson” from the rest of the sentence as a modifier to “The commander of the U.S. troops.” The fragment and the clause are thus integrated effectively.

Question 15

Answer: B

Question Type: *Rhetorical Skills: Theme and voice*

Explanation: The point of the sentences in question must be inferred by the reader. However, one clue to their meaning is that they follow a sentence describing the “near complete annihilation” of Black Hawk’s forces. The interpretation that makes the most sense in this context is that represented by alternative B—that Black Hawk was “greatly outnumbered.” He clearly had not amassed “a large band of warriors” (A), and neither do these facts indicate that he was “not the great military leader his reputation would suggest” (D). Although the second sentence might imply that “Atkinson is a liar” (C), that does not seem to be the main point of the sentences.

Question 16

Answer: G

Question Type: *Usage and Mechanics: Independent and dependent clauses; Fragments*

Explanation: This sentence is so long that you may find it difficult to believe that it’s a fragment. But it is, because the subordinating conjunction “when” makes it a long subordinate clause that leads nowhere. As with many ACT English questions, you have to convert the subordinate clause to an independent clause by choosing the alternative that eliminates the subordinating conjunction. In this case, that alternative is G, “the chief.” It also happens to be the shortest answer, fitting with the “shorter is better” rule of thumb. Alternatives H and J merely replace the original subordinating conjunction with new subordinating conjunctions, maintaining the problem.

Question 17

Answer: B

Question Type: *Usage and Mechanics: Parallel sentence structure*

Explanation: You have to look at the list items before and after the one underlined to figure out the pattern, and fix the underlined portion to fit the pattern. Eliminating the underlined portion, we have two list items: “population” and “means of defense.” The phrase “the extent of the” is not carried over into the list items. It is implied, but not restated: “[the extent of the] population, [the extent of the] means of defense.” Therefore, it should not be carried over in the list item represented by the underlined portion of the sentence either. Alternative B eliminates the words that stray from the established form, and so it is the correct answer.

Question 18

Answer: H

Question Type: *Rhetorical Skills: Redundancy; Fragments*

Explanation: Be on the lookout for a phrase that says almost the same thing as a single word in the same sentence. That’s the problem here: the phrase “After some time,” doesn’t add much to the word “eventually,” so the sentence is redundant. If you remove “After some time,” you end up with “His skeleton was eventually...” (alternative H), which makes perfect sense and is not redundant. Alternative J is so redundant it actually uses the same word twice to refer to the same situation. Omitting all of the underlined words (G) leaves you with a fragment that starts with a lowercase letter.

Question 19

Answer: A

Question Type: *Usage and Mechanics: Verb tense; Subject-verb agreement*

Explanation: The subordinating conjunction “Having been” introduces something that happened before an incident that also happened in the past by establishing the past perfect tense. Moreover, the verb “is said to have been,” which follows the underlined portion, sets the event in the past tense. The underlined verb, therefore, should be placed in the simple past tense. The original (A) and “prisoners was taken” (C) use the correct verb tense. However, alternative C’s “was” creates a subject-verb agreement problem since “prisoners” is plural and “was” is singular. The original (A) is the correct answer, because it uses the correct verb tense and number.

Question 20

Answer: J

Question Type: *Rhetorical Skills: Redundancy*

Explanation: When the ACT writers put redundant words together in a sentence, they’re easier to spot than when at opposite ends of the sentence. The words “emotion” and “feeling” are synonymous enough that one pretty much implies the other; using both is unnecessary. Alternatives G and H are just as redundant as the original. Only answer J removes the redundancy—and makes the sentence more concise in the process.

Question 21**Answer: D****Question Type:** *Usage and Mechanics: Subject-verb agreement; Verb tense; Wordiness*

Explanation: This is a pretty straightforward subject-verb agreement question. The verb is at some distance from the subject and comes immediately after a plural noun, which could cause some confusion. The subject is actually “council” - a singular subject that requires a singular verb. “Were”, of course, is plural, so you need to replace it with a singular verb. Alternatives C and D both use singular verbs, but C’s verb is in the future tense, making it inconsistent with the context of the sentence. Alternative D, then, is the correct answer. Alternative B maintains the subject-verb agreement problem and adds a wordiness problem with the unnecessary “then”.

Question 22**Answer: G****Question Type:** *Rhetorical Skills: Clear and appropriate transitions*

Explanation: Here’s another question that asks you to decide which transition expresses the most appropriate meaning for the circumstances. The original version uses the transition “although,” which implies a contradiction or exception. There seems to be no contradiction between Keokuk becoming the new chief and Black Hawk taking his orders, so that word is inappropriate. Likewise, alternatives H (“but”) and J (“however”), which also imply contradiction. Alternative G is the only answer that uses a non-contradicting transition (“and that”), and it is the correct answer.

Question 23**Answer: C****Question Type:** *Usage and Mechanics: Punctuation*

Explanation: The only difference between the different alternatives is their punctuation, so that’s the only thing you need to concentrate on. It is a rule in punctuation that a quotation, introduced in the middle of a sentence, should be preceded by a comma. This question tests your knowledge of that rule, plain and simple. Alternative C uses the correct punctuation. You could also narrow your choices down to two via a process of elimination. A colon should only follow a complete statement, which it doesn’t do in alternative B. A semicolon should separate two independent clauses, which it doesn’t do in alternative D. You’re left with a fifty-fifty chance choosing between A and C.

Question 24**Answer: H****Question Type:** *Rhetorical Skills: Overall organization*

Explanation: Notice that paragraphs 1, 2, and 3 remain consistent from alternative to alternative; you only have to concentrate on paragraphs 4, 5, and 6. This is a narrative essay, an essay that tells a story, so we can expect the paragraphs to work best in chronological order. Right away you should notice that paragraph 4 deals with Black Hawk’s death, and the other paragraphs deal with his life, so—given a strict chronological telling—paragraph 4 should end the essay. Putting paragraphs 5 and 6 together based on chronology is a bit tricky because there are no obvious within-paragraph clues for which event came first—the “final liberation” ceremony or the “passing through Detroit and Saukenuk” incident; it’s just possible that the “final liberation” at Fort Armstrong occurred before Detroit (ceremonies being symbolic rituals that are not necessarily bound to reality), and certainly possible that it could have been the other way around. In this case, as in many “ordering” problems, you have to look outside the paragraphs you’re trying to sequence for clues. The last sentence of paragraph 2 states that Black Hawk was to be taken “through New York City, Buffalo, and Detroit to Fort Armstrong in Illinois.” That would put paragraph 6 after paragraph 5, so we have 1, 2, 3, 5, 6, 4—alternative H.

Question 25**Answer: A****Question Type:** *Rhetorical Skills: Theme and voice*

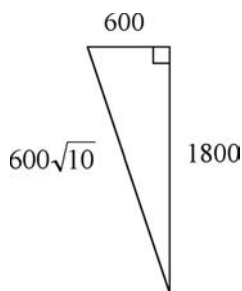
Explanation: Some essays do not state their theme; it must be inferred by the reader. There seems to be little, if any, explicit commentary on the treatment of Black Hawk in this passage. Instead, the essay presents a series of events and lets the reader draw his or her conclusions. But, the events were probably chosen out of many other events in Black Hawk’s life to fit a certain theme. Certainly, most of the events depicted—from the being “put in irons” to having his skeleton “destroyed in a fire” while on display—seem to fit the theme of “humiliation and degradation.” That theme seems to fit, and for the reasons specified in alternative A. The other alternatives seem not to be confirmed by the content of the passage.

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Answers: Math

Math Section 1

1-1. Ans A. $5x^5 \times 3x^5y^4 \times 2y^3 = 5 \times 3 \times 2 \times x^5x^5y^4y^3 = 30x^{10}y^7$
 $30x^{10}y^7 + 10x^{11}y^7$ cannot be reduced any further. (*Variable Manipulation*)



1-2. Ans G. Since distance = rate \times time, distance varies directly as rate. The rate of the river was 3 times George's swimming rate, so the distance George was carried downstream by the river was 3 times the distance George swam across the river, 1800 feet. We have a right triangle with legs of length 600 feet (across the river) and 1800 feet (down the river). The distance George was displaced from his original position is the hypotenuse of the triangle. Use the Pythagorean Theorem, $a^2 + b^2 = c^2$, where a and b are the lengths of the legs and c is the length of the hypotenuse. $600^2 + 1800^2 = c^2$.

Then $c = \sqrt{360,000 + 3,240,000} = \sqrt{3,600,000} = \sqrt{6^2 \times 10^4 \times 10} = 600\sqrt{10}$ feet. (*Proportions, Pythagorean Theorem*)

1-3. Ans C. Distance = rate \times time, so time = $\frac{\text{distance}}{\text{rate}}$. The river was 600 feet across.

(600 feet) $\left(\frac{1 \text{ mile}}{5280 \text{ feet}} \right) = \frac{10}{88} = \frac{5}{44}$ miles. So time $\frac{\frac{5 \text{ miles}}{44}}{\frac{1 \text{ mile}}{1 \text{ hour}}} = \frac{5}{44}$ hour. (*Distance Formula, Unit Conversion*)

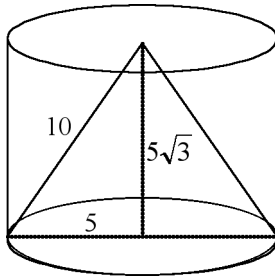
1-4. Ans K. $a = 3$ or -3 , $b = 2$ or -2 . A is $-3 + -2$, B is $-3 + 2$, C is $-2 + 3$ and D is $2 + 3$. All are possible, so none are true. (*Variable Manipulation*)

1-5. Ans D. $\left(\frac{4}{3} \right)$ is the same as and $\frac{4}{3} \times \frac{3}{1} = 4$, $\frac{3}{2} \times \frac{2}{3} = 1$, and $\left(\frac{1}{3} \right)^2 = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$.

So, the expression reduces to $(4)(1) + \frac{1}{9} = \frac{36}{9} + \frac{1}{9} = \frac{37}{9}$. (*Basic Math*)

1-6. Ans J. The matrices show the number of people in the store and the ratio of those people who will make a purchase match the age groups' population with their ratio. This ratio represents a percentage, so $100 \times 0.35 = 35$. (*Proportions*)

1-7. Ans C. Use the same reasoning to find the number of adolescents and adults who will make purchases, then add all the age group results. $35 + 15 + 25 = 75$. (*Proportions*)



1-8. Ans K. Use the Pythagorean Theorem to find the height of the cylinder: $\sqrt{10^2 - 5^2} = \sqrt{100 - 25} = \sqrt{75} = 5\sqrt{3}$.

Since the radius of the base is 5, the area of the base = $\pi r^2 = 5^2 \times \pi = 25\pi$.

The volume of the cylinder = (area of base) \times height = $25\pi \times 5\sqrt{3} = 125\pi\sqrt{3}$. (*Plane Geometry*)

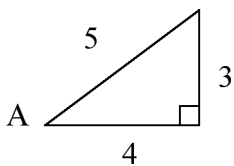
1-9 Ans D. From the first equation, $x = 7 - 3y$. Substitute this for x in the second equation: $2(7 - 3y) - 4y = 5$. Distribute

2 through the parentheses: $14 - 6y - 4y = 5$. Then $14 - 10y = 5$, so $-10y = -9$, and $y = \frac{9}{10}$. Use this in the first equation to

find x : $x + 3\left(\frac{9}{10}\right) = 7$, so $x = \frac{70}{10} - \frac{27}{10} = \frac{43}{10}$. Thus $(x, y) = \left(\frac{43}{10}, \frac{9}{10}\right)$. (*Coordinate Geometry*)

1-10. Ans J. The number of favorable outcomes is 47 (the number of marshmallows that are not purple = $15 + 32$).

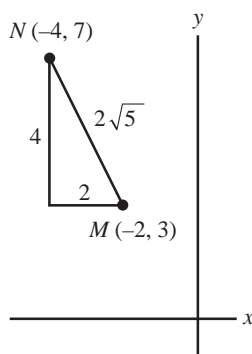
The total number of outcomes is $15 + 3 + 32 = 50$, so the correct answer is $\frac{47}{50}$. (*Probability*)



1-11 Ans D. Use SOH-CAH-TOA:

The sine is $\frac{\text{opposite}}{\text{hypotenuse}} = \frac{3}{5}$. The cosine is $\frac{\text{adjacent}}{\text{hypotenuse}} = \frac{4}{5}$. The tangent is $\frac{\text{opposite}}{\text{adjacent}} = \frac{3}{4} = .75$. (*Trigonometry*)

1-12. Ans H. $\frac{x}{50} = \frac{30}{100}$. $100x = (30)(50) = 1,500$. $x = \frac{1,500}{100} = 15$. (*Proportions*).



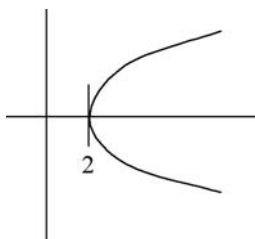
1-13. Ans C. Use the distance formula:

$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. $D = \sqrt{(-4 - (-2))^2 + (7 - 3)^2} = \sqrt{(-2)^2 + (4)^2} = \sqrt{4 + 16} = \sqrt{20} = 2\sqrt{5}$.

(*Coordinate Geometry*)

1-14. Ans G. $\frac{10}{20} = \frac{5}{5+x}$. $(5)(20) = (10)(5+x)$. $100 = 50 + 10x$. $50 = 10x$. $x = 5$. (*Plane Geometry and Proportions*)

1-15. Ans A. $x = y^2 + 2$, then $y^2 = x - 2$, so $y = \pm\sqrt{x-2}$. This says the graph “starts” at the point (2,0). The graph of $y = \sqrt{x}$ is the upper half of a parabola symmetric to the x axis, so $y = \pm\sqrt{x}$ is a full parabola symmetric to the x axis. Therefore, the graph of $y = \pm\sqrt{x-2}$, which is equivalent to $x = y^2 + 2$, looks like this:



(*Variable Manipulation and Coordinate Geometry*)

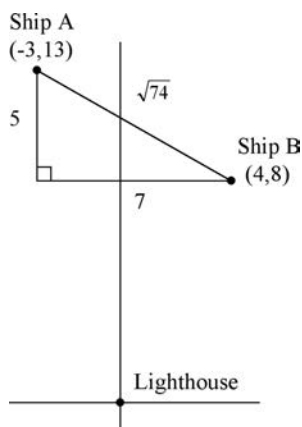
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Math Section 2

2-1. Ans A. $(x^2)^3 = x^6$. This is the same as $\frac{1}{x^6}$. (*Variable Manipulation*)

2-2. Ans F. $(4x)(2x) + (4x)(-4) + (2)(2x) + (2)(-4) = 8x^2 - 16x + 4x - 8 = 8x^2 - 12x - 8$. (*Variable Manipulation*)

2-3. Ans E. $9 \times 2 \times 3 = 54$, so $54w \times z \times y \times y^4 = 54wzy^5 = 54wy^5z$ (*Variable Manipulation*)

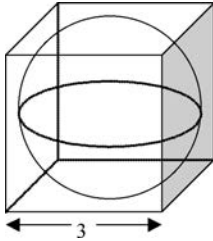


2-4. Ans G. There are two methods to solve this. One way is to use the distance formula $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ to find the distance between points (-3, 13) and (4, 8). Alternatively, view this as a right triangle with one leg of length (13 - 8) and one leg of length (3 + 4). Use the Pythagorean Theorem ($a^2 + b^2 = c^2$) to find the length of the hypotenuse: $(13 - 8)^2 + (3 + 4)^2 = c^2$. $25 + 49 = c^2$. $\sqrt{74} = c$. (*Coordinate Geometry*)

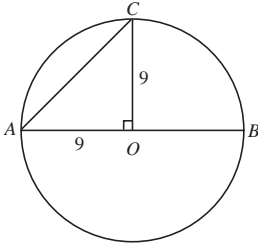
2-5. Ans D. $36^{\frac{3}{2}} = \left(36^{\frac{1}{2}}\right)^3 = 6^3 = 36 \times 6 = 216$ (*Basic Math*)

2-6. Ans G. $3 + 2\frac{5}{8} = 5\frac{5}{8}$. $\frac{51}{8} - \frac{45}{8} = \frac{6}{8} = \frac{3}{4}$. (*Basic Math*)

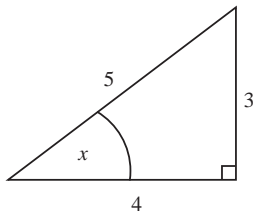
2-7. Ans E. $3\pi = 2\pi r$, so $r = \frac{3\pi}{2\pi} = \frac{3}{2}$. The diameter of the sphere is 3, so the volume of the cube is $3 \times 3 \times 3 = 27$.
(*Plane Geometry*)



2-8. Ans H. 2, 3, and 5 are the only prime numbers on the standard die. Since there are 6 sides, and 3 are prime, the probability is $\frac{3}{6} = \frac{1}{2}$. (*Probability*)



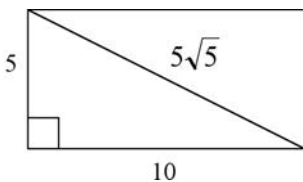
2-9. Ans C. AC is the hypotenuse, and both legs are length 9, so $9^2 + 9^2 = AC^2$. $\sqrt{(2)(81)} = 9\sqrt{2} = 12.7$.



2-10. Ans K. $\tan x = \frac{\text{opposite}}{\text{adjacent}} = \frac{3}{4}$, so by the Pythagorean Theorem, the hypotenuse

$= \sqrt{3^2 + 4^2} = \sqrt{25} = 5$. $\csc x = \frac{1}{\sin x} = \frac{1}{\left(\frac{\text{opposite}}{\text{hypotenuse}}\right)} = \frac{\text{hypotenuse}}{\text{opposite}} = \frac{5}{3}$. (*Trigonometry*)

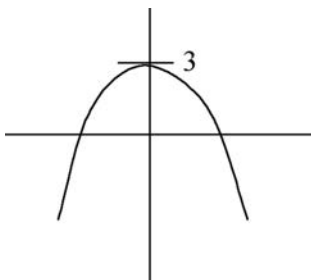
2-11. Ans E. $(10 \text{ pages}) \times \left(\frac{540 \text{ words}}{1 \text{ page}}\right) \times \left(\frac{1 \text{ minute}}{90 \text{ words}}\right) = \frac{10 \times 540}{90} = 60 \text{ minutes}$. (*Proportions*)



2-12. Ans G. $5^2 + 10^2 = \text{diagonal}^2$. $25 + 100 = 125$. So the diagonal $\sqrt{125} = \sqrt{(5)(25)} = 5\sqrt{5}$. (*Coordinate Geometry*)

2-13. Ans B. The diameter of the circle is 3, so the radius is $\frac{3}{2}$. The area of the circle is then $\pi\left(\frac{3}{2}\right)^2 = \frac{9\pi}{4}$.

The area of the square is side \times side $= 3 \times 3 = 9$. $\text{Area}_{\text{square}} - \text{Area}_{\text{circle}} = 9 - \frac{9\pi}{4}$. (*Plane Geometry*)



2-14. Ans G. Since the coefficient of x^2 is negative, this parabola opens downward and reaches a maximum value at its vertex. Since the parabola is symmetric about the line $x = 0$, the maximum will occur when $x = 0$, which is where the vertex is located. The value at $x = 0$ is $y = -(0) + 3$, so at $x = 0$, $y = 3$. The parabola achieves its maximum at $(0,3)$. (*Coordinate Geometry*)

2-15. Ans D. Since corresponding angles are equal, set $x^2 + 2 = 3x$. $x^2 - 3x + 2 = 0$. Factor the quadratic to get $(x - 2)(x - 1) = 0$. Therefore, either $x = 1$ or $x = 2$ solves this equation. (*Plane Geometry*)

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Math Section 3

3-1 Ans B. The actual distance Joe drove does not matter in solving this problem, so let the distance be a number easily divisible by 50 and 30, say 300 miles. Then Joe drove 150 miles at 50 miles per hour, so that part of the trip took 3 hours. He drove the remaining 150 miles at 30 miles per hour, so that part of the trip took 5 hours.

Average speed $= \frac{\text{total distance}}{\text{total time}} = \frac{300 \text{ miles}}{8 \text{ hours}} = 37.5$ miles per hour. In solving this problem, any positive real number can be used for the distance, and the result will always be the same. (*Overall Average*)

3-2 Ans K. $x^2 + 3 > 12$, so $x^2 > 9$, so $x > 3$ or $x < -3$. Full answer is $|x| > 3$. (*Variable Manipulation, Absolute Value*)

3-3 Ans C. Since $x > 0$ and thus cannot be equal to 0, dividing numerator and denominator by x is permissible.

After dividing, the quotient $= \frac{1}{x^2 - 3}$. This is positive when $x^2 > 3$, so $x > \sqrt{3}$. (*Variable Manipulation*)

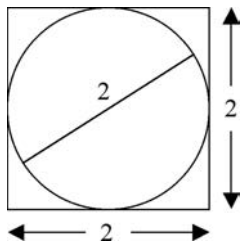
3-4 Ans F. $y = (-10)^2 + 2 = 100 + 2 = 102$. The graphs intersect at $(-10, 102)$. (*Coordinate Geometry*)

3-5 Ans A. $16^{2x+3} = (2^4)^{2x+3} = 2^{8x+12}$, $2^{8x+12} = 2^{3x+2}$, so $8x + 12 = 3x + 2$. $5x = -10$. Therefore, $x = -2$. (*Exponents*)

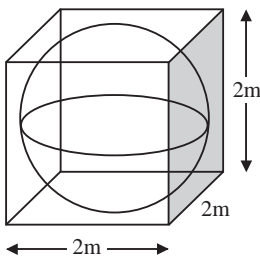
3-6 Ans J. Cotangent $= \frac{\text{adjacent}}{\text{opposite}}$, so the ratio of sides is $\frac{\sqrt{3}}{1}$. That means this is a 30-60-90 triangle. The length of the hypotenuse is twice the length of the shorter leg. (*Trigonometry*)

3-7 Ans D. Answers A, B, and C are integers of value 2, 4, and 32, respectively. E can be rewritten as x^3 , so E has a value of 8. D can be rewritten as $\frac{1}{x^2} = \frac{1}{4}$, which is not an integer. (*Variable manipulation*)

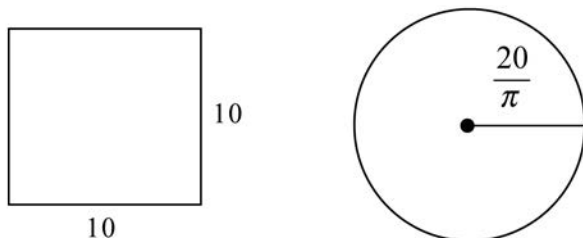
3-8 Ans H. 125% of $\$60 = 1.25 \times \$60 = \$75$. 15% of $\$75 = .15 \times \$75 = \$11.25$. So Johnny paid $\$75 - \$11.25 = \$63.75$. (*Percents*)



3-9 Ans C. Since the diameter of the circle is 2, each side of the square is 2. Therefore, since the area of a square is side \times side, the area of this square is $2 \times 2 = 4$. (*Plane Geometry*)



3-10 Ans G. $8m^3 = (\text{side})^3$, so side = $2m$. Diameter of sphere = $2m$, so radius = $1m$. Surface area of sphere = $4\pi r^2 = 4\pi(1^2) = 4\pi m^2$. (*Plane Geometry*)



3-11 Ans D. Area of square = $100 = \text{side} \times \text{side}$, so side = 10. Perimeter of square = $40 = \text{circumference} = 2\pi \times \text{radius}$. $20 = \pi \times \text{radius}$, so radius = $\frac{20}{\pi}$. Area of circle = $\pi r^2 = \pi \left(\frac{20}{\pi}\right)^2 = \frac{400}{\pi}$. (*Plane Geometry*)

3-12 Ans F. $\frac{6 \text{ females}}{4 \text{ males}} = \frac{n \text{ females}}{80 \text{ males}}$. Cross-multiply: $4n = 480$, so $n = 120$. (*Proportions*)

3-13 Ans D. $(x - 15)(x + 2) = 0$ after factoring, so $x = 15$ and $x = -2$ are solutions. (*Variable Manipulation*)

3-14 Ans J. $(7)(3)(4) = 84$ distinct outfits, by the Fundamental Counting Theorem.

3-15 Ans E. $100\% - 25\% - 36\% - 14\% = 25\%$ for Miscellaneous. $25\% = .25$. $.25 \times (360 \text{ degrees in circle}) = 90 \text{ degrees}$. (*Proportions, Plane Geometry*)

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Math Section 4

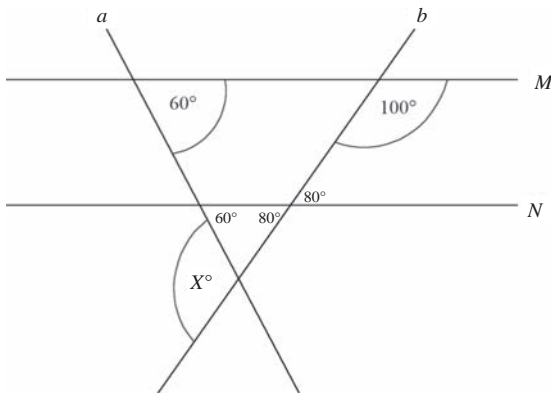
4-1 Ans B. $ax - by + cxy = z$. $ax + cxy = z + by$. $x(a + cy) = z + by$

$$x = \frac{z + by}{a + cy}. \text{ (Variable Manipulation, Factoring)}$$

4-2 Ans H. If $x^4 = 256$, then $x = \pm 4$ or $\pm 4i$. But of these possibilities, only $\sqrt{4}$ is a real number, so $x = 4$.
 $\sqrt{4} - 3(4^3) = 2 - 192 = -190$. (Variable Manipulation, Roots)

4-3 Ans B. First put the numbers in ascending order: 1, 1, 2, 2, 3, 4, 4.5, 5, 6, 7, 7, 43. The median is the middle number. If there are two middle numbers, the median is their average. Since there are two middle numbers here, 4 and 4.5, take their average: $\frac{4 + 4.5}{2} = 4.25$. (Mean, Median, Mode)

4-4 Ans G. By the pattern given, $\frac{1}{\sqrt{8}} = \frac{\sqrt{8}}{8}$. But $\frac{\sqrt{8}}{8} = \frac{\sqrt{2 \times 4}}{8} = \frac{2\sqrt{2}}{8} = \frac{\sqrt{2}}{4}$. (Basic Math, Roots)



4-5 Ans D. Since lines M and N are parallel, the measure of the upper left angle of the small triangle is 60° (corresponding angles are equal), the measure of the angle below the 100° angle is 80° (interior angles on the same side of a transversal are supplementary). Therefore, the measure of the angle at the upper right inside the small triangle is also 80° (vertical angles are equal). Thus $X = 60^\circ + 80^\circ = 140^\circ$ by the Exterior Angle Theorem. (Plane Geometry)

4-6 Ans H. After first year: $\$25,000 \times .85 = \$21,250$.

After second year: $\$21,250 \times .90 = \$19,125$.

After third year: $\$19,125 \times .90 = \$17,212.50$, which rounds to $\$17,213$. (Percents)

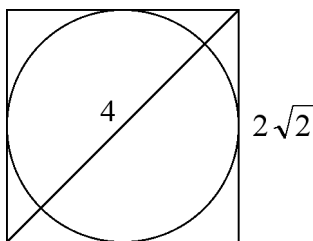
4-7 Ans A. This is a geometric sequence: Each term is multiplied by i to get the next term. $i \times i = -1$, $(-1) \times i = -i$, $(-i) \times i = 1$. Therefore, the next term is $(1) \times i = i$. (Complex Numbers)

4-8 Ans F. Distance \times rate = time. The rate the two men closed the distance between them was

$$6 \frac{\text{feet}}{\text{second}} + 9 \frac{\text{feet}}{\text{second}} = 15 \frac{\text{feet}}{\text{second}}.$$

$$600 \text{ feet} = 15 \frac{\text{feet}}{\text{second}} \times T \text{ seconds, so } T = \frac{600}{15} = 40 \text{ seconds until the men met.}$$

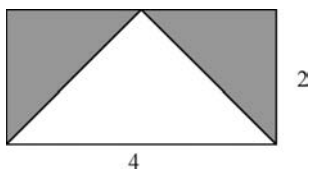
The dog's distance = 12×40 seconds = 480 feet. (Distance, Rates)



4-9 Ans D. By the Pythagorean Theorem, $4^2 = \text{side}^2 + \text{side}^2 = 2 \times \text{side}^2 = 16$. $8 = \text{side}^2$, so $\text{side} = \sqrt{8} = \sqrt{2 \times 4} = 2\sqrt{2}$. (Alternatively, recognize that this is a special triangle $1-1-\sqrt{2}$ with hypotenuse $= \sqrt{2} =$ (length of leg).

Then $4 = \sqrt{2} \times$ (length of leg), so length of leg $= \frac{4}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$. The diameter, then, is $2\sqrt{2}$ so the radius is $\sqrt{2}$.

The area of a circle $= \pi r^2 = \pi(\sqrt{2})^2 = 2\pi$. (Plane Geometry)



4-10 Ans H. The unshaded region is a triangle with a base of 4 and a height of 2.

The area of a triangle $= \frac{\text{base} \times \text{height}}{2} = \frac{4 \times 2}{2} = 4$. (Plane Geometry)

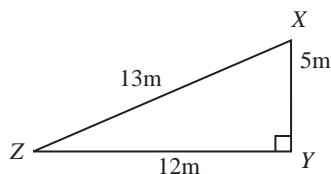
4-11 Ans E. Either x or y , but not both, must be negative in order for their product to be negative. The only quadrants where ordered pairs of one positive value and one negative value are possible are the second (negative x values, positive y values) and the fourth (negative y values, positive x values). (Variable Manipulation and Coordinate Geometry)

4-12 Ans H. Rearrange the equation to see if it matches any of the answers. Multiply both sides of the equation by (-4) , so $-4y = -5x + 64$. Add $5x$ to both sides to get $5x - 4y = 64$. (Variable Manipulation)

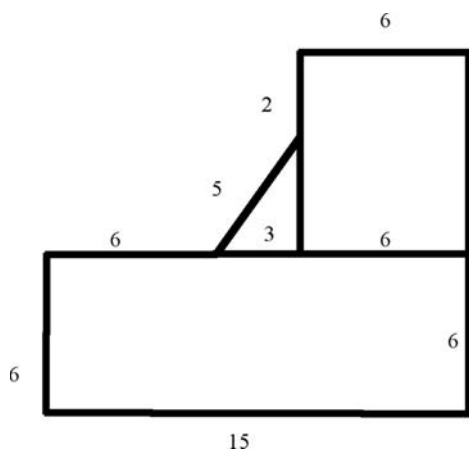
4-13 Ans E. In order for the probability of randomly plucking a yellow candy from the bowl to be $\frac{1}{5}$, we must have

$\frac{1}{5} = \frac{\text{number of yellow candies}}{\text{total number of candies}} = \frac{25}{t}$. Solve for t : $\frac{1}{5} = \frac{25}{t}$. Cross-multiply: $(5)(25) = t$, so the total number of candies must

be 125. Currently there are $15 + 30 + 20 + 25 = 90$ candies in the bowl, so 35 additional candies must be added. (Probability)



4-14 Ans H. Cosine $= \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{12\text{m}}{13\text{m}} = \frac{12}{13}$. (Trigonometry)



4-15 Ans D. Extend lines to create shapes that are easily recognizable as rectangles or triangles, then find the area of each shape and total them to find the total area. The large rectangle on the bottom has an area of $15 \times 6 = 90$. To find the area of the triangle, recognize the special 3-4-5 triangle, or use the Pythagorean Theorem to solve for the vertical leg:

$\sqrt{5^2 - 3^2} = \sqrt{25 - 9} = \sqrt{16} = 4$. Then the area = $\frac{\text{base} \times \text{height}}{2} = \frac{3 \times 4}{2} = 6$. The final rectangle has sides length 6 and 6, so the area = 36. Total area = $90 + 6 + 36 = 132$. (*Plane Geometry*)

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Math Section 5

5-1 Ans B. PEMDAS tells us to process parentheses first, then exponents, then multiplication and division, then addition and

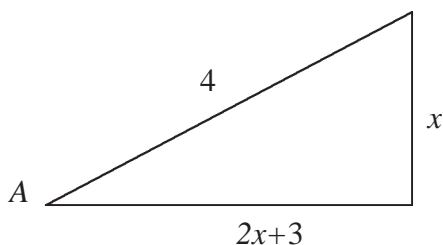
subtraction. $\left(\frac{1}{3}\right) - \left(\frac{3}{4}\right) = \frac{1}{3} \times \frac{4}{4} = \frac{4}{12} - \frac{9}{12} = -\frac{5}{12}$. Now we must add $\frac{1}{3} + \frac{3}{4} - \frac{4}{9} + \frac{1}{4}$. To do so, we use the common denominator 36

to find $\frac{12}{36} + \frac{27}{36} - \frac{16}{36} + \frac{9}{36} = \frac{32}{36} = \frac{8}{9}$. (*Basic Math*)

5-2 Ans G. Use FOIL (first, outside, inside, last) to multiply each term of the first parentheses with each term of the second parentheses: $(2x - 7)(3x + 4) = (2x)(3x) + (2x)(4) + (-7)(3x) + (-7)(4) = 6x^2 + 8x - 21x - 28 = 6x^2 - 13x - 28$. (*Variable manipulation*)

5-3 Ans B. Since the group grew by 50%, it was $(100\% + 50\%)$ times the size of the original group.

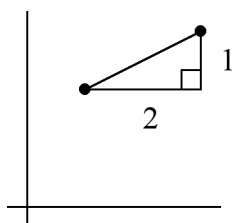
$1.5x = 300$, $x = \frac{300}{1.5} = 200 =$ the size of the original group. $.45(200) = 90$. (*Percents*)



5-4 Ans K. $\text{Cotangent} = \frac{1}{\text{tangent}} = \frac{1}{\left(\frac{\text{opposite}}{\text{adjacent}}\right)} = \frac{\text{adjacent}}{\text{opposite}} = \frac{2x+3}{x}$. Answer F is the sine of angle A, answer G is the cosine

of angle A, answer H is the tangent of angle A, and answer J is the secant of angle A. (*Trigonometry*)

5-5 Ans C. In order for Kelly to end up with a 2-inch border on all sides, the larger piece of paper must have had side lengths of $(2 + 8 + 2)$ and $(2 + 10 + 2)$. Multiply these side lengths to find the area of the larger paper $= 12 \times 14 = 168$ square inches. Subtract from that the area of the picture, which $= 8 \times 10 = 80$ square inches. The resulting border has area $168 - 80 = 88$ square inches. (*Plane Geometry, Area*)



5-6 Ans F. The slope formula tells us that the slope of the line is $\frac{3-2}{3-1} = \frac{1}{2}$, so the slope-intercept form of the equation is

$y = \frac{1}{2}x + b$. Substitute the coordinates of the point $(1,2)$ in this equation to obtain $2 = \frac{1}{2}(1) + b$, so $b = \frac{3}{2}$.

The equation is $y = \frac{1}{2}x + \frac{3}{2}$. (*Coordinate Geometry*).

5-7 Ans B. There are 20 marbles total. The probability of drawing a red marble is $\frac{5}{20} = \frac{1}{4}$. The probability of drawing a green marble is also $\frac{1}{4}$. The probability of drawing a blue marble is $\frac{10}{20} = \frac{1}{2}$. The probability of drawing a red, green, and blue marble, in that order, is $\frac{1}{4} \times \frac{1}{4} \times \frac{1}{2} = \frac{1}{32}$. (*Probability*)

5-8 Ans H. For each variable, subtract the exponent in the denominator from the exponent in the numerator:

$\frac{xy^2z^3w}{x^4y^6z} = x^{1-4}y^{2-6}z^{3-1}w = x^{-3}y^{-4}z^2w$. Now move the variables with negative exponents to the denominator and change the exponents' signs to obtain $\frac{z^2w}{x^3y^4}$. (*Variable Manipulation*)

5-9 Ans E. $25^{\frac{3}{2}} = \left(25^{\frac{1}{2}}\right)^3 = (\sqrt{25})^3 = 5^3 = 125$. (*Basic Math*)

5-10 Ans J. The marked angles are congruent because parallel lines cut by a transversal form congruent alternate interior angles. $x^2 + 4 = 3x + 2x$, so $x^2 + 4 = 5x$. Then $x^2 - 5x + 4 = 0$. Factor this equation to obtain $(x - 4)(x - 1) = 0$. Then $x = 1$ or $x = 4$. (*Plane Geometry, Factoring*)

5-11 Ans D. The arc length is $\frac{70}{360}$ of the total circumference, since the central angle is $\frac{70}{360}$ of the total degrees in the circle.

The circumference = $2\pi r = 2\pi(3) = 6\pi$. $\left(\frac{70}{360}\right) \times 6\pi = \frac{7\pi}{6}$. (*Plane Geometry*)

5-12 Ans J. The area of the entire house is $10 \times 20 = 200$. The area of the hallway is $2(5 + 1) = 2(6) = 12$. The area of the kitchen is $4(10 - 1) = 4(9) = 36$, and the area of the dining room is $10(10 - 4) = 10(6) = 60$, making the total area of hallway, kitchen, and dining room = $12 + 36 + 60 = 108$. The percentage is then $\frac{108}{200} = \frac{54}{100} = 54\%$. (*Percents, Plane Geometry*)

5-13 Ans C. Since the price of the basket was marked down 70% of the original price, Henrietta paid 30% of the original price. To find 30% of x , multiply x by .30. Then $.30x = 60$, so $x = \frac{60}{.3} = 200$. Next, 20% more than the original price is 100% of the original price + 20% of the original price = 120% of the original price. To find 120% of x , multiply x by 1.20. Thus, $1.20(200) = 240$. (*Percents*)



5-14 Ans F. Find the coordinate of the point halfway between -1 and 11 by finding their average, which is $\frac{-1+11}{2} = \frac{10}{2} = 5$.

The graph includes all numbers which are at a distance of 6 or more from 5. The expression $|w - 5|$ means “the distance between the number w and 5,” so the inequality $|w - 5| \geq 6$ means “the distance between the number w and 5 is greater than or equal to 6.” This is what the graph shows. (*Basic Math, Absolute Values*)

5-15 Ans A. $59 = \frac{9}{5}C + 32$. Subtract 32 from both sides to obtain $27 = \frac{9}{5}C$. Multiply both sides by the reciprocal of $\frac{9}{5}$,

which is $\frac{5}{9}$. Then $\frac{5}{9}(27) = C$. Thus $C = 15$. (*Functions, Variable Manipulation*)

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Math Section 6

6-1 Ans B. Distance = rate \times time. 15 miles = 1 1/2 miles per day $\times d$ days, so $d = \frac{15 \text{ miles}}{\left(\frac{1.5 \text{ miles}}{1 \text{ day}}\right)} = 10$ days. (*Distance Formula*)

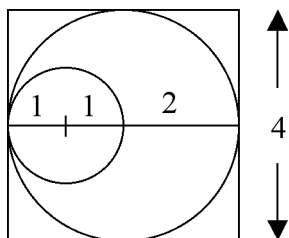
6-2 Ans G. $\frac{\sqrt{5} + \sqrt{10}}{\sqrt{10} - \sqrt{5}} \times \frac{\sqrt{10} + \sqrt{5}}{\sqrt{10} + \sqrt{5}} = \frac{\sqrt{50} + \sqrt{25} + \sqrt{100} + \sqrt{50}}{\sqrt{100} + \sqrt{50} - \sqrt{50} - \sqrt{25}} = \frac{15 + 2\sqrt{50}}{5}$. Notice that this is answer K, but it is not

completely simplified. Since $\sqrt{50} = \sqrt{2 \times 5 \times 5}$, then $\sqrt{50} = 5\sqrt{2}$. Therefore, $\frac{15 + 2\sqrt{50}}{5} + \frac{15 + 10\sqrt{2}}{5} = 3 + 2\sqrt{2}$. (*Roots*)

6-3 Ans C. $\frac{1}{2}x^2(3x + 5y) = \frac{1}{2}x^2(3x) + \frac{1}{2}x^2(5y) = \frac{3}{2}x^3 + \frac{5}{2}x^2y$. (*Variable Manipulation*)

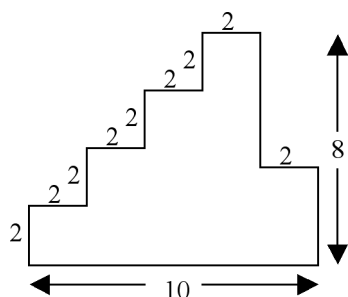
6-4 Ans F. $1 - \frac{2}{3} - \frac{1}{6} = \frac{1}{6} = .167 = 16.7\%$. (*Percents*)

6-5 Ans C. 30% of 25,000 is $.3 \times 25,000 = 7,500$. $40,000 - 25,000 = 15,000$, which is $7,500 \times 2$. So, it would take a 30% increase twice, or 20 years, to reach \$40,000. (*Percents*)



6-6 Ans J. The radius of the larger circle is 2, so the diameter is 4. A circumscribing square would have a side length of 4, so the perimeter would be $4 \times 4 = 16$. (*Plane Geometry*)

6-7 Ans B. Since this is a question of averages, use the TAN method. You know the number and the average, so you need to know T , the total. $T = AN$. $A = 30$, $N = 3$, so $AN = 90$. Therefore, Jerry must score $90 - 23 - 34 = 33$. (*Data, Average*)



6-8 Ans K. The vertical distance is the same on each side of the figure, so since the vertical segments on the left side have a total length of 8, the right side also has a length of 8. The horizontal distance is the same on each side of the figure as well, 10 on each side. The perimeter is then $2(8) + 2(10) = 36$. (*Plane Geometry*)

6-9 Ans D. The least common multiple is the smallest number into which both of the given numbers divide evenly. Check whether both numbers divide into the given answers, and choose the smallest answer for which they do. Start with Answer C, 2,160, since that is the smallest number that 2,160 divides into evenly. 810 does not divide into 2,160, however. Next try Answer D, 6,480. Then $\frac{6,480}{2,160} = 3$ and $\frac{6,480}{810} = 8$, so 6480 is a multiple of both 2,160 and 810. Since Answer E is larger than 6,480, it cannot be the least common multiple. (*Basic Math*)

6-10 Ans G. A diagonal is a line segment between two nonconsecutive vertices of a polygon. A 7-sided polygon has 7 vertices, each of which can be connected by a diagonal to all the vertices except the one on its left, the one on its right, and itself. So each vertex can be the endpoint of 4 diagonals. This would give 7×4 diagonals, but each diagonal would be counted twice, since the diagonal from vertex A to vertex B, for example, would be counted as segment AB and as segment BA . So we divide by 2 to obtain $\frac{7 \times 4}{2} = 14$. Alternatively, draw the diagonals and count them. (*Plane Geometry, Counting*)

6-11 Ans A. The formula for the distance between points (x_1, y_1) and (x_2, y_2) is $D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

Here, $D = \sqrt{(\sqrt{7} - 1)^2 + (10 - \sqrt{2})^2} = \sqrt{(7 - 2\sqrt{7} + 1) + (100 - 20\sqrt{2} + 2)} = \sqrt{110 - 2\sqrt{7} - 20\sqrt{2}}$.

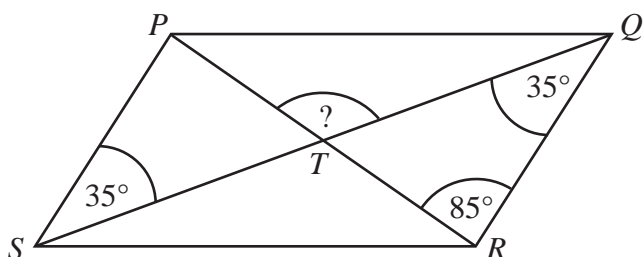
(*Coordinate Geometry, Multiplying Binomials*)

6-12 Ans K. The formula for the area of a trapezoid is $A = \left(\frac{\text{base}_1 + \text{base}_2}{2}\right) \times \text{height}$. Here, $50 = \left(\frac{x + 2x}{2}\right) \times 5$, so $100 = 15x$.

Thus $x = \frac{100}{15} = \frac{20}{3}$. (*Plane Geometry*)

6-13 Ans C. Since for any x , $\sin^2 x + \cos^2 x = 1$, then $1 - \sin^2 x = \cos^2 x$. So $\frac{\sin^2 x}{1 - \sin^2 x} = \frac{\sin^2 x}{\cos^2 x} = \left(\frac{\sin x}{\cos x}\right)^2 = \tan^2 x$.
(Trigonometry)

6-14 Ans F. Distribute the negative sign through the right side of the equation: $m = -n - 7$. Add n to both sides of the equation: $m + n = -7$. Cube both sides: $(m + n)^3 = (-7)^3 = (-7)(-7)(-7) = -343$. (Algebra)



6-15 Ans C. Since \overline{PS} is parallel to \overline{QR} , and parallel lines that are cut by a transversal form congruent alternate interior angles, then the measure of angle $TQR =$ the measure of angle $PST = 35^\circ$. Angle PTQ is an exterior angle to triangle QTR , so its measure is equal to the sum of the measures of the remote interior angles. The measure of angle $PTQ =$ (measure of angle TQR) + (measure of angle QRT) = $35^\circ + 85^\circ = 120^\circ$. (Plane Geometry)

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Math Section 7

7-1 Ans A. $(-1) + [3 - (-1)](-3) = (-1) + [4](-3) = (-1) + (-12) = -13$. (Basic Math)

7-2 Ans F. 5 and 30 have a common factor of 5, so 5 can be factored out of the polynomial to obtain $5(x + 6y)$.
(Variable Manipulation)

7-3 Ans B. This problem presents two points, (5, 65) and (8,80), on a line and asks for the y -value of a third point on the line.

The line takes the form $y = mx + b$, where $m =$ slope $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{80 - 65}{8 - 5} = \frac{15}{3} = 5$. Then $y = 5x + b$. Plug in the values of

x and y from one of the points and solve for b . $65 = 5(5) + b$. So $b = 65 - 25 = 40$. Now we have $y = 5x + 40$.

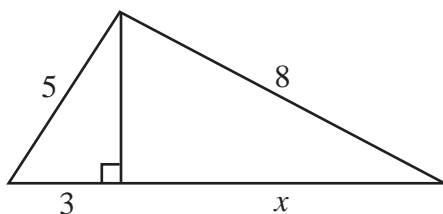
Let $x = 12$ and solve for y : $y = 5(12) + 40 = 60 + 40 = 100$. (Line Equation)

7-4 Ans H. The second equation gives us $y = 10x - 4$, so substitute $10x - 4$ for y in the first equation: $-3x + 2(10x - 4) = -3$.

Then $-3x + 20x - 8 = -3$, so $17x = 5$, and $x = \frac{5}{17}$. Substitute this value for x in the second equation:

$$y = 10\left(\frac{5}{17}\right) - 4 = \frac{50}{17} - \frac{68}{17} = -\frac{18}{17}. \text{ The ordered pair is } \left(\frac{5}{17}, -\frac{18}{17}\right).$$

Alternatively, plug in the answer choices and determine which one makes both equations true. (Coordinate Geometry)



7-5 Ans B. Solve for the altitude by using the Pythagorean Theorem with the triangle on the left: $5^2 = 3^2 + \text{altitude}^2$, so $\text{altitude}^2 = 25 - 9 = 16$, and $\text{altitude} = 4$. (Alternatively, recognize the left triangle as a special 3-4-5 right triangle and fill in the missing leg.) Now use the Pythagorean Theorem again with the triangle on the right to solve for x : $8^2 = 4^2 + x^2$, so $x^2 = 64 - 16 = 48$, and $x = \sqrt{48} = \sqrt{3 \times 16} = 4\sqrt{3}$. (Alternatively, recognize the triangle on the right as a special 30-60-right triangle, with side proportions of $1 : 2 : \sqrt{3}$. Since the known leg has length 4 and the hypotenuse has length 8, the missing leg has length $4\sqrt{3}$.) (*Plane Geometry*)

7-6 Ans J. If $T - 1 < 0$, then $|T - 1| = -(T - 1) = -T + 1 \leq .2$. Subtract 1 from both sides: $-T \leq -.8$. Now multiply both sides by -1 , remembering to reverse the sign of the inequality: $T \geq .8$. Therefore, the thinnest acceptable pancake can be $.8$ centimeters thick. (*Absolute Value*)

7-7 Ans C. The set of positive integers does not include zero. The union of that set with the set of negative integers gives the set of all integers except 0. (*Sets*)

7-8 Ans G. $\$95(100\% - 25\%) = \$95(.75) = \$71.25$. Similarly, $\$71.25(100\% - 10\%) = \$71.25(.9) = \$64.125$, which rounds to $\$64.13$. (*Percents*)

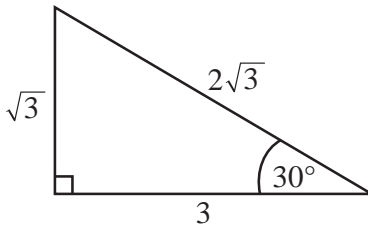
7-9 Ans D. This is a geometric sequence in which each term is the product of b and the previous term. The first term is $a \times b^0$, the second is $(a \times b^0) \times b = a \times b^1$, the third is $(a \times b^1) \times b = a \times b^2$, and so forth. So the 500th term is $a \times b^{499}$. (*Geometric Sequence*)

7-10 Ans K. $V_{\text{Cylinder}} + V_{\text{Cone}} = V_{\text{Figure}}$. $V_{\text{Cylinder}} = (\text{area of base}) \times (\text{height})$. The area of the base $= \pi r^2 = \pi \times (2m)^2 = 4\pi m^2$.

So $V_{\text{Cylinder}} = (4\pi m^2)(3m) = 12\pi m^3$.

$V_{\text{Cone}} = \left(\frac{1}{3}\right)(\text{Volume of cylinder with same base and height}) = \left(\frac{1}{3}\right)\pi(2m)^2(1m) = \frac{4\pi}{3}m^3$.

Therefore, $V_{\text{Figure}} = 12\pi m^3 + \frac{4\pi}{3}m^3 = \frac{36\pi}{3}m^3 + \frac{4\pi}{3}m^3 = \frac{40\pi}{3}m^3$. (*Volume, Solid Geometry*)



7-11 Ans D. This is a 30-60-90 triangle, with a ratio of side lengths of 1: 2: $\sqrt{3}$, where the 1 corresponds to the side opposite the 30° angle, the 2 corresponds to the hypotenuse, and the $\sqrt{3}$ corresponds to the side adjacent to the 30° angle. Since this triangle has length 3 for the side adjacent to the angle, and $3 = \sqrt{3} \times \sqrt{3}$, then we must multiply the other parts of the ratio by $\sqrt{3}$ as well in order to find the lengths of the other sides. Thus the short leg has length $\sqrt{3} \times 1$ and the hypotenuse has length $\sqrt{3} \times 2$. The perimeter of the triangle is $3 + \sqrt{3} + 2\sqrt{3} = 3 + 3\sqrt{3}$. (*Plane Geometry*)

Alternatively, use trigonometry to find the lengths of the missing sides. We know that the cosine of $30^\circ = \frac{\sqrt{3}}{2}$, and also that the cosine of any angle = $\frac{\text{adjacent}}{\text{hypotenuse}}$. Here, the adjacent side is given as 3, and the hypotenuse is unknown.

Set $\frac{\text{adjacent}}{\text{hypotenuse}} = \frac{3}{h} = \frac{\sqrt{3}}{2}$ and solve for h : $h = 3\left(\frac{2}{\sqrt{3}}\right) = 2\sqrt{3}$. Then solve for the opposite side by using the fact that the sine of $30^\circ = \frac{1}{2}$, and the sine of any angle = $\frac{\text{opposite}}{\text{hypotenuse}}$. Set $\frac{\text{opposite}}{\text{hypotenuse}} = \frac{x}{2\sqrt{3}} = \frac{1}{2}$, so $x = \left(\frac{1}{2}\right)(2\sqrt{3}) = \sqrt{3}$.

The perimeter is again $3 + 3\sqrt{3}$. (*Trigonometry*)

7-12 Ans G. This question is related to distance = rate \times time, but the formula we use here is jobs = (number of workers) \times (rate of one worker) \times (time), or $j = nrt$. Since 3 workers complete 4 jobs in 5 days, we have $4 = 3 \times r \times 5 = 15r$. Divide both sides by 15 to obtain the rate of one worker: $r = \frac{4}{15}$. Now use that rate and the second set of values for j and n to solve

for t : $7 = (6) \times \left(\frac{4}{15}\right) \times t = \frac{24}{15}t = \frac{8}{5}t$. Multiply both sides by $\frac{5}{8}$ to find $t = (7) \times \left(\frac{5}{8}\right) = \frac{35}{8}$. (*Proportions, Rates*)

7-13 Ans D. Since we are to solve for g in terms of h , then f must not appear in the equation. We will solve for f in terms of h in the second equation, and then substitute the result in place of f in the first equation. Add 42 to both sides of the second

equation: $h + 42 = 14f$. Now divide both sides by 14: $\frac{h+42}{14} = f$. Substitute into the second equation:

$$g = 2\left(\frac{h+42}{14}\right) + 17 = \frac{h+42}{7} + 17 = \frac{h}{7} + \frac{42}{7} + 17 = \frac{h}{7} + 23. \quad (\text{Variable Manipulation})$$

7-14 Ans G. The area of a circle = πr^2 . Here, $169\pi = \pi r^2$, so $169 = r^2$, and $r = 13$. The diameter of the circle is twice the radius, and is the same as the length as a side of the square, so the side length is 26. (*Plane Geometry*)

7-15 Ans E. The fraction of voters over the age of 28 is the number of voters over 28 divided by the total number of voters. The total number of people over 28 includes the 28–39 and 40–50+ age groups = $1,000 + 2,500 = 3,500$. The total number of voters = $500 + 1,000 + 2,500 = 4,000$. Thus the fraction of voters over age 28 = $\frac{3,500}{4,000} = \frac{7}{8}$. (*Graphs, Fractions*)

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Math Section 8

8-1 Ans C. This is an example of a problem of averages, so use the TAN method ($T = AN$). You know A and N , so you will find T . $T = AN = (88\%)(6) = (.88)6 = 5.28$. So, $5.28 - .8 - .9 - .9 - .75 - .99 = .94$.

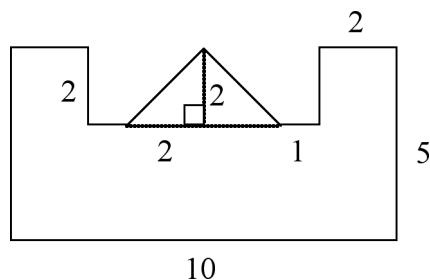
Alternatively, note that the first score is 8 points lower than the desired average, the second and third are each 2 points high, the fourth is 13 points low, and the last is 11 points high, so the net deficit is 6 points. Add 6 to the desired average to obtain 94. (*Data, averages*)

8-2 Ans H. A prime number, by definition, has exactly 2 factors, 1 and itself. Therefore, all prime numbers except 2 are odd. Thus the only common element in both sets, and therefore the intersection, is 2. (*Basic Math*)

8-3 Ans C. Apply the Pythagorean Theorem to find the hypotenuse of the triangle: $\text{hypotenuse}^2 = 1^2 + 1^2 = 2$, so $\text{hypotenuse} = \sqrt{2}$. This is the diameter of the circle, so the radius is $\frac{\sqrt{2}}{2}$.

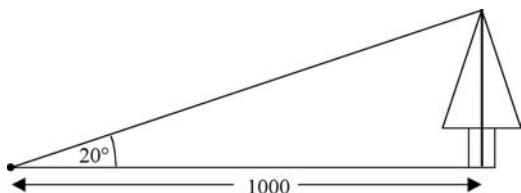
The area of the circle $= \pi r^2 = \pi \left(\frac{\sqrt{2}}{2}\right)^2 = \pi \left(\frac{2}{4}\right) = \frac{\pi}{2}$. (*Plane Geometry*)

8-4 Ans K. Plug the point $(-5, -8)$ into each system. The first equations in F and G both yield $-8 = -3$. H's first equation yields $-8 = -7$. J's first equation yields $-16 = -2$. E's equations yield $-8 = -8$ and $-8 = -15 + 7 = -8$. (*Coordinate Geometry*)



8-5 Ans D. The base of the triangle has length $10 - 2 - 2 - 1 - 1 = 4$, and the height is 2. The small triangle on the left has legs of length 2. Use the Pythagorean Theorem to find the length of its hypotenuse: $2^2 + 2^2 = h^2 = 8$. Therefore, the length of the hypotenuse is $\sqrt{8} = 2\sqrt{2}$. (Alternatively, recognize this as a special 45-45-90 triangle, with side ratios of $1:1:\sqrt{2}$.)

Now add the lengths of all the sides. Starting at the bottom, $10 + 5 + 2 + 2 + 1 + 2\sqrt{2} + 2\sqrt{2} + 1 + 2 + 2 + 5 = 30 + 4\sqrt{2}$. (*Plane Geometry*)



8-6 Ans K. $\text{Tangent} = \frac{\text{opposite}}{\text{adjacent}}$. Here, $\tan 20^\circ = \frac{\text{height of tree}}{1,000 \text{ feet}}$, so the height of the tree $= 1,000 (\tan 20^\circ)$ feet. (*Trigonometry*)

8-7 Ans C. One way to solve this sort of percent problem is to choose a number such as 100 to start with. Let David's number be 100. Then Hannah's number is 130, and Peter's number is $(100\% - 40\%)(130) = (.6)(130) = 78$. Then

$\frac{\text{Peter's number}}{\text{David's number}} = \frac{78}{100} = 78\%$. Another strategy is to "stack" percents in front of the variable of which you want the

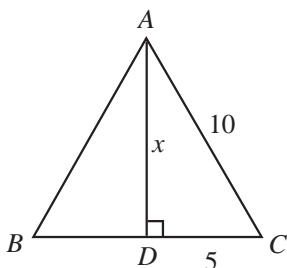
final percent. Hannah's number = $(130\%)(\text{David's number})$. Peter's number = $(60\%)(\text{Hannah's number}) =$

$$(60\%)(130\%)(\text{David's number}) = \left(\frac{60}{100}\right)\left(\frac{130}{100}\right)(\text{David's number}) = \left(\frac{78}{100}\right)(\text{David's number}). \text{ (Percents)}$$

8-8 Ans H. The bananas cost $(2)(\$2.95) = \5.90 . The milk costs $(2)(\$3.29) = \6.58 . The candy bar costs \$.72. The total cost is then $\$5.90 + \$6.58 + \$.72 = \13.20 . To add the 6% sales tax, we multiply the total cost by 1.06 and obtain \$13.992. Subtract this from \$15.00 for a result of \$1.008, which rounds to \$1.01. *(Basic Math, Percents)*

8-9 Ans B. $f(x) = x^2$, so $f(x+h) = (x+h)^2 = (x+h)(x+h) = x^2 + xh + xh + h^2 = x^2 + 2xh + h^2$.

Then $\frac{f(x+h) - f(x)}{h} = \frac{(x^2 + 2xh + h^2) - x^2}{h} = \frac{2xh + h^2}{h} = 2x + h$. *(Functions, Variable Manipulation)*



8-10 Ans H. Since segment AD is the perpendicular bisector of segment BC, then $DC = 5$. Use the Pythagorean Theorem to find x : $10^2 = 5^2 + x^2$, so $x^2 = 100 - 25$. Then $x = \sqrt{75} = \sqrt{3 \times 25} = 5\sqrt{3}$. *(Plane Geometry, Roots)*

8-11 Ans B. This graph has the form of a hyperbola centered at $(0,0)$, with foci on the y -axis. *(Coordinate Geometry, Conics)*

8-12 Ans H. The ratio of sides is 4:5, so one square has side length $4x$ and the other square has side length $5x$, where x is some positive real number. The perimeter of the first square is $4(4x) = 16x$. The perimeter of the second square is $4(5x) = 20x$.

So the ratio of the perimeters is $\frac{16x}{20x} = \frac{16}{20} = \frac{4}{5}$. *(Plane Geometry)*

8-13 Ans D. The point (r, s) is in quadrant I because r and s are both positive numbers. If the point is reflected over the x -axis, then it is in quadrant IV, where the x coordinate is positive and the y coordinate is negative. *(Coordinate Geometry)*

8-14 Ans H. The first sentence translates into the equation $L = 4(D - 2)$. The second sentence translates into the equation $L + 2 = 2(D + 2)$. Substitute $4(D - 2)$ from the first equation in place of L in the second equation: $4(D - 2) + 2 = 2(D + 2)$. Distribute through both sides: $4D - 8 + 2 = 2D + 4$. Subtract $2D$ from both sides: $2D - 6 = 4$. Add 6 to both sides: $2D = 10$. Divide both sides by 2: $D = 5$. Put that value for D into the first equation: $L = 4(5 - 2) = 4(3) = 12$. *(Algebra)*

Alternatively, try each of the answer choices until you find one that works.

8-15 Ans C. The circumference of a circle = $2\pi r$. Here, 10π inches = $2\pi r$, so $r = 5$ inches. Use this value of r in the volume equation: $V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(5)^3 = \frac{4}{3}\pi(125) = 523.599$, which is approximately 524 cubic inches.

(Plane Geometry, Volume)

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Answers: Reading

Reading Section 1

Question 1

Answer: B

Question Type: *Generalization Question*

Explanation: The correct answer is B. Focus on the final paragraph, in which the author states that Alaire “resented the good impression Law had made upon her.” Choice A is incorrect, because Alaire admits to her curiosity about the man. Choice C is not effective, because Alaire states that the man made a good impression on her. Choice D is too extreme; while Alaire is bothered by her feelings toward Law, she is not exceptionally annoyed.

Question 2

Answer: H

Question Type: *Vocabulary-in-Context Question*

Explanation: The best answer is H. The other three choices are traps. While “keen” and “intelligent” (answer A) are synonyms, that is not the meaning of “keen” in this sense. Answers G and J do not match the meaning of “keenest” at all.

Question 3

Answer: B

Question Type: *Generalization Question*

Explanation: The correct answer is B. There is no evidence in the passage that Alaire has previously been dependent on others, so choice A cannot be correct. The passage does not suggest that Law is negligent in his care of Alaire; on the contrary, he appears attentive and kind. Choice D is not the best option because, while Alaire is weak, the passage does not indicate that she believes this to be a personal weakness or imperfection.

Question 4

Answer: J

Question Type: *Function Question*

Explanation: The correct answer is J. The last full paragraph suggests that Alaire views Law as rugged, but not necessarily sexually attractive. There is no evidence in the passage to support either choices F or H. Choice G is not the best answer, because it contradicts the statement and does not suggest that he is attractive.

Question 5

Answer: C

Question Type: *Inference Question*

Explanation: The correct answer is C. The passage does not give us sufficient evidence to conclude why Law bestows so much attention on his horse, only that Alaire believes the cause of his consideration for the animal is its beauty. Choices A, B and D are not the best options, because, while they could be true, we do not have enough evidence to support them.

Question 6

Answer: F

Question Type: *Generalization Question*

Explanation: The correct answer is F. Focus on lines 11–14: “Like most normal women...she paid the penalty.” Choice G opposes what is stated in the first paragraph. Choices H and J are not the best options, because we do not have evidence that Alaire suffered more mentally than physically or that her mental anguish was a result of the physical state.

Question 7

Answer: C

Question Type: *Detail Question*

Explanation: C is the correct answer. Selections I, II, and IV are supported in the passage. Selection III is a trap. Lines 76–77 state that in Law’s face, “there was nothing animal, in a bad sense”.

Question 8

Answer: G

Question Type: *Inference Question*

Explanation: The correct answer is G. The passage states that Alaire “permitted some play to her curiosity,” and we read a full paragraph about her observations of him. Choice F is incorrect because, while we do learn that Alaire has a bias against men, this does not prohibit her from speaking to Law. Choice H is a trap answer because, while Alaire does conclude that she likes Law more than most men, “astonishingly different from any other man” is too extreme. Choice J is incorrect, since no part of the passage supports this assertion.

Question 9

Answer: D

Question Type: *Detail Question*

Explanation: The correct answer is D. Focus on the last section of the last full paragraph. Line A is a trap option. It is not the best answer because, while the passage as a whole indicates that this statement is true, the lines in question are best paraphrased with line D. The passage does not give us any information to support options B or C.

Question 10

Answer: H

Question Type: *Inference Question*

Explanation: The correct answer is H. There is not enough information in the passage to support choices F, G, or J.

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Reading Section 2

Question 1

Answer: C

Question Type: *Specific Detail: identify and interpret details*

Explanation: The author uses Thomas Huxley to exemplify “Darwin’s followers,” who popularized a “skewed conception” of Darwin’s principle. Lines 20–22 state, “It may be remarked at the outset that Huxley’s view of nature had little claim to be taken as scientific deduction.” Note that the author refers to Huxley’s “view,” a word that is often synonymous with “opinion.” According to the author, then, Huxley’s opinion has little basis in science, and the best approximation of this is answer C. He is also saying here, and in the previous paragraph, that interpreters like Huxley got Darwin wrong, which eliminates answers A, B, and D.

Question 2

Answer: F

Question Type: *Specific Detail: identify and interpret details*

Explanation: The third paragraph describes how ants are obligated to share food with each other and sacrifice for each other. It also mentions that any food-carrying ant that refuses to share “will be treated as an enemy.” Although a minor inference must be made to come to this conclusion, it seems clear that the author is saying ants punish fellow ants that refuse to share food. The correct answer, then, is F.

Question 3

Answer: B

Question Type: *Inference: determine the meaning of words from context*

Explanation: For this question, the key phrase to interpret is this: “and results in the development of faculties, which secure the best conditions for survival.” Since the first part of the sentence already covers the idea that “cooperation” is developed, you can assume that the “faculties” (inherent abilities) of the second phrase are something beyond cooperative abilities. That something more is being said in the second phrase is implied by the word “and,” which signals a list of supporting ideas. The author is suggesting, very subtly, that evolved cooperative tendencies come with a bonus: some general, adaptive “faculties”—for instance, intelligence. Therefore, B is the best answer.

Question 4

Answer: J

Question Type: *Big Picture: determine the main idea of a paragraph*

Explanation: Answer J is the best answer because it sticks to the main theme the author is trying to develop: that evolution does not necessarily imply inter-species warfare. Every paragraph in the piece supports this idea, and the prairie dog description is no exception. The concluding sentence wraps

up the meaning of the description nicely by insisting that “Huxley’s ruthless ‘war of each against all’ seems not to exist” among this species. Answers G and H are not supported by anything in the paragraph, and answer F is a misinterpretation; it’s not Darwin’s theory that the author is at issue with, but certain people’s interpretation of that theory.

Question 5

Answer: B

Question Type: *Specific Details: identify and interpret details*

Explanation: The key to this question is the phrase on lines 68–70, which the term “would lose its...only true meaning, if it were to be used in its narrow sense only.” In other words, the author’s interpretation is that Darwin meant the term more broadly (i.e., in a more general way) than it has been taken, answer B. Although A and D might be tempting, they are not supported in the passage; the author’s idea is that between-individual struggle is not the whole picture, according to Darwin, but he does not deny that it exists or suggest that it will disappear. Answer C is not supported either; the author suggests that the term can be seen metaphorically, and that Darwin may have seen it philosophically, but he does not suggest that Darwin meant it to be taken as a symbol only.

Question 6

Answer: F

Question Type: *Inference: determine the meaning of words in context*

Explanation: The word is used as a verb here; the young prairie dogs are clearly “doing” something to each other when they “worry” each other. The author is using the word “worry” to suggest some kind of play fighting, rather than the typical meaning invoking anxiety or fear. The best answer, then, is F. The tone of the paragraph helps here; the author is using words that suggest a happy little community (e.g. “lively conversation”), rather than an anxious one.

Question 7

Answer: B

Question Type: *Big Picture: make generalizations*

Explanation: Thomas Huxley is the author’s main target because he interpreted Darwin’s theory as a call for “pitiless struggle,” rather than “mutual aid.” In this question, the book title most consistent with that idea is answer B since it suggests that a wolf species is strengthened by victimizing the weakest wolf—the “omega.” Answer A would not support Huxley’s view since Huxley believed the “shrewdest” (line 16) members of the species pass on their genes through competition, not as an aspect of cooperative social behavior. Likewise, answers C and D suggest that a cooperative framework is more effective than a competitive one, in contradiction to Huxley’s views.

Question 8**Answer: H****Question Type:** *Inference: determine the meaning of words from context*

Explanation: The first paragraph must be interpreted carefully to find the best answer. The sentence that introduces Thomas Huxley (lines 14–18) is preceded by a sentence referring to “the most authoritative Darwinians.” This implies that Huxley was one of “the most authoritative Darwinians”—i.e., he was considered an expert on him. Thus, answer H is correct. Since Huxley is labeled a “biologist” in line 14, answer F can be eliminated. The first sentence of the passage implies that Huxley (among others) was a “follower” of Darwin, so answer G can be eliminated. The first sentence also eliminates answer J since it states that Huxley and his like-minded contemporaries “popularized” their view of Darwin’s concept.

Question 9**Answer: A****Question Type:** *Specific Detail: identify and interpret details*

Explanation: The context of the quote reveals that the word “which” refers to Darwin’s remarks about how groups who develop “sympathetic” individuals tend to “flourish”. The quote “might have” implies that a promising line of research was not pursued. Answer A, then, is a reasonably straightforward interpretation of the quoted text. Although answer B is implied elsewhere in the passage, it is not the point of the quote in question. And answers C and D are not supported by the passage at all.

Question 10**Answer: H****Question Type:** *Big Picture: make generalizations*

Explanation: The author uses the middle three paragraphs of the passage to support his thesis through reference to the actual, observed behavior of animals; this is the heart of his argument. So answer H is quite correct. Answer F is not supported; in fact, the author suggests that data was collected in a biased way to support the “ruthless struggle” view. Answers G and J are also contradicted in the passage.

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Reading Section 3**Question 1****Answer: C****Question Type:** *Big Picture: determine the main idea of a paragraph, paragraphs, or a passage*

Explanation: Answers A, B, and C are all faithful versions of ideas presented by the author in this passage. Of these, only one, however, qualifies as a “major supporting argument”—a developed idea that is crucial to “winning” the overall argu-

ment (the “theme”) of the passage: answer C. The theme of the passage is something like “specific aspects of artistic writing are not as important as one overriding consideration: that the writing faithfully transmits the writer’s inner idea of truth.” Answer A is an opposing argument presented by the author that he implies is not important enough to undermine his major ideas. Answer B is a minor idea that is not critical to the main theme. And answer D is actually partially contradicted by the author in favor of a less restrictive view of literary form.

Question 2**Answer: F****Question Type:** *Specific Detail: identify and interpret details*

Explanation: Answer F is a reasonably straightforward interpretation of the sentence indicated (“Critical efforts...discredited by artistic production”), which follows the sentence referenced in the question. It is not that careers are destroyed (G) or that the criticism has a damaging effect on writing (J), but that the very existence of brilliant prose, using poetic language, contradicts the statement. Answer H is a misinterpretation of the author’s point; he is discussing poetic language in prose—not authors who write in both modes on different occasions.

Question 3**Answer: C****Question Type:** *Specific Detail: understand comparative relationships*

Explanation: The author’s statement is reasonably clear in the sentence indicated: It is not the job of the art critic to define artistic expression, but to judge how effective a particular work of art is. Answer C is the best answer because it is an example of evaluating writing “on its own terms”—the terms the writer herself claims to be using. Answers A and D “limit [art’s] possibilities;” their purpose is to distinguish between what is poetry and what is prose, and what is art and what is not art. Answer B is a bit more subtle, but does the same thing; it implies that memoir and autobiography should be works of strict fact rather than works that include the writer’s interpretation of fact.

Question 4**Answer: J****Question Type:** *Inference: determine the meaning of words in context*

Explanation: The answer is J because that example is most clearly in contrast to what the author presents as “artistic expression” in the same sentence: “the skillful accommodation of matter to a personal vision” (lines 50–51). The “humbler or plainer” functions, then, are those that do not reveal the writer’s personal vision, and something like “listing the dates of certain events” certainly fits the bill. All of the other answers are examples of expression that are affected by the writer’s personal vision, so they do not qualify as the “plainer” (i.e., non-artistic) functions.

Question 5**Answer: A****Question Type:** *Inference: understand comparative relationships*

Explanation: In the line indicated, the author is comparing the writing of Hemingway to that of Shakespeare and Garcia Marquez. His implied point is that language use in fiction is as diverse as the writers of fiction themselves, and that “magical” prose like that of Garcia Marquez is just as acceptable as the “straightforward” prose of Hemingway. Therefore, we can infer that answer A is the best answer. He does not seem to be suggesting that Garcia Marquez is writing poetry (B), and he is definitely not criticizing his writing (C). His use of Hemingway in the sentence shows that he sees the merit in writers who use a plainer style, so D can be eliminated also.

Question 6**Answer: H****Question Type:** *Inference: determine the meaning of words in context*

Explanation: Answer H is a pretty straightforward inference from context. The sentence previous to the one in question refers to the “selection” process as leading naturally to the transmission of “personal preferences.” There is no mention of conscious agenda-mongering in the passage (A), and the personal vision of the historian seems to be embraced rather than derided as unskillful (J). Nor is it suggested that historians lose their grasp of “the truth” (G); the personal truth of the writer comes across via the modification of history.

Question 7**Answer: B****Question Type:** *Inference: determine the meaning of words from context*

Explanation: One of the inferences that can be drawn from the sentence indicated is that the author believes art is defined by two things: (1) it is made by a person, and (2) it contains that person’s “sense of fact.” Presumably, then, anything human-made can be art (B). None of the other answers is supported in the reference.

Question 8**Answer: J****Question Type:** *Specific Detail: identify and interpret details*

Explanation: The passage directly addresses the question of “quality” in only one sentence: “And the art is good in proportion to the truth in the presentment of that sense” (lines 45–46). The previous sentence defines the “sense” as “his or her unique sense of the world.” What the passage submits, then, is that the quality of art is a function of how well the artist transmits a personal vision, or “spirit,” i.e., answer J. It is not necessarily the “the amount of personal detail” (H) or the amount of “distortion” (F) that determines this, but the amount of skillfulness with which the writer expresses his or her distorted world. And the passage argues explicitly against answer G in lines 32–36.

Question 9**Answer: A****Question Type:** *Specific Detail: identify and interpret details*

Explanation: The key phrase in the first paragraph is pretty self-explanatory: “the distinction between poetry and prose that is drilled into every 11-year-old in every 6th grade classroom.” The author insists that the distinction between prose and poetry was presented as an indisputable fact to all of us in school (answer A). It was probably “believed by unsophisticated school children” (D), but that’s not the point made by the author here.

Question 10**Answer: G****Question Type:** *Inference: determine the meaning of words from context*

Explanation: The surrounding sentences give the clues needed to interpret the author’s meaning here. The previous sentence argues against limiting the definition of prose, because any such limitation runs against the reality of what writers (such as Shakespeare and Garcia Marquez) actually write. The sentence that follows the one in question claims that there are “many beauties of poetry.” We can assume that the quotation from lines 19–21 are in line with this reasoning—that the author is suggesting it is a mistake to limit poetry, because the poets themselves do not, i.e., answer G. The author would probably agree with answer H, but it is not the point he is making in lines 19–21. There is nothing in the paragraph to suggest either F or H.

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Reading Section 4**Question 1****Answer: D****Question Type:** *Inference: understand cause-effect relationships*

Explanation: Answer D is a very subtle implication of the quoted question, but it is the only one of the alternative answers that makes sense. The passage seems to “build” to the point about hydrogen as an alternative fuel source, so we can assume that many of the statements preceding that point are in some way related to it. Line 24 certainly fits nicely as an added argument for viewing hydrogen as a viable alternative to fossil fuels. Answer A has rather weak, if any, support in the passage, and there is no reason to conclude that the expense of transporting hydrogen has any connection to its scarcity in earth’s environment (answer B). Answer C may or may not be true, but it has no explicit or implied support in the passage, so it is not as solid as answer A.

Question 2**Answer: G****Question Type:** *Inference: understand sequences of events*

Explanation: The key to answering this question is to note that the authors call Lavoisier's judgment "premature." In other words, Lavoisier called hydrogen inflammable before much experimental evidence had been collected on the substance. We know from the next paragraphs that hydrogen was found to be flammable, and we can conclude that it was Lavoisier's lack of this knowledge that led to his erroneous view—answer G. There is nothing in the passage to support F and J, and answer H is contradicted by the facts that Cavendish had isolated hydrogen previous to Lavoisier's work, and that Lavoisier saw hydrogen as a "water former"; he obviously knew that it existed separate from water.

Question 3**Answer: A****Question Type:** *Big Picture: draw conclusions about the author's voice and method*

Explanation: The best answer is answer A, because it is the most accurate. It is not strictly true, nor is it suggested in the passage, that water can be combined directly with oxygen to form hydrogen (D). It is stated that Lavoisier used the term "hydrogen" because it means "water former," but this fact is not itself used to support the strong relationship between hydrogen and water (B). Nor do the superficial similarities of answer C suggest a "strong relationship" between hydrogen and water. What the authors do to support their thesis about the strong relationship between the three substances is describe how they can be combined and/or separated to form one another—answer A.

Question 4**Answer: H****Question Type:** *Specific Detail: identify and interpret details*

Explanation: This question asks you to combine two ideas in one answer: what constitutes oxidation and what constitutes reduction. The previous discussions of oxidation and reduction give you the answer, but it's a bit tricky to simultaneously juggle those ideas in your mind. The best tactic here is probably to eliminate one or two answers before you begin juggling. We know from the description of the water cell process that the outcomes are "water and electricity." So, answer G can be eliminated; water cannot result if "hydrogen does not combine with oxygen." Since it is clear that the question is asking for two distinct criteria, a process of oxidation and a lack of reduction, the single-thing answers, F and J, can also be eliminated—leaving H.

Question 5**Answer: C****Question Type:** *Specific Detail: identify and interpret details*

Explanation: The correct answer, C, can be found in "1. By electric current" (line 28) under "Preparation from water".

Even though the topic of the sentence is hydrogen, it implies that oxygen can be extracted from water using an electric current since the products of the process are "hydrogen and oxygen." There is nothing to support answer A in the passage, and answers B and D are contradicted in the discussion of hydrogen's weight compared to that of oxygen (lines 12–15).

Question 6**Answer: F****Question Type:** *Big Picture: make generalizations*

Explanation: In the paragraph titled "Hydrogen's Relationship to Oxygen" (lines 39–49), the authors state that under some conditions hydrogen "explodes" in oxygen when heated to 500° C, and under other conditions it will "burn quietly." Knowing only that the hydrogen "combusts in oxygen," we cannot know for certain which result will occur, so answers G and H are not good answers. What we do know is that the "combustion of hydrogen is due to its union with oxygen," and that the result is "water." Although this fact is linked in the paragraph to the description of a "hydrogen flame," it can be inferred that any combustion of hydrogen (e.g., one that results in an explosion) is the result of a union with oxygen under such conditions. Therefore, answer F is the best answer. Since "reduction" (answer C) is the extraction of oxygen from a compound, and no such process takes place in the description of hydrogen combusting in oxygen, we can eliminate answer J.

Question 7**Answer: A****Question Type:** *Specific Detail: understand and interpret details*

Explanation: This is a pretty straightforward detail question. All that needs to be done is to translate the passage's expression "ordinary temperatures" (line 36) into the question's version of it—"room temperature." Lines 36–38 clearly state that magnesium releases hydrogen from water when the metal is heated above ordinary temperatures, so answer A is correct. Answers B, C, and D are misreadings of the relevant paragraph.

Question 8**Answer: F****Question Type:** *Specific Detail: understand sequences of events*

Explanation: One sentence—the sentence that defines oxidation and reduction—is the key to answering this question: "The substance that gives up its oxygen is called an oxidizing agent, while the substance that unites with the oxygen is called a reducing agent" (lines 68–70). Simply locate the key words from the question, "reducing agent" and "oxidizing agent," in the passage (which the authors have been kind enough to highlight), and you've homed in on the answer. If you read a bit outside the sentence, the authors reveal that oxidation and reduction typically result in "water" as a byproduct. Once you have identified answer F as consistent with the description, you can check it off and go on to the next question.

Question 9**Answer: C****Question Type:** *Specific Detail: identify and interpret details*

Explanation: Although rare, the ACT will sometimes give you a straightforward “extract the number right out of the passage” question—with the only difficulty being choosing the right number. This one is on line 21. You just have to translate from “A is greater than B” to “B is less than A.”

Question 10**Answer: H****Question Type:** *Inference: determine the meaning of words in context*

Explanation: The sentences following line 2 indicate what is implied by “pure state”: hydrogen that is not combined with some other element (answer H). The authors immediately give an example of hydrogen in a non-pure state when he refers to it existing as “a constituent of water.” The remainder of the passage describes hydrogen going into and out of its “pure state,” strengthening that “lone substance” sense of the expression. Nowhere does the passage imply that “pure hydrogen” is necessarily stable (F), a gas (G), or a by-product of water (J).

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Reading Section 5**Question 1****Answer: C****Question Type:** *Detail Question*

Explanation: Choice C best explains what is insinuated in the second paragraph. Choice A is a trap; while we know that Redwood is involved in this study, there is no evidence that he is “too engaged” to be involved in other research. We have no information in the paragraph to support choice B. Choice D is a trap, because, while it uses some of the same wording present in the paragraph, it concludes that another experiment would have been too distracting. The paragraph does no support this assertion.

Question 2**Answer: J****Question Type:** *Inference Question*

Explanation: Focus on the last paragraph. Choice F is a trap, because, while Bensington does consider this possibility, he does not actually come to a conclusion in the passage about what he will do with the tadpoles. Choice G is misleading. While we know that Bensington is now interested in the idea of an Experimental Farm, there is no suggestion in the passage that this interest has taken place of his tadpole experiment. Actually, the passage insinuates that he is considering

the farm in its capacity to house his experiment. Choice J is, therefore, the correct answer. There is no information in the passage to support choice H.

Question 3**Answer: A****Question Type:** *Detail Question*

Explanation: The passage as a whole insinuates that Jane feels the tadpoles could make Bensington sick, but line 43 does not mention the tadpoles, only that Bensington was “delicate”. Choice B is, therefore, incorrect. The passage does not mention Bensington’s appearance, so choice C cannot be correct. Choice D is a trap; the phrase “certain to become ill” expresses a degree of certainty that is not implied in the passage.

Question 4**Answer: H****Question Type:** *Generalization Question*

Explanation: There is no evidence in the passage to support options F or J. Choice G is incorrect, because lines 72–73, “as soon as he had his substance isolated and prepared,” tells us that the matter was not yet prepared for the experiment. H is the best answer, because it is the only option that the text verifies.

Question 5**Answer: A****Question Type:** *Detail Question*

Explanation: The correct answer is A. While the word “cupboard” might suggest the “storage unit” of answer B, the sense of the complete phrase “cupboard of refuge from the weekly storm of cleaning” suggests that it is Bensington’s refuge—the whole room. Therefore, choice B is too narrowly drawn to cover the meaning. The information in option C is not supported anywhere in the passage. Choice D is incorrect; while the passage does state that Jane passes over this room when she cleans, there is no evidence that she feels bitterly about the arrangement.

Question 6**Answer: G****Question Type:** *Vocabulary-in-Context Question*

Explanation: The word “considerable” in this sentence most closely matches “substantial.”

Question 7**Answer: C****Question Type:** *Inference Question*

Explanation: We have no information to support the assertions made in choices A and B. Choice D is too extreme to be correct; while we know that Jane objects to Bensington’s current experiment, there is no suggestion that she always behaves this way. The third paragraph states that Jane “regarded his solicitude for distinction in learned societies as an excellent substitute for the coarser form of depravity.” Choice C is, therefore, the correct option.

Question 8**Answer: J****Question Type:** *Generalization Question*

Explanation: We have no information to support options F or G. Choice H is not the correct answer; while we know that the men wish to test the substance on tadpoles, we cannot assume that they are attempting to cure a disease that the tadpoles carry. We are only able to support option J with information from the passage.

Question 9**Answer: A****Question Type:** *Generalization Question*

Explanation: In the first paragraph, the narrator is enthusiastic about the substance and even insists on calling it the “Food of the Gods.” We have no evidence in the text to support options B or D. Choice C is a trap question; the wording used in this choice is present in the first paragraph to describe Mr. Bensington’s reaction to his discovery, and not that of the narrator.

Question 10**Answer: G****Question Type:** *Inference Question*

Explanation: Near the end of the passage, the narrator states that “the prospect of ever trying the Food of the Gods upon tadpoles in their flat, at any rate, vanished completely in the apology.” Choice F is not correct; while Jane does threaten to move away, this is not why Bensington gives up his argument. Choices H and J could be true, but we do not have enough evidence to support them, so G is the best answer.

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Reading Section 6**Question 1****Answer: B****Question Type:** *Big Picture: make generalizations*

Explanation: Although the primary purpose of the essay seems to be informative rather than persuasive, certain turns of phrase suggest an opinion that the changes made by the “Factory Acts” were beneficial. The best example of this is this sentence: “The sad life of these exploited children - overworked, underfed, neglected, and abused in the factories and barracks of remote North West England - eventually came to the notice of the outside world” (lines 49-52). Nowhere in the passage does the author suggest that the laws were unfounded or that they went too far, so answers A, C, and D can be eliminated.

Question 2**Answer: F****Question Type:** *Specific Details: understand cause-effect relationships*

Explanation: The correct answer, F, is a clear transcription of two reasons given in the passage for the use of poorhouse children in the factories. Lines 6–9 state that factories were situated in the North West where there was a “sparse population and a strong prejudice against factory work”—with the implication that this caused an “insufficient supply of labor for...factories” (lines 2–3). Further down (lines 32–35), the “remote” location of the factories—North West England—is implied to be one of the reasons factory owners were able to get away with the practice of exploiting children. The second reason given in answer F, that “city poorhouses” were “overpopulated with children”, is a succinct restatement of lines 11–16 in the passage - lines that are easily inferred to be reasons poorhouse children were used in the factories. The other answers contain statements that are misinterpretations of the passage.

Question 3**Answer: B****Question Type:** *Big Picture: make generalizations*

Explanation: To answer this “author’s reason for doing something” question, it helps to first identify the main purpose of the passage—which seems to be to explain child labor practices that led to the first labor laws (the “Factory Acts”) of England. This eliminates answer C. Although answer D would be an interesting direction to go from the first sentence, the direction instead, as mentioned, is to discuss labor conditions that led to changes in the law. And, statements in the passage suggesting the author’s disapproval of these child labor practices imply that there is no real “justification” being given here (answer A). Answer B is the best answer, because it sticks to the theme the author immediately starts developing after the first sentence.

Question 4**Answer: H****Question Type:** *Big Picture: make generalizations*

Explanation: The most clearly defensible interpretation of the author’s view of pre-Factory Acts England is represented by answer H; it is implied that the system of law that allowed poorhouse wardens to essentially sell children into slavery was a flawed system. The labor pressures brought on by the factories are discussed quite explicitly and are implied to be a cause of the problem. Answer F calls the labor issue “centuries-old,” which finds no support in the passage. Although the foremen and overseers are mentioned as part of the problem, they seem to be positioned as symptomatic of the overall system rather than a causal. Answer J is an overly simplified and naïve interpretation of the author’s description, ignoring the obvious abuses he brings to the fore.

Question 5**Answer: C****Question Type:** *Inference: determine the meaning of words from context*

Explanation: The wording in line 72—“for, although its application was quite restricted”—implies that the 1801 law was an exception to the general rule of the “Factory Acts” in its “restricted” nature. Other later “Factory Acts,” then, must have been less restrictive; they must have applied to beyond “cotton factories and indentured servants” (lines 73–74)—i.e., answer C. This inference eliminates answers A, B, and D.

Question 6**Answer: F****Question Type:** *Inference: understand the meaning of words in context*

Explanation: The sentence that follows the one in question is a key to understanding the use of quotation marks. The sentence states that workers were “essentially indentured servants.” If “indentured servant” had the same meaning as “apprentice,” the author probably would not have bothered using the term. We can assume from context that the situation of an “apprentice” is not as harsh as that of an “indentured servant.” From this, answer F can be seen as a good answer, and answer J can be eliminated. There is no support in the passage for the idea that the word did not exist in the 1790’s (answer G)—in fact, most laborers started their careers as apprentices prior to the Industrial Revolution—and the word is common enough in modern speech to eliminate answer H.

Question 7**Answer: B****Question Type:** *Specific Details: identify and interpret details*

Explanation: This question’s purpose is to point out how much exploitation the new Factory Act still allowed. Nowhere does the description of the new law, on lines 62–65, indicate regulations on nutrition or breaks (answer D). Limits to children nine years and younger and “twelve working hours a day” allow the exploitation indicated in answers A and C. Amazingly, only one of these answers is included as a regulation in the law; “night labor” was banned, so, presumably, beds got cold during the day (answer B).

Question 8**Answer: H****Question Type:** *Big Picture: make generalizations*

Explanation: Since the passage states that early cotton mill owners had an “insufficient supply of labor” (lines 2–3), and implies that this shortage resulted from the necessity of locating factories in the boondocks of England, we can assume that any change which allowed the owners to move their factories closer to better labor sources would be embraced. Once factories are freed from the “fast running streams” of

the boondocks by steam power, it can be inferred that they moved into the cities where, among other things, the “poor-houses” that represented their chief source of labor were located. Answer H, then, makes the most sense. There is nothing in the passage to suggest that factory laws would no longer be necessary (F), that Northern farmers would give up their prejudice against factory work (G), or that people would move to the North West (J).

Question 9**Answer: D****Question Type:** *Inference: determine the meaning of words in context*

Explanation: Again, the immediate context of the quoted section gives this one away. The author follows the statement in question with a description of the sources of this spreading news: newspapers, city Boards of Health, and informers to the English government. This seems to indicate that the best answer is D. There is no indication that the news spread outside of England (A). (Besides, the term “industrialized nations” is modern; in the 1790’s, not even England was truly “industrialized.”) There is nothing to support the idea that people in North West England spread the news (C), and—aside from “Sir Robert Peel” (line 56)—it is unlikely that the factory owners themselves were trumpeting their atrocities.

Question 10**Answer: F****Question Type:** *Specific Detail: identify and interpret details*

Explanation: This is a pretty straightforward detail question. Only the information in answer F is given as a reason that the poorhouse authorities jumped on the opportunity to put their charges to work in the new factories (lines 14–16). There is no reason to think that the overseers made any money off of the contracts (answer G), and the other answers seem even more far-fetched.

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Reading Section 7

Question 1

Answer: D

Question Type: *Inference: determine the meaning of words from context*

Explanation: From context, it can be inferred that the “Renaissance Glory” to which the author refers is the New Louvre itself, i.e., answer D. The sentence after the one in question must be about work on the New Louvre, which was “not interrupted by intrigues of court...” (line 75–76); this suggests that the two sentences are both about the New Louvre. In fact, the entire paragraph is about the New Louvre, so it would be odd to include a statement about Lescot that refers to some other of his artistic achievements. Based on this, alternatives A, B, and C can be eliminated.

Question 2

Answer: G

Question Type: *Big Picture: determine the main idea of a paragraph, paragraphs, or a passage*

Explanation: The two answers that are best supported by an overall reading of the passage are G and J; they both take details that span the entire passage into account. Answer G focuses on the causal relationship between the Louvre and France while answer J stresses the changing character of the monument itself. Typically, key sentences in a passage—often placed at the beginning and/or end of the passage—expose the passage’s theme. In this case, the first two sentences and the last sentence of the passage seem to make general statements that function in this way. The first two sentences (lines 1–5) discuss the interrelationship between the Louvre and the “life of Paris...the nation...and the people.” The last sentence discusses the changing character of the building from “fortress” to the present day art museum (suggesting answer J), it returns again to the relationship of the Louvre to the people and their capital—referring to the “central place it holds in the hearts of the French and their capital city” (lines 84–85). Answer G, then, receives more support in these key sentences than answer J. Answers F and H are key details in the passage, but do not infuse the entire passage and so should not be considered “themes.”

Question 3

Answer: A

Question Type: *Specific Detail: identify and interpret details*

Explanation: Since the Frank’s “attacked the city in the 5th century” (lines 13–15) and Paris was “practically only the island of Lutetia” before the conquest of the Franks (line 11–12), it was prior to the 5th century that Paris was little more than an island (answer A). Answer B is not supported in the passage; the Franks may very well have built beyond the island of Lutetia by the end of the 5th century. And answers C and D refer to periods when Paris was already becoming the sprawling city it is today, as detailed in the passage.

Question 4

Answer: F

Question Type: *Inference: determine the meaning of words in context*

Explanation: Answers G, H, and J get too specific to find support in the author’s actual words. There is no suggestion that the Louvre had first been called a “palace” by Charles V: context suggests that prior kings had resided in the Louvre (e.g., Phillippe Auguste); and the author does not imply that it was the addition of the library only that “changed the character of the palace.” Instead, the more general assertion that the term “did not really fit” is the best, most defensible answer.

Question 5

Answer: C

Question Type: *Inference: determine the meaning of words from context*

Explanation: In claiming that the “French capital is much more representative of France” than other capitals are of their nations (lines 6–10), the author is suggesting that the countryside of France is in some way represented by the city of Paris. Whether this is true or not, it is the suggestion made by the paragraph and is best represented by answer C. Answers A and B may be true statements, but they are not particularly relevant to the question asked. And answer D seems to be contradicted by the main thrust of the paragraph.

Question 6

Answer: J

Question Type: *Specific Detail: identify and interpret details*

Explanation: Answer J is a straightforward summary of lines 34–46. Answer H reverses the statement made in lines 24–26—that Philippe Auguste “turned [the old fort] into an ambitious castle.” Answer G refers to the work of another French monarch: Francis I. And answer F seems not to have happened; instead, the king paved the roads with cobblestones (lines 35–36).

Question 7

Answer: B

Question Type: *Inference: determine the meaning of words from context*

Explanation: The key phrase needed to answer this question is in lines 66–67: “including the near-complete demolition of the old palace”. The previous paragraph states that Charles V had made “many fine enhancements” to Philippe Auguste’s structure, but the author implies that Francis I basically tore it down and started from scratch. This explains the name “New Louvre” (line 68), and leads to answer B. The other answers are misinterpretations of the paragraph.

Question 8

Answer: G

Question Type: *Big Picture: make generalizations*

Explanation: There are two ways to answer this question,

both with specific references in the passage. The first way, by a process of elimination, is accomplished by understanding the implication of a comment on lines 24–25: “Nothing remains of the old fort.” Since the “old fort” was the original 5th century structure, this short phrase is sufficient to eliminate answers that refer to physical aspects of the Louvre—F, H, and J—leaving only answer G. The second method is by positively identifying the correct answer via lines 21–22: “it is well deserved that its name should live on to the present day.” The Louvre has been “the Louvre” from the very beginning, according to the passage, so answer G is correct.

Question 9

Answer: C

Question Type: *Details: identify and interpret details*

Explanation: The only difficult part of answering this question is sidestepping the trick answers. It’s true that a tower was built at the Louvre that became the precursor to France’s National Library (answer A), but the tower was built by Charles V (as stated on lines 54–57)—not Jean-le-Bon. It’s also true that Francis I kept his “Renaissance treasures” at the Louvre, but he did it in the 16th century, and his treasures were “chiefly paintings” (line 65). And Philippe Auguste’s “municipal improvement” involved road paving, not libraries, and occurred in the “thirteenth century” (line 26). The only answer that holds up is answer C, which is confirmed in the 5th paragraph of the passage (lines 50–62).

Question 10

Answer: J

Question Type: *Specific Detail: identify and interpret details*

Explanation: Although all of the statements made by the answers are true (according to the passage), only one is held up as an enduring reason for the Louvre’s importance: answer J. The fourth paragraph of the passage states this quite explicitly, arguing that the Louvre’s “very location assured its civic importance” (line 44). The physical “centrality” of the Louvre is referenced at the beginning of the passage as well; the author refers to “that grand structure in the center of Paris, the Louvre” (lines 1–2). By comparison, the aspects of the Louvre referenced in answers F, G, and H are presented as one-shot supporting details only—not a recurring theme in the author’s argument for the centrality of the Louvre in French life.

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Reading Section 8

Question 1

Answer: B

Question Type: *Big Picture: determine the main idea of a paragraph, paragraphs, or a passage*

Explanation: The first two sentences of the passage are a bit misleading in the sense that the opening of an essay generally states, or hints at, the essay’s overarching theme. If that assumption is made here, we begin by assuming that the theme of this essay is something like “Ptolemy was the most influential astronomer of all time,” suggesting answer C. But, in fact, the remainder of the essay focuses on only one of Ptolemy’s accomplishments: his early insight and arguments about the shape of the earth, i.e., answer B. The author is not trying to convince us that the world is spherical (answer D); presumably, we don’t need convincing. Nor does he suggest that all of Ptolemy’s ideas are “still relevant today” (from answer A); lines 6–8 suggest that most of them are not.

Question 2

Answer: F

Question Type: *Inference: understand cause-effect relationship*

Explanation: This is a question that taxes your “visual-spatial” reading comprehension since it requires you to envision models of the earth, moon, sun, stars, and ocean and draw conclusions from them. The best answer is F, since if a lunar eclipse is not a truly simultaneous event, if its occurrence changes with the observer’s position on earth, then Ptolemy’s observations might hold under a flat earth. The point made by answer G would not explain the gradual change in time observed by Ptolemy “the further away their stations were from Alexandria” (lines 57–58); mere inaccuracy of time devices would result in a more random set of times. Although answer H’s statement might explain a slight difference in the heights of constellations in the sky at different latitudes, it could not explain how stars “set and rise” (line 33) at one latitude, but do not at another. And if the oceans were “dish-shaped,” as in answer J, the “cut off” appearance of objects (line 23) would be more difficult to explain from a flat earth perspective than from a spherical earth perspective.

Question 3

Answer: D

Question Type: *Inference: understand cause-effect relationships*

Explanation: Three of the answers—A, B, and D—represent statements actually made in the passage; answer C’s assertion is not made. Of those three, only answer D is directly relevant to the last sentence; if Ptolemy “showed conclusively” in his lunar eclipse data that “the earth was not flat,” then it follows that he presented at least one “quite satisfactory” argument for a spherical earth. Answer A seems to be undermined by the sentence in question rather than supported by it, and answer B is more of a supporting detail for the sentence than a hypothesis that is supported by the sentence.

Question 4**Answer: G****Question Type:** *Inference: determine the meaning of words from context*

Explanation: Although answer G does not have strong support in the text, it does gain weak support from the description of Ptolemy’s lunar eclipse data; the stations mentioned were all to the east and west of Alexandria, and it would make sense for Ptolemy to gather data in that way if he, himself, were located in Alexandria. The other answers are contradicted in the passage in various ways. The author repeatedly refers to Ptolemy’s “astuteness”—undermining answer F; the descriptions of Ptolemy’s arguments reveal them to be somewhat complex—undermining answer H; and the fact that “many of his principles were discarded” (line 10) is not consistent with answer J.

Question 5**Answer: C****Question Type:** *Big Picture: draw conclusions about the author’s voice and method*

Explanation: This question is relatively easy to answer through a process of elimination. Answer A can be eliminated by the statement on line 20 that Ptolemy’s proofs are “the same proofs we give today” (line 20). Answer B can be eliminated by the same sentence, which states that the proofs “are quite satisfactory,” and by the previous assertion that his arguments “remain essentially intact” (line 13). There is no support for answer D and, in fact, the author describes the lunar eclipse proof as “particularly striking” and typical of “Ptolemy’s acuteness.” Answer C is the best answer, therefore. And it gains support from the author’s characterization of the “object across the sea” proof as “obvious” (line 25) in comparison to the “very impressive” constellations proof that follows it.

Question 6**Answer: J****Question Type:** *Specific Detail: identify and interpret details*

Explanation: The key sentence for answering this question is the second sentence in the passage, lines 3–8. The author makes the argument that Ptolemy’s ideas hold the record for longevity and influence, although other scientists have “done more for science.” Answer J, then, is the best answer. The other alternatives are either contradicted or unsupported in the passage.

Question 7**Answer: B****Question Type:** *Big Picture: make generalizations*

Explanation: “Astute” means “showing an ability to accurately assess something.” In the context of science, it refers to being able to apply sound logic to draw conclusions from careful observation. Given this meaning, answer B is the best answer. First of all, since Ptolemy’s time, it has been shown that the moon’s orbit is not perfectly circular. Second of all, it would take careful observation to determine that the rate of the moon’s waxing and waning changes, and sound reasoning to conclude that a non-circular orbit would explain this. Answer A has Ptolemy basing his reasoning on a value judg-

ment—that ellipses are simply “perfect”—and includes no logical reasoning. Answer C has him attribute the regular, consistent retrograde motion of planets to random asteroid bombardment—not a very “astute” suggestion. Answer D has him radically underestimating the complexity of the universe, again with no logical support.

Question 8**Answer: H****Question Type:** *Inference: determine the meaning of words from context*

Explanation: Of the answers given, H is clearly the best because it distinguishes a northerly latitude (the Northern hemisphere) from the “sufficient southern latitude” used as a contrasting position in the sentence; it makes sense that certain stars which rise and set in the South never set in the North. Also, there is some suggestion that Ptolemy is from Alexandria, Egypt in the passage, and the author seems to use Ptolemy as one of us and as a starting point from which “travelers went to the south” (line 28); Egypt is in the Northern hemisphere. No such difference in star rising and setting would occur between Eastern and Western positions on the earth (answers F and G), and answer J reverses the situation described in the passage.

Question 9**Answer: A**

Explanation: The use of the word “proofs” in the next sentence of the passage seems to be used as a synonym for the previously used “demonstrations.” The author goes on to describe situations compiled by Ptolemy to show that the earth must be spherical. Therefore, answer A is the best answer. The author does not suggest that Ptolemy displays emotions (B), picks up a globe and spins it around (C), or uses a symbolic argument (D).

Question 10**Answer: F****Question Type:** *Inference: understand sequences of events*

Explanation: The text states that Ptolemy’s “authority on the subject of celestial bodies held sway for...fourteen centuries” (lines 5–7), so it can be inferred that his ideas lost their authority about fourteen centuries after he introduced them. Knowing that Ptolemy was active in the “2nd century A.D.” (line 1), then, leads to the conclusion that his theories started to go out of favor in the 16th century—answer F. The number “1400” (answer G) would refer to the number of years Ptolemy’s book was influential—not the year it began to lose influence. The figures 1800 (answer J) and 20th century (answer H) refer to the difference between Ptolemy’s time and our own, rather than that between the writing of *The Almagest* and the work of “Copernicus, Galileo, and Newton” (line 11).

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Answers: Science

Science Section 1

1. **C.** More light results in longer leaves, as demonstrated by the table for experiment 2.

2. **J.** Note that the temperature (20 degrees Celsius) and exposure to sunlight (9 hours) in this problem are those that have been held constant in experiment 1, eliminating the need to further consider experiments 2 and 3. Since 40 percent humidity is not shown, but 30 and 50 percent humidity are shown, we know that the leaf width must be somewhere in the range equivalent to 30 to 50 percent humidity. This range would be 2.9 to 3.4 cm. Only one answer falls in this range, J, 3.2 cm.

3. **C.** Experiment 3 shows no significant variation in leaf width for the whole range of temperature, so answer C is correct.

4. **G.** The variable that causes very little change in the growth measurements (temperature) can be ignored. The first thing to consider is the variable that causes the greatest change, which is exposure to sunlight, and pick the value in your choices that will best promote growth (12 hours). All other answers can be eliminated from further consideration. The humidity variable should now be considered to determine the final answer. 15% humidity would produce much shorter leaves than those produced at 80%. Thus G is the correct answer.

5. **B.** Experiment 1 shows that between 15% and 85%, increases in humidity result in decreases in leaf width. This is the only variable that shows this trend.

6. **J.** A high k value would make the spring stiff, causing it to shut the door rapidly. The highest k value is, 13, so answer J.

7. **D.** *Approach 1:* Notice that as we divide the k value by 3, the distance x increases by three, $45 \times 3 = 135$. Be certain to always look for these types of patterns and trends in the data as suggested in the Basic Science Techniques in the strategy book (p. 150). *Approach 2:* As stated in the problem, $F = k(x)$. Notice that the force is constant for any given mass, and thus the force in trial 6 will be 675 N. Plug the numbers into the equation ($675 = 5x$) and solve.

8. **H.** If the increased distance is less than 135 cm (as calculated in problem 7), M_3 may still bottom out without hitting the floor.

9. **A.** According to passage, $F = kx$, so $5 \times 35 = 175$.

10. **F.** A spring with a higher k value would be stiffer than the one used in trial 6, and thus would stretch a shorter distance. J is incorrect because if the stand flexed, the empirical k value in the experiment would include the bending of the stand, thereby invalidating the experiment.

11. **C.** These scientists differ on what effect an increase in carbon dioxide might have, but both agree that it is increasing.

12. **G.** Scientist 2 states that the correlation between carbon dioxide levels and temperature does not hold for the past 100 years, suggesting that some other factor is causing global warming.

13. **C.** Correlations cannot be used to prove a theory, but they do provide the basis for forming a theory. Scientist 2 has proposed that atmospheric H_2O is responsible for the earth's greenhouse effect without providing any evidence to substantiate this claim.

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Science Section 2

1. **C.** In the table, the factory-recommended tire pressure is listed first with deviations from the recommended psi, both higher and lower, in the list that follows. Regardless of the order in which the data is presented, the correspondence between the x value (tire pressure) and y value (total miles) determines the shape of the graph. Please note that if car #2 had not had car failure, it would have driven 200 miles: $10 \text{ miles/gallon} \times 20 \text{ gallons} = 200 \text{ miles}$.

2. **G.** The car has driven 120 miles, and has 8 gallons left in the tank, so it must have used 12 gallons. $120 \text{ miles}/12 \text{ gallons} = 10 \text{ miles per gallon}$.

3. **A.** The sun compass hypothesis does not address how changes in magnetic fields may affect the pigeon's navigation. According to this hypothesis, the birds should be able to find their way home on a sunny day.

4. **H.** The sun compass hypothesis emphasizes a dependence on sun position and the pigeons' internal clocks. If their internal clocks are disturbed, this hypothesis predicts the birds would not be able to find their way back on a sunny day.

5. **C.** Even though it was sunny, the birds could not find their way home during the magnetic disturbance, which supports the magnetic field hypothesis.

6. **F.** An appropriate control in this experiment would have been to attach an unmagnetized bar to a group of pigeons, which would have determined whether it was the mere presence of the metal that undermined the pigeons' navigation abilities.

7. **B.** The researchers performed the magnetic field experiments on a cloudy day, which had been shown by other scientists to interfere with the pigeons' ability to navigate. One can conclude that magnetic disturbances may not be the sole cause of the pigeons' inability to navigate in these experiments.

8. **J.** Since a number of factors may be involved in the ability of pigeons to navigate, these new results do not decisively disprove either hypothesis. Nor do they support either hypothesis.

9. **A.** The total mass lost from the sample during the experiment was 20 grams in the form of CO_2 , and every gram of CO_2 occupies half a liter of volume, so $20 \text{ g} \times 0.5 \text{ L/g} = 10 \text{ L}$.

10. **H.** Reactions that are exothermic release heat (exo = outward; thermic = heat). Since the water warmed up, heat must have been released during the reaction. Also, H is the only answer dealing with temperature.

11. **C.** Since the sample is in a vacuum at the start of the experiment, the pressure will be zero at the start of the experiment, eliminating A and D as possible correct answers. Since the reaction releases CO_2 gas, pressure will increase as the reaction progresses, leaving C as the correct answer.

12. **H.** The reaction is to be performed in a sealed container under a vacuum, so altitude, which will affect the pressure outside the container, will not affect the experiment.

13. **C.** The passage mentions that the speed of the reaction is inhibited by the presence of CO_2 , so something that reacted with CO_2 as it was released would keep CO_2 levels low, thereby speeding up the reaction.

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Science Section 3

1. **C.** For every 5 centimeters of depth increase, pH decreases by 0.5. Assuming the pattern persists, the pH at 40 cm would be 2.8.

2. **J.** All O_2 concentrations are 0 (zero) at depths greater than 10 cm; therefore this variable would not be an indicator of depths greater than 10 cm.

3. **D.** These bacteria require a basic environment and therefore would not thrive in any of these layers. All layers are below pH 7, and thus acidic.

4. **H.** The CO_2 concentration initially increases with depth, but then decreases. The other variables in the chart do not show a similar correspondence between concentration and depth.

5. **D.** As depth increases, pH decreases, reflecting an increase in acidity.

6. **G.** Ice water was used in trial 2 to cool down the paraffin faster.

7. **D.** Since the water in which the paraffin was heated would not be as hot, it would take longer to completely melt the paraffin.

8. **J.** If the ambient temperature remains constant, the time to solidify the paraffin would remain constant, regardless of the elapsed time between readings.

9. **D.** The paraffin would have transferred heat to the water, warming it to greater than 0°C , thereby increasing the time required to solidify the paraffin.

10. **H.** The only statement that is proven by the data is H. Answer F is a trap, as it does not take it 60 seconds to solidify, but to melt.

11. **B.** The maximum increase in adhesive force when varying the concentration of mineral oil is approximately 1.2 times that of the pure polymer, whereas the maximum increase in stretch length is less than 0.4 times that of the pure polymer. Note: The plotted y values are relative, allowing comparisons of the relative effect of the percent of mineral oil on the two variables.

12. **H.** The trends in the data indicate that the maximum value for adhesive force may be close to 10% mineral oil, but more variations need to be tested to more precisely determine the percent of mineral oil required for the maximal adhesive force.

13. **C.** Repeating the experiment several times ensures that the results are reproducible within the parameters of the experiment.

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Science Section 4

1. **D.** No significant variation in the resistance of Metal A or B occurs as ambient pressure increases, as shown by the relatively flat lines in Graph 2.

2. **G.** At room temperature, Metal A's resistance continues to steadily change. However, from 20°C to 40°C, Metal B's resistance undergoes a large change with a small temperature range, making it an ideal metal for detecting temperature changes in the household environment.

3. **B.** As can be seen in Graph 2, Metal A's resistance is constant at about 175 Ohms, and Metal B's resistance is constant at about 170 Ohms in the temperature maintained by the scientists. In Graph 1, one can see that 175 Ohms of resistance for Metal A and 170 Ohms of resistance for Metal B both occur when the temperature is approximately 22°C.

4. **G.** Metal A is a semiconductor because semiconductors decrease in resistance as temperature goes up, and according to Graph 1, Metal A decreases in resistance as the temperature goes up. Metal B is a conductor because conductors increase in resistance as the temperature goes up, and according to Graph 1, Metal B increases in resistance as the temperature goes up.

5. **A.** Metal A is most suitable for this application because Metal B does not sufficiently vary in resistance below 10° Celsius, whereas Metal A has a fairly predictable resistance change over the entire temperature range encountered during flight.

6. **G.** A quick visual inspection of the graph suggests that the increase in average speeds from 1977–1990 to 1991–2004 is about twice that of the increase from 1963–1976 to 1977–1990 ($2 \times 4\% = 8\%$). All other answers fail to come close to this approximation.

7. **C.** Clots are more likely to form when the percent of red blood cells in the blood are high and the heart rate is low. A person's heart rate is slowest in deep sleep, and athletes have the slowest resting heart rate. In fact, it has been reported that some EPO-doping cyclists sleep with a heart-rate monitor that sounds an alarm when their pulse drops below a certain level.

8. **G.** F is incorrect because using diuretics would decrease blood volume without effecting red blood cell number; thus, the red blood cell percentages would actually rise. H is incorrect, because although aspirin may lower the chance of clotting, it will have no effect on red blood cell percentages. J is incorrect because EPO doping is detected indirectly through measuring red blood cell percentages, which can only be done by taking blood samples. G is correct, because increasing the liquid portion of the blood would decrease the red blood cell percentages. One team manager reported that each morning he set up the transfusion apparatus just in case the UCI doctors showed up to collect blood samples. The transfusions, which take about 20 minutes, were performed while doctors waited for the riders to come down from their rooms.

9. **D.** Answers A–C would each reduce doping among cyclists by an incremental amount. Combining all three strategies would be additive, and therefore would reduce doping to lower levels than any one of the other strategies alone.

10. **H.** F is incorrect because EPO wasn't available until the late 1980s. G is incorrect because averaging the data over 14-year intervals from 1949 to 2004 would greatly diminish the effect of bad weather in any given year, and can not account for the lower average speeds during these early years. J is incorrect since newcomers to the sport would wash out any multigenerational effects caused by sons following in the footsteps of their fathers to become competitive cyclists. This leaves H as the correct answer; more stringent testing in 2007 did in fact lead to the disqualification of many of the cycling competitors.

11. **D.** Flask D initially contained pure water, indicating that 100 mL of water can dissolve 10 grams of glucose. Since the unit in the answers is g/L and 1 L is equivalent to a 1000 mL, one must multiply 10 g/100 mL by 10, arriving at 100 g/1000 mL = 100g/L.

12. **J.** No more glucose could be dissolved in the solution contained in flask B, indicating the solution was saturated with glucose. The students determined that saturation was reached when 10.0 grams of glucose was added to the 100 mL of pure water contained in flask D.

13. **C.** The students determined that saturation was reached when 10.0 grams of glucose was added to 100 mL of pure water. Since students were able to dissolve only 3.0 more grams of glucose in the solution in flask A, it can be inferred that the unknown quantity of glucose in this solution was 7.0 grams.

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Science Section 5

1. **D.** Model C suggests that each increase in speed, whether it occurs at high or low speed, evokes a similar increase in gas consumption. The data, however, shows that this relationship isn't linear; at high speeds, each increase in speed results in a larger increase in gas consumption than do similar increases at low speeds.

2. **J.** To save fuel, the friend should travel as slowly as possible and with the fewest stops. Although the shortcut would decrease the miles required to drive to the gas station, 25 stops would require repeated accelerations, thereby dramatically increasing fuel consumption.

3. A. At 3% oxygen levels, the highest percentages of nitrogen and phosphorus are removed, thereby compensating for suboptimal sulfur removal.

4. H. Mid-level oxygen concentrations enhance the removal of phosphorus, not sulfur.

5. C. By the time the effluent has reached System 2, 90% of the contaminants have been removed by the 100-volt plate in System 1. The 50-micron filter in System removes 90% of the remaining contaminants ($10\% \times .9 = 9\%$). The total contaminants removed before the effluent reaches System 3 is 99% (90% by System 1 + 9% by System 2 = 99%).

6. J. This passage does not address temperature effects.

7. A. As the voltage increases from 100 volts, efficiency steadily drops. This trend suggests that voltages greater than 5000 volts would result in removal efficiencies of less than 60%.

8. G. Running 2,500 gallons of effluent through the 50-micron filter without prefiltration would require 5 filters. If the effluent was prefiltered through the 200-micron filter, only two filters would be required, one 100-micron filter and one 50-micron filter. Since only 2 filters would be required rather than the 5 required, the company would save \$150 for each 2,500 gallons of effluent ($3 \text{ filters} \times \$50/\text{filter} = \$150$).

9. C. The steepness of the graph suggests that a small change in voltage in the 50- to 500-Voltage range could lead to a large change in the contaminant removal. Therefore, gathering more data in this range could lead to the discovery of a level that could effect greater purification. If contaminant removal was increased by 2%, this would reduce the contaminant load to be filtered in Step 2 by 20% ($2\% \div 10\% = .20$), leading to an increased filter life for the filters in Step 2 of the purification process.

10. H. Since NaNO_3 and NaCl freely dissolve in water as shown in flask 4 and 5, one can conclude that these salts do not form precipitates in aqueous solution. It is therefore safe to assume that the Ag ions combine with Cl ions in flask 1 and Hg ions combine with Cl ions in flask 3 to form the observed precipitates.

11. C. Since 1.2 grams NaCl can be added Flask 1 before a precipitate is formed and only 0.3 grams NaCl to flask Flask 3, the AgCl precipitate must be more soluble. Note that this conclusion could be drawn only if the molar concentrations of the salts in flask 1 and 3 are equivalent.

12. G. We know that since adding NH_3 to flask 1 causes the precipitate to redissolve, AgOH must be soluble. We know that adding NH_3 to flasks 4 and 5 did not cause a precipitate to form, thereby eliminating C and D as possible answers. And finally, we know from step 2 of the experiment that PbCl_2 is soluble. The only possible conclusion is that the Pb ion combines with the hydroxide ion to form the precipitate.

13. C. The additional precipitate that formed could be a mixture of $\text{Hg}_2(\text{OH})_2$ and Hg_2Cl_2 . The only way to test this would be perform both the procedures described in answers A and B.

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Time Management Strategies

TM #1: _____

TM #2: _____

TM #3: _____

TM #4: _____

TM #5: _____

TM #6: _____

TM #7: _____

TM #8: _____

TM #9: _____

TM #10: _____

TM #11: _____

TM #12: _____

Testing Strategies

TS #1: _____

TS #2: _____

TS #3: _____

TS #4: _____

TS #5: _____

TS #6: _____

TS #7: _____

TS #8: _____

TS #9: _____

Testing Strategies

TS #10: _____

TS #11: _____

TS #12: _____

TS #13: _____

TS #14: _____

TS #15: _____

TS #16: _____

TS #17: _____

TS #18: _____

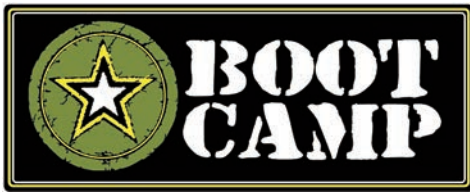
TS #19: _____

ACT National Average

Full Practice Test Scoring Grid

ACT SCORE	RAW SCORE				ACT SCORE	Approximate Percentile
	ENGLISH	MATH	READING	SCIENCE		
36	75	60	40	39–40	36	
35	74	59	39	37–38	35	
34	73	57–58	38	36	34	
33	72	55–56	37	36	33	99%
32	71	53–54	36	35	32	98%
31	70	51–52	35	34	31	
30	69	49–50	34	33	30	95%
29	68	47–48	33	32	29	
28	66–67	45–46	32	31	28	90%
27	64–65	43–44	31	30	27	
26	63	41–42	30	29	26	
25	60–62	39–40	29	27–28	25	74%
24	58–59	37–38	28	26	24	
23	56–57	35–36	27	24–25	23	
22	52–55	34	26	23	22	
21	49–51	32–33	24–25	21–22	21	55%
20	46–48	30–31	23	19–20	20	
19	44–45	28–29	21–22	17–18	19	
18	41–43	27	20	15–16	18	
17	39–40	25–26	18–19	14	17	28%
16	36–38	20–24	17	13	16	
15	33–35	15–19	15–16	12	15	
14	31–32	12–14	13–14	11	14	
13	28–30	9–11	11–12	10	13	
12	26–27	7–8	10	9	12	
11	24–25	6	8–9	8	11	
10	21–23	5	7	7	10	Guessing
9	18–20	4	6	6	9	
8	15–17	4	5	5	8	
7	13–14	3	4	4	7	
6	10–12	2	4	3	6	
5	8–9	2	3	3	5	
4	6–7	1	2	2	4	
3	4–5	1	2	1	3	
2	2–3	1	1	1	2	
1	0–1	0	0	0	1	

*Source: ACT, student scores 2011–2014



15 Min Practice Tests

English		Math		Reading		Science	
Number Correct	Approximate ACT Score	Number Correct	Approximate ACT Score	Number Correct	Approximate ACT Score	Number Correct	Approximate ACT Score
25	36	15	36	10	36	13	36
24	33-35	14	32-35	9	33-35	12	33-35
23	30-32	13	30-31	8	29-32	11	30-32
22	28-29	12	28-29	7	25-28	10	27-29
21	26-27	11	26-27	6	22-24	9	25-26
20	24-25	10	24-25	5	19-21	8	23-24
19	22-23	9	22-23	4	16	7	21-22
18	21	8	20-21	3	12	6	19-20
17	20	7	19	2	9	5	17
16	19	6	18	1	6	4	14
15	18	5	17			3	11
14	17	4	15			2	7
13	16	3	13			1	4
12	15	2	7				
11	14	1	4				
10	13						
9	12						
8	11						
7	10						
6	9						
5	8						
4	7						
3	6						
2	4						
1	3						

**HOW DO
YOU
STACK UP**

Prepare, Practice, Succeed®



YOUR PLAN

ENGLISH	ESSAY	MATH
#1 _____ _____ _____ _____	#1 _____ _____ _____ _____	#1 _____ _____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished
#2 _____ _____ _____ _____	#2 _____ _____ _____ _____	#2 _____ _____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished
#3 _____ _____ _____ _____	#3 _____ _____ _____ _____	#3 _____ _____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished
#4 _____ _____ _____ _____	#4 _____ _____ _____ _____	#4 _____ _____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished

OF ACTION



READING	SCIENCE	PERSONAL NOTES
#1 _____ _____ _____	#1 _____ _____ _____	_____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	_____ _____
#2 _____ _____ _____	#2 _____ _____ _____	_____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	_____ _____
#3 _____ _____ _____	#3 _____ _____ _____	_____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	_____ _____
#4 _____ _____ _____	#4 _____ _____ _____	_____ _____ _____
<input type="checkbox"/> goal accomplished	<input type="checkbox"/> goal accomplished	_____ _____

***REMEMBER TO SET A REALISTIC GOAL FOR WEEKLY 15 MINUTE PRACTICES**

Notes

Notes
