

ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. In most cases, you are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose “NO CHANGE.” In some cases, you will find in the right-hand column a question about the underlined part. You are to choose the best answer to the question.

You will also find questions about a section of the passage, or about the passage as a whole. These questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box.

For each question, choose the alternative you consider best and fill in the corresponding oval on your answer document. Read each passage through once before you begin to answer the questions that accompany it. For many of the questions, you must read several sentences beyond the question to determine the answer. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

I Am Iron Man

[1] The term “Iron Man” has many connotations, including references to a song, a comic book icon, even a movie. [2] Yet only one definition of the term truly lives up to its name: the Ironman Triathlon held annually in Hawaii a picturesque setting for a challenging race. [3] This grueling race demands amazing physical prowess and the ability to swim, bike, and run a marathon, all in less than 12 hours with no break. [4] Very few individuals are up to the task. 2

Otherwise, Gordon Haller is a notable exception. Growing up in the 1950s, Haller developed an interest in many sports

categorized as endurance athletics, and welcomed their grueling physical demands. As he pursued a degree in physics he drove a

1. A. NO CHANGE
B. Hawaii,
C. Hawaii, being
D. Hawaii, it is
2. If the writer were to delete Sentence 4, the essay would primarily lose details that:
F. emphasize how difficult the race truly is.
G. mourn how few athletes are able to visit Hawaii in order to compete in the race.
H. highlight that most athletes prefer the run to the swimming or biking components of the race.
J. suggest that women are not truly competitive in the race.
3. A. NO CHANGE
B. As a result,
C. In addition,
D. However,
4. F. NO CHANGE
G. athletics and welcomed their
H. athletics, and welcomed there,
J. athletics and, welcomed there

GO ON TO THE NEXT PAGE.

taxi to pay the bills, but competitive training proved⁵ his passion. So when he heard about the race in 1978, the first year it was held, he immediately signed up.

The race somewhat⁶ originated in an amusing way. The members of two popular sports clubs, the Mid-Pacific Road

Runners of Honolulu, and the Waikiki Swim Club of Oahu,⁷ had a long-standing and good-natured debate going over who made better athletes: runners or swimmers. However, some local

bikers thought both clubs were wrong, while claiming⁸ that they, in fact, deserved the title. Wanting to settle the dispute once and

for all, when⁹ they decided to combine three separate races

already held annually on the island¹⁰ into one massive test of endurance. Thus, the Waikiki Roughwater Swim of 2.4 miles, the Around-Oahu Bike race of 112 miles, and the Honolulu Marathon of 26.2 miles were all combined to form the Ironman Triathlon.

Haller was one of only fifteen competitors to show up that February morning to start the race. He quickly scanned the few pages of rules and instructions, and while reading those pages¹¹ on the last page he discovered a sentence that would become the race's famous slogan: "Swim 2.4 miles! Bike 112 miles! Run 26.2 miles! Brag for the rest of your life!" Haller took that to

5. A. NO CHANGE
B. verified
C. justified
D. certified
6. The best placement for the underlined word would be:
F. where it is now.
G. before the word *in*.
H. before the word *amusing* (changing *an* to *a*).
J. before the word *way*.
7. A. NO CHANGE
B. Runners, of Honolulu, and the Waikiki Swim Club
C. Runners of Honolulu and the Waikiki Swim Club
D. Runners, of Honolulu, and the Waikiki Swim Club,
8. F. NO CHANGE
G. and while claiming
H. they claimed
J. claiming
9. A. NO CHANGE
B. and
C. where
D. DELETE the underlined portion.
10. The best placement for the underlined phrase would be:
F. where it is now.
G. before the word *Wanting* (revising the capitalization accordingly).
H. before the word *once*.
J. after the word *endurance* (ending the sentence with a period).
11. A. NO CHANGE
B. and
C. and while perusing those pages
D. and in those sheets of paper

GO ON TO THE NEXT PAGE.

heart, and at the end of the day, he had become¹² the first Ironman

champion in history. 13

In the approximately thirty years since that very first race, the Ironman has become a tradition in Hawaii and now boasts approximately 1,500 entrants every year. The competitors who¹⁴ complete the race don't have to be the first across the finish line to claim success: just finishing is a victory unto itself.

12. F. NO CHANGE

G. become

H. became

J. becomed

13. Which of the following true statements, if added here, would most effectively and specifically emphasize Haller's achievement as described in this essay?

A. Twelve other people also finished the race that day.

B. There were points in the race when Haller thought he couldn't possibly finish.

C. No women raced this year, but that was soon to change.

D. Haller's amazing physical strength had enabled him to do what no one else in the past had accomplished.

14. Which of the following alternatives to the underlined portion would be LEAST acceptable?

F. The individuals

G. That

H. The athletes

J. The people

Question 15 asks about the preceding passage as a whole.

15. If the writer were to delete the final paragraph of this essay, the essay would primarily lose information that:

A. discusses the level of interest the race attracts in the present day.

B. describes the way the current race is different from the race that Haller ran in 1978.

C. describes how the victors respond when they cross the finish line.

D. explains why 1,500 people would be willing to compete in such a difficult race.

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PASSAGE II

New Beginnings

[1]

As a junior in high school, I am very concerned about college. I'm trying to do everything right: when I keep my ¹⁶ grades up, participate in a few extracurricular activities, prepare for standardized tests, even perform community service. I spend most days thinking about the future hoping that I'm on the right ¹⁷ path, I do my best at everything I can.

[2]

[1] I'm interested in a career in nursing, I decided to try to ¹⁸ secure a spot as a volunteer at the local hospital. [2] I accepted

his offer immediately, thinking to myself that here lies all the ¹⁹ opportunities I could ever want! [3] It would be the best of both worlds: helping people while gaining valuable on-the-job

experience! [4] So I put on a nice pair of slacks, a blouse, and ²⁰ some comfortable shoes—don't all nurses wear comfortable shoes?—and went to visit the business office. [5] Fortunately, the hospital director was quite willing to let me help out, and he said I could start that summer as soon as I finished my finals. 21

[3]

The director gave me a brief tour of various departments as he told me about the primary focus of each, an expert himself ²² in every facet of hospital administration, until we stopped right ²² in front of the maternity ward. "This is where you're going to work," he said, ushering me through the brown double doors.

16. F. NO CHANGE
G. I keep
H. I am keeping
J. I have kept

17. A. NO CHANGE
B. future, hoping
C. future. Hoping
D. future praying

18. F. NO CHANGE
G. nursing, therefore,
H. nursing, so
J. nursing, but

19. A. NO CHANGE
B. lays
C. lay
D. lie

20. F. NO CHANGE
G. pair, of slacks, a blouse,
H. pair, of slacks, a blouse
J. pair of slacks a blouse

21. For the sake of the logic and coherence of this paragraph, Sentence 2 should be placed:
- A. where it is now.
B. after Sentence 3.
C. after Sentence 4.
D. after Sentence 5.

22. F. NO CHANGE
G. expert, himself in every facet of hospital administration,
H. expert, himself, in every facet of hospital administration
J. expert himself in every facet of hospital administration

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Walking into the ward, my ears were immediately overwhelmed.

Women yelled and newborns wailed. Nurses rushed around to
adjust medical instruments that screamed for attention. I felt

suspicious in the center of so much action and wondered if I had
been too hasty in seeking out such a difficult service project.

[4]

Apparently my fear must have shown clearly on my
face as I looked around because the director said, “Don’t worry.
You’ll get used to the pace up here. You are going to help in the

nursery.” With that, we walked down the busy hallway past
the numerous delivery rooms and into the most peaceful room
I’ve ever seen. The pastel colors provided a quiet backdrop to the
humming of machines and soft coos of sleeping infants. A

whispering nurse, the one in charge of the nursery, welcomed
me, thanked me for volunteering, and asked me to start folding

some baby blankets and placing it in the appropriate drawer. The
director gave me a questioning look, which I returned with a

quiet nod. 29 I got right to work.

23. A. NO CHANGE
B. my ears immediately felt overwhelmed, women
C. I was overwhelmed by the sounds. Women
D. hearing and overwhelmed. Women
24. Which choice would be most consistent with the figurative description provided elsewhere in this paragraph?
F. NO CHANGE
G. besieged
H. weak
J. defenseless
25. Which of the following alternatives to the underlined portion would be LEAST acceptable?
A. face while
B. face when
C. face at the same time that
D. face since
26. Given that all the choices are true, which one provides the most vivid description of the hospital hallway?
F. NO CHANGE
G. down a hallway filled with bright blue and pink balloons, beautiful flowers, and jubilant fathers
H. past a nurses’ station and a handful of expectant fathers
J. under the yellowing ceiling of the dated hospital
27. A. NO CHANGE
B. nurse the one in charge of the nursery,
C. nurse the one in charge of the nursery
D. nurse, the one in charge of the nursery
28. F. NO CHANGE
G. place them
H. placed them
J. placing these
29. If the writer were to delete the phrase “which I returned with a quiet nod” from the preceding sentence and end the sentence with a period, the sentence would primarily lose:
A. a detail that expresses the narrator’s ease while in the nursery.
B. a specific description of the narrator’s anger toward the director.
C. information that indicates the narrator will quit the hospital as soon as the director leaves.
D. nothing at all, because this information had already been provided earlier in the passage.

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Question 30 asks about the preceding passage as a whole.

30. Upon reviewing the essay and realizing that some key information has been left out, the writer composes the following sentence incorporating that information:

Soon enough, I showed up for my first day at the hospital.

This sentence would most logically be placed before the first sentence in Paragraph:

- F. 1.
- G. 2.
- H. 3.
- J. 4.

PASSAGE III

Give a Snake a Break

Throughout much of history, snakes have had a reputation³¹ for being more deadly than they actually are. Negative associations abound: a “snake in the grass” is a seemingly

innocent person intent on causing harm. ³² A “snake charmer” uses flattery to distract you from his shady intent. Nearly every

reference to a snake that is popular in modern society bears this negative connotation. Despite this perception, the snake,

with its³⁴ ugly, slimy appearance, is one of the most unjustly maligned creatures on the planet.

31. A. NO CHANGE
 B. a reputation for being more deadly than
 C. a reputation as the most deadly than
 D. the deadliest reputation then
32. Given that all the following statements are true, which one provides the most relevant information at this point in the essay?
 F. “Snake oil” refers to fake medicine that promises impossible results.
 G. Most snakes are passive creatures that will never cause you injury.
 H. Snakes are carnivorous reptiles that can be found on every continent except Antarctica.
 J. Pet snakes have become increasingly common over the last decade.
33. A. NO CHANGE
 B. reference that is popular about a snake
 C. famous reference they have about a snake
 D. popular reference to a snake
34. F. NO CHANGE
 G. who’s
 H. sporting it’s
 J. with its’

GO ON TO THE NEXT PAGE.

Snakes are only rarely dangerous to humans. Their fangs, so ³⁵ intimidating when the snakes are hissing, are designed not to

attack people but to hold small prey; small rodents, birds, insects, etc. Only exceptionally large snakes, like pythons or ³⁶ anacondas, pose a real threat. Most of the time, the typical snake you encounter in your backyard is more afraid of you than you are of it and will gladly avoid any contact with you.

Poisonous snakes—such as rattlesnakes, vipers, and cobras—are most frightening to people, but they attack if they ³⁷ are only provoked. While certainly venomous, these snakes pose a threat ³⁷ mainly to smaller animals. Of the 5 million snake bites that occur each year to humans around the world, only about 2.5 percent prove fatal. ³⁸ Prompt treatment with one of the

available antivenoms do much ³⁹ to ensure the victim's survival. Although you may get an infection at the wound site, you can be

effectively treated, seeing as ⁴⁰ you are still shaken from the encounter, you will survive.

Why put up with snakes at all? Even if they don't normally kill humans, most people still considering them a nuisance and ⁴¹ avoiding them like the plague. Individuals who dislike snakes for ⁴¹ this reason do not appreciate the great service snakes do for humanity. The typical diet of a snake includes small rodents like rats, mice, gophers, and prairie dogs, as well as lizards, birds, fish, and insects. We may not like snakes, if they were ⁴² mysteriously wiped out of existence, however, we would be virtually overrun with other vermin that would spread disease and filth.

35. A. NO CHANGE
B. fangs being
C. fangs, so they are
D. fangs, they are

36. F. NO CHANGE
G. prey,
H. prey:
J. prey

37. A. NO CHANGE
B. they will provoke and attack them.
C. they will attack humans only if provoked.
D. if provoked, they will attack them.

38. The writer is considering deleting the preceding sentence from this paragraph. If the writer made this deletion, the paragraph would primarily lose:
F. scientific proof that snakes are too dangerous to coexist with humans.
G. an example of the various locations where most fatalities take place.
H. a specific statistic to support a previous claim.
J. excessive detail that distracts the reader from the broader message of the passage.

39. A. NO CHANGE
B. can do much
C. are able to do much
D. have much ability

40. F. NO CHANGE
G. but because
H. and even if
J. however

41. A. NO CHANGE
B. consider them a nuisance and avoid
C. considering them a nuisance and avoid
D. considered them a nuisance to avoid

42. F. NO CHANGE
G. snake's if they
H. snakes, they
J. snakes; if they

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So, next time you hear about someone putting down snakes, stand up for our legless friends. These snakes in the grass help us more than we might think.

43. The writer wants to provide a sentence here that will tie the conclusion of the essay to its beginning. Which choice does that best?
- A. NO CHANGE
 - B. Snakes make excellent pets.
 - C. Let's reduce the incidence of snake bites around the world.
 - D. Wouldn't you rather see a snake in your yard than a rat?

Questions 44 and 45 ask about the preceding passage as a whole.

44. The writer is considering deleting the last sentence of the first paragraph of the essay. If the writer were to make this deletion, the essay would primarily lose a statement that:
- F. adds a bit of sarcasm to a rather humorous introduction.
 - G. identifies the overall point of the entire passage.
 - H. summarizes the list of examples previously provided by the author.
 - J. provides a list of animals more useful than the snake.
45. Suppose the writer's goal had been to write an essay focusing on the various ways in which humans were threatened by snakes. Would this essay fulfill that goal?
- A. Yes, because the author gives specific statistical evidence that proves snake bites happen around the world.
 - B. Yes, because the essay focuses on many of the negative stereotypes associated with snakes.
 - C. No, because the essay primarily focuses on the fact that snakes are not harmful to humans.
 - D. No, because the essay points out that snakes feed primarily on rodents and other small animals.

PASSAGE IV

Zora Neale Hurston, *Independent Woman*

Zora Neale Hurston proves to be a study in contrasts: a black writer reaching a white audience, a woman struggling in a man's profession, an independent thinker living in a conformist era.

Now, almost 50 years since her death, her hard work and fabulous novels still have much to teach the modern audience.

She overcame the challenges she faced and demonstrated that perseverance makes anything possible.

46. Which of the following alternatives to the underlined portion would be LEAST acceptable?
- F. Presently,
 - G. Currently,
 - H. Instantly,
 - J. At the present,
47. Which of the following alternatives to the underlined portion would be LEAST acceptable?
- A. faced, and in so doing,
 - B. faced and, thus,
 - C. faced that
 - D. faced, an action that

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Hurston ascribed much of her deeply individualistic⁴⁸ personality to the experience of growing up in Eatonville,

Florida. The town was unique in that it was particularly hot in⁴⁹ the summer, but mild at other times of the year. Hurston always said growing up in a community totally separate from the larger⁴⁹

white society allowed her a freedom that independence not⁵⁰ available to everyone in the south.

[1] Hurston began her undergraduate studies at Howard University, but her obvious intelligence and talent⁵¹ soon earned her a scholarship to Barnard College in New York City. [2]

Moving north in the 1920s thrust her into the midst of the⁵² Harlem Renaissance, a black cultural movement that spawned

exceptional achievements in literature, books, poems, and plays,⁵³ art, and music. [3] Interacting with the likes of Langston Hughes, W.E.B. DuBois, Billie Holiday, and Duke Ellington,

Hurston developed⁵⁴ her skills as a writer and published numerous

short stories and poems. 55 [4] The most influential work that came to define her career grew out of her attempt to capture the black experience. [5] That novel, called *Their Eyes Were Watching God*, traced three generations of a family living in

48. F. NO CHANGE
G. personally individualistic
H. freely independent
J. truly egotistical

49. Given that all the choices are true, which one most effectively identifies why Eatonville has a history unlike any other city in the United States?

- A. NO CHANGE
B. a fairly representative small town, founded in the mid-nineteenth century.
C. the first all-black town to be incorporated in the country.
D. not yet in existence at the start of the Civil War.

50. F. NO CHANGE
G. and was
H. it featured
J. and

51. A. NO CHANGE
B. intelligence, and talent
C. intelligence, and talent,
D. intelligence and talent,

52. F. NO CHANGE
G. 1920s, thrust
H. 1920s, thrust,
J. 1920s; thrust

53. A. NO CHANGE
B. literature, written records of stories once transmitted orally,
C. literature, which includes all forms of written expression,
D. literature,

54. F. NO CHANGE
G. developed up
H. develops up
J. develops

55. At this point, the writer is considering adding the following true statement:

Billie Holiday's music evokes such feeling and melancholy that it's no wonder she became so popular.

Should the writer add this sentence here?

- A. Yes, because it provides an interesting detail about one of the other Harlem Renaissance artists.
B. Yes, because music was an important influence on Hurston's work.
C. No, because it doesn't clearly identify which of Billie Holiday's songs were popular.
D. No, because it distracts the reader from the main point of this paragraph.

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Eatonville. [6] Her ⁵⁶interesting representation of the southern dialect caused her Harlem Renaissance contemporaries to belittle the work for what they saw as its propagation of inaccurate

stereotypes. [7] Hurston, however, remained true to it, convinced ⁵⁷that the accuracy of her representation would ultimately prevail over

the political pressures her peers sought to inflict upon her. 58

History has shown that Hurston was right. ⁵⁹However, modern critics admire her authentic and skillful representation of the language as well as her realistic portrayal of daily life in the early twentieth century. She is universally ⁶⁰applauded, as one of the best writers of her era, ranked with Toni Morrison, Maya Angelou, and Alice Walker as one of the most important African-American writers of all time.

PASSAGE V

Jimmy Carter, Humanitarian

[1]

Everyone has heard of Jimmy Carter. As president of the United States from 1977 to 1981. He oversaw a particularly ⁶¹turbulent time in American history. Americans taken hostage in the Middle East, serious inflation woes, major gasoline shortages around the country, and a tenuous relationship with a potential

56. Which choice would most clearly indicate that the dialect referenced in the passage was a realistic representation of the actual way language was spoken in Eatonville?
- F. NO CHANGE
G. unusual
H. authentic
J. fascinating
57. A. NO CHANGE
B. her project,
C. that thing,
D. which,
58. The writer has decided to divide this paragraph into two. The best place to add the new paragraph break would be at the beginning of Sentence:
- F. 4, because it would indicate that Hurston's writing was most strongly influenced by Langston Hughes.
G. 4, because it would signal the essay's shift in focus to one of Hurston's novels.
H. 5, because all the remaining sentences in the paragraph provide a detailed summary of the plot of Hurston's novel.
J. 5, because it would indicate that the essay is now going to focus on social conditions in Eatonville.
59. A. NO CHANGE
B. Modern
C. Thus, modern
D. In addition, modern
60. F. NO CHANGE
G. applauded as one of the best writers of her era and
H. applauded as one of the best writers of her era
J. applauded, as one of the best writers of her era, she is
61. A. NO CHANGE
B. 1981 but he
C. 1981, and he
D. 1981, he

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enemy—the Soviet Union—are hardly the stuff of pleasant
⁶²memories.

[2]

Yet even though Carter held America's most, powerful office,
⁶³

he will probably be remembered more for the work he has done
⁶⁴since he left the White House. His record on humanitarian issues
 around the world sets him apart as a caring, dedicated person

who wants to see the underprivileged, those of low economic
⁶⁵or social status, benefit from the great wealth, power, and
⁶⁵generosity of this country.

[3]

One of the major issues Carter has focused on throughout his
 career is peace in the Middle East. He questioned a national
⁶⁶energy policy designed to reduce American dependence long

before it was popular to do so on foreign oil and brokered a
⁶⁷peace treaty between Israel and Egypt. Likewise, he was among
 the first to insist publicly on basic human rights for everyone

around the world, founding a non-profit organization, The Carter
⁶⁸Center, to work toward that end. In his opinion, this includes
 extending modern health care to developing nations in order to

contain disease and improve quality of life around the world, in
⁶⁹many different countries.

62. F. NO CHANGE
 G. enemy the Soviet Union—
 H. enemy the Soviet Union
 J. enemy—the Soviet Union

63. A. NO CHANGE
 B. held America's most,
 C. held America's most
 D. held Americas, most

64. F. NO CHANGE
 G. himself
 H. him
 J. itself

65. A. NO CHANGE
 B. underprivileged, who may not have many resources,
 C. underprivileged
 D. underprivileged, who have less than others in society,

66. F. NO CHANGE
 G. promoted
 H. purchased
 J. rejected

67. The best placement for the underlined portion would be:
 A. where it is now.
 B. after the word *designed*.
 C. after the word *dependence*.
 D. after the word *was*.

68. Which of the following alternatives to the underlined portion
 would NOT be acceptable?
 F. world, and he found
 G. world, and he founded
 H. world, so he founded
 J. world and founded

69. A. NO CHANGE
 B. world.
 C. world, both east and west of the United States.
 D. world, including countries on every continent except Ant-
 arctica.

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[4]

[1] Carter works actively to improve the standard of living at home here in the United States as well. [2] He and his wife Roslyn are enthusiastic supporters of Habitat for Humanity. [3] This volunteer-based organization devotes itself to building affordable but quality housing for those who otherwise might not be able to buy a home. [4] However, Carter does not focus abroad all his efforts. [5] Community workers come together on their own free time to construct, paint, and landscape simple homes, working side-by-side with the families that will occupy the residences. 72

[5]

For all these reasons, Carter deserves respect for dedicating his career to public service. Everyone can agree for his impressive philanthropy and acknowledge his obvious devotion to all of humanity.

70. F. NO CHANGE
G. at home, not just abroad,
H. at home, within the area over which he was president,
J. at home,
71. A. NO CHANGE
B. focus all his efforts abroad.
C. focus all abroad his efforts.
D. focus all his abroad efforts.
72. For the sake of the logic and coherence of this paragraph, Sentence 4 should be placed:
F. where it is now.
G. before Sentence 1.
H. after Sentence 2.
J. after Sentence 5.
73. A. NO CHANGE
B. agree to
C. agree by
D. agree with
74. Which choice would best help this sentence to summarize key points made in the essay?
F. NO CHANGE
G. he should have been president for a second term.
H. he has the right to express his opinions as much as any other American.
J. he clearly didn't want the hostages to be harmed.

Question 75 asks about the preceding passage as a whole.

75. Upon reviewing notes for this essay, the writer comes across the following true statement:
- Habitat does more than build houses: it builds communities.
- If the writer were to use this sentence, the most logical place to add it would be at the end of Paragraph:
- A. 1
B. 2
C. 3
D. 4

END OF TEST 1

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

**MATHEMATICS TEST***60 Minutes—60 Questions*

DIRECTIONS: Solve each problem, choose the correct answer, and then darken the corresponding oval on your answer sheet.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed:

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

1. On a level field, a telephone pole 24 feet tall casts a shadow 6 feet long, and at the same time of day, another nearby telephone pole casts a shadow 18 feet long. How many feet tall is the second telephone pole?

A. 6
B. 12
C. 24
D. 36
E. 72

2. The membership fees for WebFilms consist of a monthly charge of \$14 and a one-time new-member fee of \$16. Sherwood made a credit card payment of \$100 to pay his WebFilms fees for a certain number of months, including the new-member fee. How many months of membership did Sherwood include in his credit card payment?

F. 4
G. 6
H. 7
J. 12
K. 14

3. If $y = -6$, what is the value of $\frac{y^2 - 4}{y - 2}$?

A. -8
B. -4
C. 4
D. 9
E. 28

DO YOUR FIGURING HERE.

GO ON TO THE NEXT PAGE.



4. A school offered its students an optional field trip. If 15 or fewer students went on the field trip, the charge for each student would be \$11.50. If more than 15 students chose to go on the field trip, the charge for each student would be \$10.25. 18 students opted to go on the tour, but each pre-paid \$11.50. The students agreed to put the extra amount toward dinner on the trip. How much total money will be put toward dinner on the trip?

F. \$12.50
G. \$14.75
H. \$21.75
J. \$22.50
K. \$33.00

DO YOUR FIGURING HERE.

5. A 16-piece orchestra wants to choose one of its members to speak at performances. They decide that this member CANNOT be one of the 4 soloists in the group. What is the probability that Itzhak, who is NOT a soloist, will be chosen as the speaker?

A. 0
B. $\frac{1}{16}$
C. $\frac{1}{12}$
D. $\frac{1}{4}$
E. $\frac{1}{3}$

6. What is the perimeter, in feet, of a rectangle with width 8 feet and length 17 feet?

F. 25
G. 34
H. 50
J. 136
K. 272

7. Passes to the Renaissance Faire cost \$9 when purchased online and \$12 when purchased in person. The group sponsoring the fair would like to make at least \$4,000 from sales of passes. If 240 passes were sold online, what is the minimum number of tickets that must be sold in person in order for the group to meet its goal?

A. 153
B. 154
C. 290
D. 334
E. 445

GO ON TO THE NEXT PAGE.



8. For what value of q is the equation $\frac{9}{q} = \frac{6}{10}$ true?

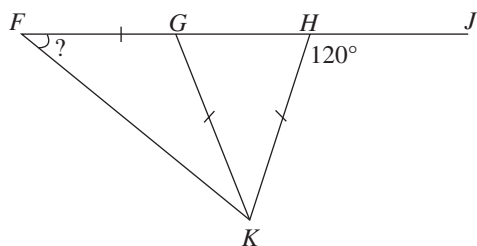
F. 3
G. 5
H. 13
J. 15
K. 19

DO YOUR FIGURING HERE.

9. If $-9(y - 13) = 16$, then $y = ?$

A. $-\frac{133}{9}$
B. $-\frac{29}{9}$
C. $-\frac{16}{9}$
D. $-\frac{1}{3}$
E. $\frac{101}{9}$

10. In the figure below, F , G , H , and J are collinear. \overline{FG} , \overline{GK} , and \overline{HK} are line segments of equivalent length, and the measure of $\angle JHK$ is 120° . What is the degree measure of $\angle GFK$?



F. 30°
G. 45°
H. 60°
J. 120°
K. 150°

11. If $f(x) = 7x^2 - 9x + 4$, then $f(-3) = ?$

A. -32
B. -2
C. 32
D. 40
E. 94

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12. What is the least common multiple of 25, 16, and 40?

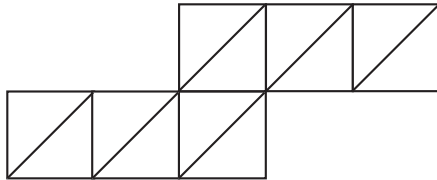
F. 27
 G. 32
 H. 320
 J. 400
 K. 16,000

DO YOUR FIGURING HERE.

13. While working on a problem on his calculator, Tex had meant to multiply a number by 3, but he accidentally divided the number by 3. Which of the following calculations could Tex then do to the result on the screen in order to obtain the result he originally wanted?

A. Multiply by 3
 B. Multiply by 9
 C. Divide by 3
 D. Divide by 9
 E. Add the original number

14. The 8-sided figure below is divided into 12 congruent isosceles right triangles. The total area of the 12 triangles is 96 square centimeters. What is the perimeter, in centimeters, of the figure?



F. 8
 G. $20 + 4\sqrt{2}$
 H. 48
 J. $40 + 8\sqrt{2}$
 K. 56

15. In $\triangle XYZ$, $\angle Y$ is a right angle and $\angle Z$ measures less than 52° . Which of the following phrases best describes the measure of $\angle X$?

A. Greater than 38°
 B. Equal to 38°
 C. Equal to 45°
 D. Equal to 142°
 E. Less than 38°

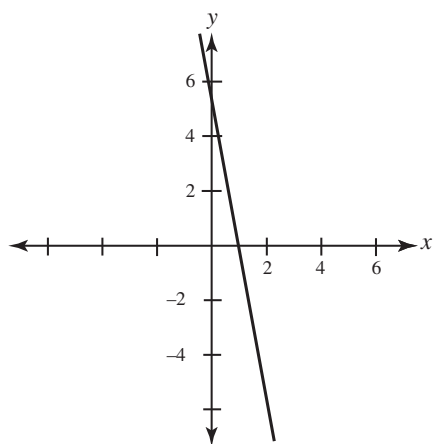
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16. Among the following arithmetic operations, which could the emoticon ☺ represent given that the equation $(8 \text{ ☺ } 2)^3 - (4 \text{ ☺ } 1)^2 = 48$ is true?

I. Subtraction
 II. Multiplication
 III. Division

- F. I only
 G. III only
 H. II and III only
 J. I and III only
 K. I, II, and III
17. Which of the following equations represents the linear relation shown in the standard (x,y) coordinate plane below?



- A. $y = -5x$
 B. $y = -6x$
 C. $y = -2x + 2$
 D. $y = -5x + 6$
 E. $y = -2x + 6$
18. An integer, x , is subtracted from 6. That difference is then multiplied by 3. This product is 15 more than half the original integer. Which of the following equations represents this relationship?

F. $3(6 - x) = \frac{x}{2} + 15$

G. $3(6 - x) + 15 = \frac{x}{2}$

H. $3(6 - x) = 15 - \frac{x}{2}$

J. $x - 6 \times 3 = \frac{15}{2}$

K. $6 + 3 = \frac{x}{2} + 15$

DO YOUR FIGURING HERE.

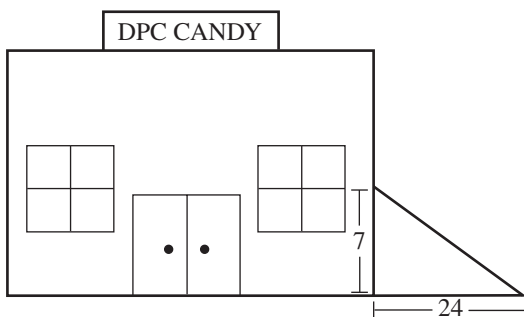
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19. The employees of two factories, X and Y, are comparing their respective production records. Factory X has already produced 18,000 units and can produce 120 units per day. Factory Y has produced only 14,500 units but can produce 155 units per day. If d represents the number of days (that is, days during which each factory is producing its maximum number of units), which of the following equations could be solved to determine the number of days until X's total production equals Y's total production?

- A. $18,000 + 120d = 14,500 + 155d$
- B. $18,000 + 155d = 14,500 + 120d$
- C. $(18,000 + 120)d = (14,500 + 155)d$
- D. $(120 + 155)d = 18,000 - 14,500$
- E. $(120 + 155)d = 18,000 + 14,500$

20. A ramp used to access the side entrance to the DPC Candy Store, which is located 7 meters above the ground, covers 24 meters along the level ground from the edge of the building. How many meters long is the ramp?



- F. 13
 - G. 14
 - H. 17
 - J. 23
 - K. 25
21. The expression $9(y + 3) - 2(4y - 4)$ is equivalent to:
- A. $y - 1$
 - B. $y + 15$
 - C. $y + 18$
 - D. $y + 23$
 - E. $y + 35$
22. If $a + 3b = 27$ and $a - 3b = 9$, then $b = ?$

- F. 3
- G. 9
- H. 14
- J. 18
- K. 36

DO YOUR FIGURING HERE.

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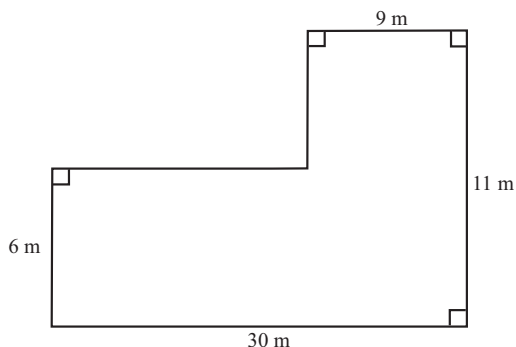


23. When $(2x + 4)^2$ is written in the format $ax^2 + bx + c$, where a , b , and c are integers, what is the value of $a + b - c$?

A. -20
B. 4
C. 20
D. 32
E. 36

DO YOUR FIGURING HERE.

24. What is the area, in square meters, of the figure below?



F. 336
G. 330
H. 225
J. 82
K. 56

25. The table below gives the values of two functions, g and h , for various values of x . One of the functions expresses a relationship that can be expressed by the formula $a + bx$, where a and b are real number coefficients. What is the value of that function for $x = 0$?

x	$g(x)$	$h(x)$
-3	4	
-2	2	3
-1	1	6
0		
1	1	
2		15
3		18

A. 0
B. 0.5
C. 1
D. 2
E. 9

GO ON TO THE NEXT PAGE.



26. What is the slope of the line represented by the equation $10y - 16x = 13$?

F. -16

G. $\frac{13}{10}$

H. $\frac{8}{5}$

J. 10

K. 16

DO YOUR FIGURING HERE.

27. What is the sum of the 2 solutions of the equation $x^2 + 5x - 24 = 0$?

A. -24

B. -8

C. -5

D. 0

E. 5

28. Two similar triangles have perimeters in the ratio 5:6. The sides of the larger triangle measure 12 in, 7 in, and 5 in. What is the perimeter, in inches, of the smaller triangle?

F. 18

G. 20

H. 22

J. 24

K. 32

29. In early November in Winnipeg, Manitoba, the temperatures for each of nine consecutive days were -9°C , 3°C , -7°C , 2°C , 5°C , 1°C , 0°C , -8°C , -7°C . What was the median of the temperatures for these nine days in early November?

A. -7°C

B. 0°C

C. 1.5°C

D. 3°C

E. 5°C

GO ON TO THE NEXT PAGE.



30. When asked the price, in dollars, of his fancy calculator, Albert responded, “If you take the square root of the price, then add $\frac{3}{8}$ the price, the result is 66.” What is the price, in dollars, of Albert’s calculator?

F. 169
G. 144
H. 121
J. 13
K. 12

DO YOUR FIGURING HERE.

31. The kinetic energy, KE , of an object travelling at v velocity can be modeled by the equation $KE = \frac{1}{2}mv^2$, where m is the mass of the object. If an object is moving at a velocity of 9, and it has a kinetic energy of 120, about how great is the object’s mass?
- A. Between 0 and 1
B. Between 1 and 2
C. Between 2 and 3
D. 6
E. 13

32. Let x , y , and z be distinct positive integers. What is the fourth term of the geometric sequence below?

$$2xz, 2x^2yz, 2x^3y^2z, \dots$$

F. $2x^2yz$
G. $2x^4y^3z$
H. $2x^3yz^2$
J. $4x^3y^2z$
K. $4x^4y^3z^2$

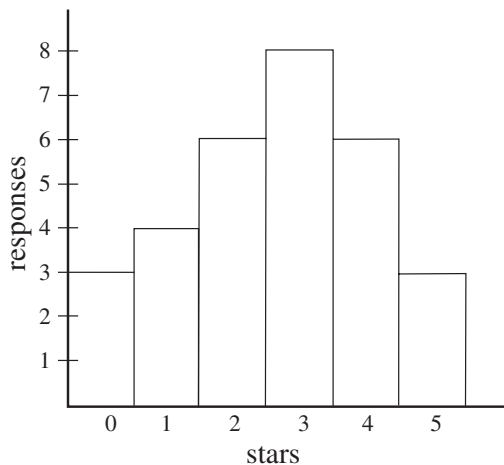
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Use the following information to answer questions 33–35.

DO YOUR FIGURING HERE.

A recent survey of book critics asked 30 critics how many stars out of a possible 5 they gave to a recent novel from a popular author. The 30 critics' responses are summarized by the histogram below.



33. What fraction of the critics gave the book a one-star review?

- A. $\frac{1}{2}$
- B. $\frac{3}{8}$
- C. $\frac{17}{50}$
- D. $\frac{3}{10}$
- E. $\frac{2}{15}$

34. The group that took the survey wants to show the data in a circle graph (pie chart). What should be the measure of the central angle of the portion for one-star reviews?

- F. 15°
- G. 24°
- H. 30°
- J. 48°
- K. 60°

GO ON TO THE NEXT PAGE.



35. To the nearest hundredth, what is the average star review for the 30 reviews?

A. 2.00
 B. 2.33
 C. 2.50
 D. 2.63
 E. 3.00

DO YOUR FIGURING HERE.

36. For all $x > 8$, $\frac{(x^2 + 7x + 12)(x - 2)}{(x^2 + 2x - 8)(x + 3)} = ?$

F. $\frac{-3(x - 2)}{(x + 3)}$

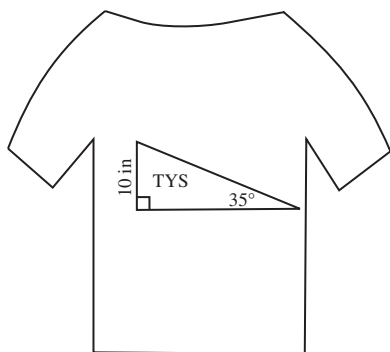
G. $\frac{-2(x - 2)}{(x + 3)}$

H. $\frac{(x - 2)}{(x + 2)}$

J. $\frac{11}{4}$

K. 1

37. A rock band, The Young Sohcahtoans, is trying to design a t-shirt logo. The measurements they have chosen are represented on the figure below. The angle to the right of the logo “TYS” has a degree measure of 35° , and the side of the figure has a measure of 10 in. Which of the following expressions gives the measure, in inches, of the diagonal top side of the figure?



- A. $10 \tan 35^\circ$
 B. $10 \cos 35^\circ$
 C. $10 \sin 35^\circ$
 D. $\frac{10}{\sin 35^\circ}$
 E. $\frac{10}{\cos 35^\circ}$

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38. The endpoints of the diameter of a circle O are A and C . In the standard (x,y) coordinate plane, A is at $(4,3)$ and C is at $(-9,-2)$. What is the y -coordinate of the center of the circle?

F. -5
G. $-\frac{5}{2}$
H. $\frac{1}{2}$
J. 1
K. 2

DO YOUR FIGURING HERE.

39. On a sonar map in the standard (x,y) coordinate plane, the Yellow Submarine and the Sandwich Submarine are located at the points $(-7,4)$ and $(-2,6)$, respectively. Each unit on the map represents an actual distance of 5 nautical miles. Which of the following is closest to the distance, in nautical miles, between the two submarines?

A. 5
B. 19
C. 27
D. 30
E. 67

40. All of the following statements about rational and/or irrational numbers must be true EXCEPT:

F. the sum of any two rational numbers is rational.
G. the product of any two rational numbers is rational.
H. the sum of any two irrational numbers is irrational.
J. the product of a rational and an irrational number may be rational or irrational.
K. the product of any two irrational numbers is irrational.

41. For the imaginary number i , which of the following is a possible value of i^n if n is an integer less than 5?

A. 0
B. -1
C. -2
D. -3
E. -4

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42. The table below gives the values of $f(x)$ for selected values of x in the function $f(x) = (x + 4)^2 - 1$, where x and y are both real numbers.

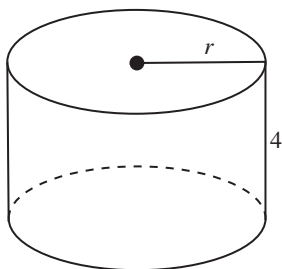
x	$f(x)$
-7	8
-5	0
-3	0
-1	8
0	15
1	24

For the equation above, which of the following values of x gives the greatest value of $f(x)$?

- F. -4
- G. -5
- H. -6
- J. -7
- K. -8

DO YOUR FIGURING HERE.

43. The volume of the right circular cylinder shown below is 64π cubic inches. If its height is 4 in., what is its radius in inches?



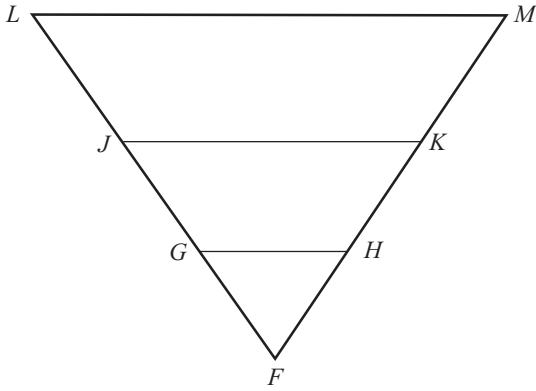
- A. 2
- B. 4
- C. 8
- D. 10
- E. 16

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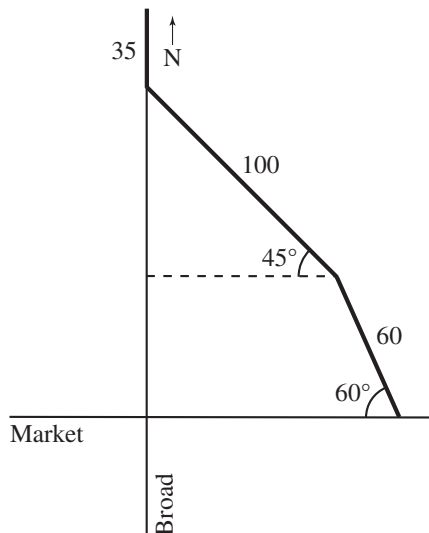


DO YOUR FIGURING HERE.

44. Line segments \overline{GH} , \overline{JK} , and \overline{LM} are parallel and intersect line segments \overline{FL} and \overline{FM} as shown in the figure below. The ratio of the perimeter of $\triangle FJK$ to the perimeter of $\triangle FLM$ is 3:5, and the ratio of \overline{FH} to \overline{FM} is 1:5. What is the ratio of \overline{GJ} to \overline{FG} ?



- F. 1:5
 G. 1:3
 H. 1:2
 J. 2:1
 K. 5:3
45. Avi is trying to draw a map of his most recent bike ride. He chose to place Market Street on the x -axis and Broad Street on the y -axis. He rode 60 m at an angle of 60° relative to Market Street, then rode 100 m at an angle of 45° relative to Market Street, and finally rode 35 m directly north on Broad Street. How many meters north of Market Street did Avi ride?



- A. 35
 B. 115
 C. 195
 D. $50\sqrt{2} + 30\sqrt{3}$
 E. $35 + 50\sqrt{2} + 30\sqrt{3}$

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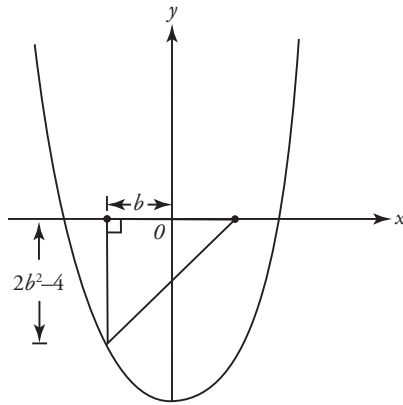


46. In the standard (x,y) coordinate plane, what is the area of the circle $(x - 3)^2 + (y + 2)^2 = 25$?

F. 5π
 G. 10π
 H. 25π
 J. 125π
 K. 225π

DO YOUR FIGURING HERE.

47. In the standard (x,y) coordinate plane below, the base of a right triangle lies along the x -axis and is bisected by the y -axis. The vertex of the angle opposite the base is on the graph of the parabolic function $f(x) = 2x^2 - 4$. Let b represent any value of x such that $-\sqrt{2} < x < 0$. Which of the following is an expression in terms of b for the area, in square coordinate units, of any such right triangle?



- A. $4b^4 - 16b^2 + 16$
 B. $4b^3 - 8b$
 C. $2b^3 - 4b$
 D. $2b^2 + b - 4$
 E. $b^2 - 4b + 4$
48. Which of the following expressions must be an even integer if x is an integer?
- F. $x + 5$
 G. $\frac{x}{4}$
 H. x^4
 J. $4x$
 K. 5^x
49. Which of the following ranges of consecutive integers contains the value of the expression $\log_9(9^{\frac{7}{3}})$?
- A. 0 and 1
 B. 1 and 2
 C. 2 and 3
 D. 5 and 6
 E. 7 and 8

GO ON TO THE NEXT PAGE.



Use the following information to answer questions 50–52.

DO YOUR FIGURING HERE.

The employees at Belinda's Paint Store are having a competition to see who can create the most new accounts over a period from January to June in a certain year. Data is missing because one of the employees began to erase it from the white board, thinking that the competition was over. The numbers in the chart below have been confirmed with the assistant manager's personal records.

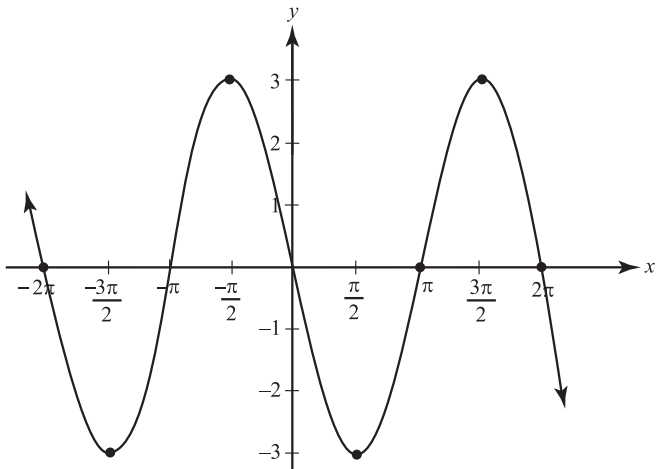
Employee	Month					
	Jan.	Feb.	Mar.	Apr.	May	June
Don	64					
Maura	31	25		27	29	24
Cameron	23	19	22	17	20	22
Belinda	78	92	83	86		90

50. Which of the following is closest to the percent decrease in Cameron's new accounts from January to February?
- F. 4.0%
- G. 17.4%
- H. 19.4%
- J. 20.0%
- K. 21.1%
51. At the beginning of the year, Maura wanted to average 30 new accounts per month for the first four months of the year. How many new accounts did she need to create in March in order to reach this goal?
- A. 25
- B. 27
- C. 29
- D. 31
- E. 37
52. Additional records are uncovered that show that Don's sales decreased 5% each month from January to May because his responsibilities in the store mounted and he could not seek out new accounts as frequently. Which of the following is closest to the number of new accounts Don created in May?
- F. 44
- G. 52
- H. 56
- J. 72
- K. 84

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53. The amplitude of the trigonometric function shown below is defined as the average of the absolute values of the maximum value of $f(x)$ and the minimum value of $f(x)$. The trigonometric function graphed below can be described by the equation $f(x) = a \sin(bx + c)$, where a , b , and c are real numbers. Which of the following values describes the amplitude of this function?



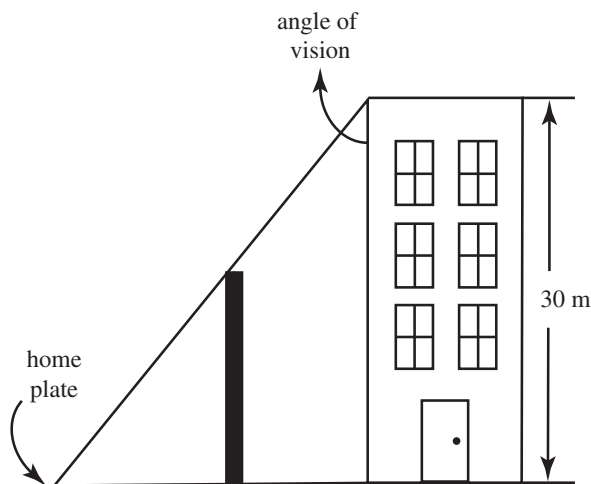
- A. 1
- B. 2
- C. 3
- D. π
- E. 2π

DO YOUR FIGURING HERE.

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54. A group of die-hard baseball fans has purchased a house that gives them a direct view of home plate, although their view of the rest of the field is largely impeded by the outfield wall. The house is 30 meters tall, and their angle of vision from the top of the building to home plate has a tangent of $\frac{7}{6}$. What is the horizontal distance, in meters, from home plate to the closest wall of the fans' house?



- F. 35.0
 G. 32.0
 H. 25.7
 J. 5.0
 K. 4.3
55. Given the equation $|y^2 - 11| - 2 = 0$, which of the following is a solution but NOT a rational number?

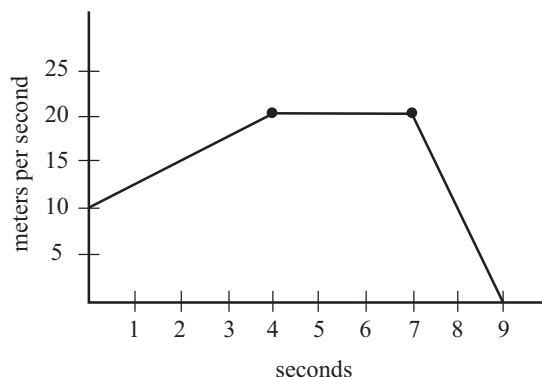
- A. $11\sqrt{13}$
 B. $4\sqrt{13}$
 C. $2\sqrt{13}$
 D. $\sqrt{13}$
 E. 3

DO YOUR FIGURING HERE.

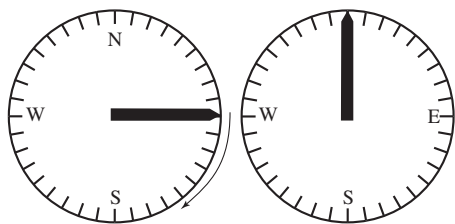
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56. Below is the graph that a specialty automobile manufacturer uses to plot the speed tests done on his new cars. The speed is recorded in units of $\frac{m}{s}$ and is conducted for a period of 9 seconds. A certain order of 3 of the following 6 actions describes the results of the speed test depicted in the graph below. Which order is it?



- I. Constant speed for 1 second
 - II. Constant speed for 3 seconds
 - III. Speed increase for 4 seconds
 - IV. Speed increase for 9 seconds
 - V. Speed decrease for 2 seconds
 - VI. Speed decrease for 7 seconds
- F. IV, II, VI
 - G. III, II, V
 - H. I, III, V
 - J. III, I, VI
 - K. V, I, II
57. As shown in the figure below, a compass has marks for every 10° and “North” and “South” are the endpoints of a line segment. If the point of the needle of this compass travels 42 mm as it moves in a clockwise direction from “East” to “North,” how long is the needle to the nearest tenth of a millimeter?



- A. 6.7
- B. 8.9
- C. 13.4
- D. 14.0
- E. 17.8

DO YOUR FIGURING HERE.

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58. For θ , an angle whose measure is between 270° and 360° ,

$\cos \theta = \frac{5}{13}$. Which of the following equals $\tan \theta$?

F. $-\frac{5}{12}$

G. $-\frac{5}{13}$

H. $\frac{5}{13}$

J. $\frac{5}{12}$

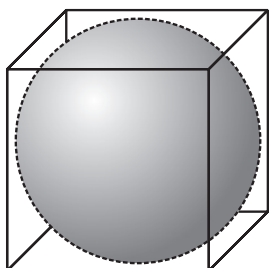
K. $\frac{12}{13}$

DO YOUR FIGURING HERE.

59. Consider all positive integer values a and b such that the product $ab = 8$. For how many values does there exist a positive integer c that satisfies both $2^a = c$ and $c^b = 256$?

- A. Infinitely many
- B. 6
- C. 4
- D. 2
- E. 0

60. A sphere is inscribed in a cube with a diagonal of $3\sqrt{3}$ ft. In feet, what is the diameter of the sphere?



- F. $3\sqrt{2}$
- G. 2
- H. $2\sqrt{2}$
- J. 3
- K. $3\sqrt{3}$

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO A PREVIOUS TEST.

READING TEST

35 Minutes—40 Questions

DIRECTIONS: There are four passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

Passage I

PROSE FICTION: This passage is adapted from the novel *A Well-Worn Jacket* by Antonia Duke (© 2008 by Antonia Duke).

Monique was enjoying this afternoon more than she had anticipated. Often, the tryouts for the spring musical tested the limits of her patience and nerves, with one hopeful girl after the next taking turns strutting onto the tarnished wooden stage, delivering a competent but uninspired version of some Rodgers & Hammerstein number, and then being politely excused by Mrs. Dominguez as the next name on the list was called.

However, this was to be Monique's third straight year in the musical, and the confidence that her seniority afforded her around the more nervous newcomers allowed her to bask in the radiance of her own poise.

She had already sung her audition song an hour ago, commencing the day's ceremonies. This year, Monique used "God Bless the Child," a choice she found to be quite sophisticated since Billie Holiday's version of it was familiar mostly to adults, and even then, mostly to adults of the previous generation. More importantly, it required a reserved performance, which Monique felt showcased her maturity, especially because most of the other auditioners chose songs that would show their enthusiasm, even if it meant their technical mastery would not be on full display.

Normally, the first audition slot was dreaded by most. Mrs. Dominguez would ask if anyone wanted to volunteer to "get it over with," but no one would make a sound. Then, she would call the first name off her list and the room would drop into an uncomfortably solemn silence as the first student walked nervously up to the stage. Monique often imagined during those moments that she was witness to a death-row inmate taking his inexorable march toward a quick curtain.

But not this year. Monique had decided to make a show of her own self-confidence by volunteering to go first. Such a defiantly fearless act, she had figured, would probably instill even more fear into her competition because they would realize that Monique had something they clearly lacked. Mrs. Dominguez had seemed neither surprised nor charmed by Monique's decision to go first. Although she was annoyed by Monique's escalating arrogance, she also acknowledged that Monique was

one of the more talented actors and was probably correct in assuming herself a shoo-in.

At this late stage of the afternoon, Monique felt like a monarch, sitting in the back of the auditorium with her royal court of friends and admirers. They took care to sit far enough away from Mrs. Dominguez that they would not be caught in the act of belittling the other students' auditions.

To Monique, the endless parade of aspirants who sang their hearts out for three minutes each were like jesters performing for her amusement. As Mrs. Dominguez read Esperanza Solito's name off her list, Monique and her entourage prepared themselves for a special treat.

Esperanza was one of the most awkward students at Thornton High. Her caramel-colored face was usually hidden behind thick tortoise shell glasses. Her wavy black hair exploded off her scalp like a snapshot of an atom bomb. She wore clothing that looked like it had spent years in a musty attic. Understanding her debased position on the social totem pole, Esperanza scurried through the high school's hallways with her eyes looking narrowly at the back of the person walking in front of her, trying to disappear within the herd lest she be recognized by any malicious onlookers as easy prey.

Esperanza had been sitting alone in the front row, paying little attention to the other auditions, working on geometry homework until her name was called. Shuffling her feet toward the center of the stage, Esperanza did not look up until she was there, and even then looked only at Mrs. Dominguez.

"Whenever you're ready," Mrs. Dominguez said politely, sensing the potential for this audition to devolve into a painful target of ridicule.

As Esperanza began the opening notes to "The Star Spangled Banner," Monique and her friends looked at each other in total disbelief. Clearly, they thought, Esperanza had no theater pedigree, or she would never stoop to singing such a trite, formulaic song. Standing perfectly still, Esperanza moved methodically through the tune with little flair or emotion. However, the

GO ON TO THE NEXT PAGE.

expectant smiles of mockery were quickly vanishing from the faces of all who listened.

75 Anticipating a tentative, mousy voice that would befit such a quirky presence as Esperanza's, the audience instead heard an unusually smooth, rich tone with full command of the multiple registers that the national anthem's melody requires. At the climactic "rocket's red glare," Esperanza's voice filled the room with
80 a calm resonance that forced one's heart to lift within one's chest as though some reluctant patriotism was determined to find its way out. The final phrase of the song, so often soaked in vibrato by melodramatic singers, was gently performed, with a touch that felt like a mother tucking in her baby to sleep.

85 Although Monique was loath to admit it and Esperanza was reluctant to want it, Esperanza had just set herself apart from the herd.

1. It can reasonably be inferred from the passage that Monique believed the song she chose for her audition:
 - A. would be the most inspiring Rodgers & Hammerstein number she could choose.
 - B. was the most sophisticated song in Billie Holiday's repertoire.
 - C. would likely be more recognizable to Monique's parents than to her friends.
 - D. would allow Monique to more effectively showcase her enthusiasm.
2. The passage initially portrays Monique and her friends as:
 - F. concerned and nervous.
 - G. confused and surprised.
 - H. friendly and inclusive.
 - J. aloof and disparaging.
3. According to the narrator, what did Esperanza do prior to singing "The Star Spangled Banner"?
 - A. Looked only at Mrs. Dominguez
 - B. Walked confidently up to the stage
 - C. Watched the other auditions carefully
 - D. Finished her geometry homework
4. The main purpose of the statement in line 29 is to:
 - F. inform the reader that students' fears of going first were largely a thing of the past.
 - G. present reasons for why this year's audition was the strangest yet.
 - H. suggest that Monique's imagination no longer involved the same imagery.
 - J. offer a contrast created by Monique's choice of audition slot.
5. It can be reasonably inferred from the passage that Esperanza Solito:
 - A. was teased more than anyone else at her school.
 - B. was not sitting near Monique and her friends during the auditions.
 - C. had her audition immediately after Monique's audition.
 - D. had previously explained her stage fright to Mrs. Dominguez.
6. According to the passage, Monique figured that volunteering to perform "God Bless the Child" as the first audition of the day would:
 - F. bolster her confidence in her performance.
 - G. make the other auditioners feel they could not compete with her.
 - H. guarantee her a part in the play.
 - J. impress and charm Mrs. Dominguez.
7. According to the passage, when Esperanza Solito got to the climax of "The Star Spangled Banner," she:
 - A. raised her voice to emphasize the lines.
 - B. demonstrated her patriotism.
 - C. had a sudden bout of nerves.
 - D. could be heard throughout the auditorium.
8. The passage states that Mrs. Dominguez suspected Esperanza's audition could be:
 - F. vulnerable to ridicule.
 - G. one of the most awkward.
 - H. a special treat.
 - J. neither surprising nor charming.
9. Which of the following details is used in the passage to describe how Monique and her friends responded to hearing Esperanza's audition?
 - A. Their decision to sit comfortably behind Mrs. Dominguez
 - B. Their preconceived notions about Esperanza's voice
 - C. Their fading facial expressions of mockery
 - D. Their fondness for patriotic songs
10. The passage most strongly suggests that Esperanza's choice of audition material was:
 - F. good for a mousy voice.
 - G. often partly sung with vibrato.
 - H. an impressive, original choice.
 - J. something Monique's friends had anticipated.

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Passage II

SOCIAL SCIENCE: This passage is adapted from the article “Information Stupor-highway” by Cal Jergenson (© 2005 by Cal Jergenson).

Think about a remote control. Something so simple in function is seemingly capable of invisible magic to most of us. Only those with an engineering and electronics background probably have any real idea of *why* a remote control works. The rest of us just assume it *should*. And the longer a given technology exists, the more we take it for granted.

Consider for a moment a split screen showing modern remote control users versus the first remote control users: the original users would be cautiously aiming the remote directly at the television, reading the names of the buttons to find the right one, and deliberately pressing the button with a force that adds nothing to the effectiveness of the device. The modern users would be reclined on a sofa, pointing the remote any which way, and instinctively feeling for the button they desired, intuiting its size, shape, and position on the remote.

Humans are known for being handy with tools, so it is no surprise that we get so comfortable with our technology. However, as we become increasingly comfortable with how to *use* new technologies, we become less aware of how they *work*. Most people who use modern technology know nothing of its underlying science. They have spent neither mental nor financial resources on its development. And yet, rather than be humbled by its ingenuity, we consumers often become unfairly demanding of what our technology should do for us.

Many of the landmark inventions of the twentieth century followed predictable trajectories: initial versions of each technology (television, video games, computers, portable phones, etc.) succeeded in wowing the general public. Then, these wondrous novelties quickly became commonplace. Soon, the focus of consumer attitudes toward these inventions changed from awed gratitude to discriminating preference.

Televisions needed to be bigger and have a higher resolution. Video games needed to be more realistic. Computers needed to be more powerful yet smaller in size. Cell phones needed to be smaller yet capable of performing other tasks such as taking pictures, accessing the Internet, and even playing movies.

For children of the last twenty years born into this modern life, these technological marvels seem like elements of the periodic table: a given ingredient that is simply part of the universe. Younger generations don’t even try to conceive of life without modern conveniences. They do not appreciate the unprecedented technology that is in their possession; rather, they complain about the ways in which it fails to live up to ideal expectations.

“The videos that my phone can record are too pixelated.”
45 “My digital video recorder at home doesn’t allow me to program it from my computer at work.” “It’s taking too long for this interactive map to display on my portable GPS.” “My robotic vacuum cleaner never manages to get the crumbs out of the cracks between the tiles.”

50 If it sounds as though we’re never satisfied, we aren’t. Of course, our fussy complaints do actually motivate engineers to continually refine their products. After all, at the root of our tool-making instinct is the notion that “there must be a better way.” Thus, the shortcomings of any current version of technology are
55 pinned on the limitations of its designers, and the expectation is that someone, somewhere is working on how to make the existing product even better.

The most dangerous extension of this mindset is its effect on our outlook on solving global climate problems. The firmly
60 substantiated problem of global warming threatens to quickly render the planet Earth inhospitable to most humans.

The solution? If you ask most people, you will hear that the solution resides in creating more efficient versions of our current technologies and devising alternative forms of energy
65 than those that burn fossil fuels.

Blindly confident that the creativity of human problem-solvers can wriggle us out of any dilemma, most people feel guiltless in continuing to live their lives with the assumption that someone else is working on these problems.

70 Unfortunately, having no real scientific perspective on the problems to be solved or the complexity of global weather patterns, most people are unduly optimistic about humanity’s ability to think its way out of this problem. In a culture completely spoiled by the idea that technology can achieve whatever
75 goal it is tasked to perform, the idea that a global climate crisis may be beyond the reach of a clever technological solution is unthinkable.

Hence, the idea that we, as a culture, may need to reexamine our lifestyles and consumer habits is too alien to take seriously.
80 In contemporary society, the leaders who are most able to communicate the state of the world do not dare suggest to the public the unpopular ideas that “times will be rough,” “sacrifices must be made,” or “we may have to take some steps backwards.”

As a result, the human race will continue defiantly with the
85 status quo and, ultimately, blame technology when problems arise. At that point, we’ll all be searching for the “rewind” button on the remote control.

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11. The passage states that original users of remote controls likely did all of the following EXCEPT:
- A. use more strength pressing the button than is necessary.
 - B. aim the remote directly at the television.
 - C. feel instinctively for the desired button.
 - D. read the names of the buttons carefully.
12. In the passage, the author answers all of the following questions EXCEPT:
- F. How do most people think the global climate crisis should be solved?
 - G. What was the most significant invention of the twentieth century?
 - H. What idea underlies humanity's tool-making instinct?
 - J. How do consumer attitudes about new technology change?
13. The descriptions offered by the author in the second paragraph (lines 7–15) are used to illustrate the concept that:
- A. consumer behavior toward new forms of technology changes over time.
 - B. modern humans do not pay enough attention to instructions.
 - C. the first consumers of new technology used new devices with ease and comfort.
 - D. remote controls have become far more effective over the years.
14. The principal tone of the passage can best be described as:
- F. nostalgic.
 - G. critical.
 - H. sympathetic.
 - J. frightened.
15. As it is used in line 79, the word *alien* most nearly means:
- A. extraterrestrial.
 - B. repetitive.
 - C. unusual.
 - D. hilarious.
16. The author uses the statement “these technological marvels seem like elements of the periodic table” (lines 38–39) most nearly to mean that:
- F. children learn technology while they learn chemistry.
 - G. consumers regard many technological inventions as unremarkable.
 - H. space exploration gives us most of our technology.
 - J. consumers complain when modern conveniences break down.
17. The phrase *the status quo* (line 85) most likely refers to:
- A. reexamining the scope and complexity of technology.
 - B. making sacrifices to combat the global climate crisis.
 - C. blaming technology for the problems we encounter.
 - D. our current pattern of lifestyles and consumer habits.
18. One form of consumer behavior the author describes is a discriminating preference for:
- F. less realistic video games.
 - G. needing to understand technology.
 - H. more powerful computers.
 - J. wanting to make sacrifices.
19. Among the following quotations from the passage, the one that best summarizes what the author sees as a potential danger is:
- A. “the shortcomings of any current version of technology” (line 54).
 - B. “devising alternative forms of energy” (line 64).
 - C. “the complexity of global weather patterns” (lines 71–72).
 - D. “our outlook on solving global climate problems” (line 59).
20. The last paragraph differs from the first paragraph in that in the last paragraph the author:
- F. makes a prediction rather than making an observation.
 - G. refutes a scientific theory.
 - H. quotes experts to support his opinions.
 - J. uses the word “we” instead of “I.”

Passage III

HUMANITIES: The following passage is adapted from the article “Conquering Jazz” by Patrick Tyrrell (© 2006 by Patrick Tyrrell).

From the time I started playing instruments, I have been intrigued and slightly mystified by the world of jazz. I’m not talking about adventurous, atonal, confusing jazz that normal music listeners have a hard time following. I’m talking about the lively, accessible, beautiful jazz that came of age in the swinging 1920s and 1930s: the simultaneously hip and regal symphonic swing of Duke Ellington and Count Basie; the carnival of contrapuntal melodies that inexplicably harmonize with each other in New Orleans’ jazz; the buoyant, atmosphere-touching saxophone solos of Charlie Parker and the young John Coltrane.

The one thing I had always heard about jazz but could never accept was that jazz was an improvised form of music. How could this be?

The trademark of beautiful jazz is the complexity of the music. All the instrumentalists are capable of dizzying arrays of notes and rhythms. The soloists find seemingly impossible transitions from one phrase to the next that are so perfect one would think they had spent weeks trying to devise *just* the right route to conduct safe passage. To think they spontaneously craft these ideas seems preposterous.

My first nervous jabs into the world of jazz came during college. I was in a rock band, but my fellow guitarist and bandmate, Victor, also played in a jazz ensemble. At our practices, I would sometimes show off a new chord I had just “invented” only to have him calmly and confidently name it, “Oh, you mean C-sharp diminished?” Often, in between our band’s simplistic rock songs, I would look over and see him playing chord shapes on his guitar I had never seen before. Were we playing the same instrument?

Of course, rock music, as well as most early classical music, operates within a much simpler harmonic world than does jazz. There are 12 tones in Western music: A-flat, A, B-flat, B, C, D-flat, D, E-flat, E, F, G-flat, and G. There are major chords, which sound happy, and minor chords, which sound sad. Essentially, rock music requires only that you learn the major and minor chord for each of the 12 tones. If you do, you can play 99 percent of all the popular radio songs from the 1950s onward.

Jazz uses the same twelve tones as do rock and classical, but it employs a much more robust variety of chords. Major sevenths, augmented fifths, flat ninths, and diminished chords all add to the depth and detail of the music. These often bizarre-sounding chords toss in subtle hints of chaos and imbalance, adding a worldly imperfection to otherwise standard chord values. Jazz starts sounding better the older you get, just as candy starts tasting too sweet and a bit of bitterness makes for a more appealing flavor.

For the most part, Victor’s elliptical personality prevented him from ever giving me straightforward explanations when I asked him to divulge the “magician’s secrets” of jazz. But I did learn that jazz is only *partly* improvised. The musicians aren’t inventing the structure of songs spontaneously, just the specific details and embellishments. A sheet of jazz music doesn’t look like a sheet of classical music. There aren’t notes all over the page dictating the “ideas.” There are just chord names spaced out over time, dictating the “topic of conversation.”

There’s a legendary book in the jazz world known as “The Real Book.” It’s a collection of a few hundred classic songs. Open it up in any room full of jazz musicians, and they could play in synchrony for a week. For years, I wanted my own copy, but I had always been too afraid to buy it, afraid that I wouldn’t know how to use the book once I had it. Then, at age 30, more than a decade since Victor and I had gone our separate ways, I bought myself a copy. I resolved to learn how to play all the chords on guitar and piano. For the next few months, I quietly plucked away at these strange, new combinations. F-sharp minor-7 flat-5? Each chord was a cryptic message I had to decode and then understand. It felt like being dropped off alone in a country where I didn’t speak the language.

But I made progress. Chords that initially took me twenty seconds to figure out started to take only a few. My left hand was becoming comfortable in its role of supplying my right hand with a steady bass line. Meanwhile, to my amazement, my right hand began to improvise melodies that sounded undeniably *jazzy*.

It seemed like the hard work of figuring out the exotic jazz chords had sent new melodic understanding straight to my hand, bypassing my brain entirely. I felt like a witness to performances by detached hands; I couldn’t believe that I was the one creating these sounds. I’m sure this feeling will not last, but for now I’m enjoying the rare and miraculous feeling of improvising music that I still consider beyond my abilities.

21. Which chord, if any, does the author eventually conclude is the most confusing jazz chord to play?
- A. The passage does not indicate any such chord.
 - B. C-sharp diminished
 - C. Major sevenths
 - D. F-sharp minor-7 flat-5

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22. As it is used in line 47, “magician’s secrets” most nearly means:
- F. information on how to play jazz.
 - G. forbidden bits of knowledge.
 - H. instances of harmless trickery.
 - J. the true nature of a private person.
23. As portrayed by the author, Victor responds to the author’s *invented* chord with what is best described as:
- A. amazement.
 - B. jealousy.
 - C. confusion.
 - D. nonchalance.
24. The author states that “The Real Book” was something he explored for a few:
- F. years.
 - G. months.
 - H. weeks.
 - J. days.
25. The details in lines 40–44 primarily serve to suggest the:
- A. aspects of jazz’s complexity that more mature listeners enjoy.
 - B. lack of depth and detail found in rock and classical music.
 - C. confusion and awkwardness of standard jazz chord values.
 - D. unpleasantly bitter taste of candy that develops with age.
26. In the context of the passage, the author’s statement in lines 68–71 most nearly means that:
- F. he was so overworked that his hands could still move, but his thoughts were turned off.
 - G. he had accidentally trained his hands to resist being controlled by his brain.
 - H. it was easier to decode the exotic jazz chords by pointing at them with his hands.
 - J. his hand was capable of playing music that his mind was incapable of fully comprehending.
27. The author implies that F-sharp minor-7 flat-5 is an example of a chord that he:
- A. had little trouble decoding now that he had “The Real Book.”
 - B. had previously only seen during his travels abroad.
 - C. knew how to play on guitar but not on a piano.
 - D. initially found confusing and struggled to understand.
28. The passage supports which one of the following conclusions about Victor?
- F. He played music with the author until the author turned 30 years old.
 - G. He gave his copy of “The Real Book” to the author as a gift.
 - H. He was at one time a member of multiple musical groups.
 - J. He invented a chord and named it C-sharp diminished.
29. The passage is best described as being told from the point of view of someone who is:
- A. reviewing the chain of events that led to his career in jazz.
 - B. discussing reasons why jazz is less complicated than it seems.
 - C. relating his impressions of jazz music and his attempts to play it.
 - D. highlighting an important friendship that he had in college.
30. Assessing his early and later experiences with “The Real Book,” the author most strongly implies that it was:
- F. pleasantly strange to begin with but annoyingly familiar by the end.
 - G. initially difficult to decipher, but ultimately manageable following diligent practice.
 - H. almost impossible to understand because its pages didn’t look like sheets of classical music.
 - J. very useful as a learning tool, but not useful for more profound study.

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Passage IV

NATURAL SCIENCE: This passage is adapted from the article “Fair-Weather Warning” by Julia Mittlebury (© 2007 by Julia Mittlebury).

Could the sun be causing epidemics? Take cholera, for example, an often fatal disease caused by the bacterium *Vibrio cholerae* (*V. cholerae*). Every so often, coastal areas suffer massive outbreaks of cholera due to infected food or water. Where do these outbreaks come from?

The bacterium that causes cholera is found in areas that contain the copepod, a certain type of crustacean. The copepod depends on zooplankton for nourishment, and these zooplankton in turn depend on phytoplankton for their nourishment. Phytoplankton use photosynthesis to feed on sunlight. Although one might need to go to the bottom of the food chain, the evidence shows that an increase in sunlight might mean an increase in the potential for cholera.

Interested in this correlation, Rita Calwell and her fellow researchers at the University of Maryland are studying ways to use satellite measurements of sea temperatures, sea height, and chlorophyll concentrations in order to predict when conditions favoring a cholera outbreak are more likely. As sea temperatures rise, photosynthetic organisms such as phytoplankton become more abundant. As sea levels rise, the phytoplankton, zooplankton, copepods, and, by extension, the cholera bacterium are all brought closer to the shore. This increases the likelihood of food and water contamination.

By monitoring the cholera food chain in reverse, Calwell and her colleagues believe they can predict the emergence of cholera 4 to 6 weeks in advance. Calwell’s model predicted the rate of infection during one recent cholera outbreak in Bangladesh with 95 percent accuracy. Unfortunately, because this field of study is so new and its insights are so speculative, local public health officials have not yet begun to base any preventative measures on these satellite-based forecasts.

Just up the road from Calwell and the University of Maryland, Kenneth Linthicum is leading similar efforts at the NASA Goddard Space Flight Centre in Greenbelt, Maryland. He has designed a model to analyze the spread of Rift Valley fever, a mosquito-spread virus that killed about 100,000 animals and 90,000 people back in December 1997.

Scientists observed that prior to the outbreak, the equatorial region of the Indian Ocean saw a half-degree increase in surface temperature. Although half of a degree sounds like only a slight difference, the temperature of an ocean does not change easily. Warmer ocean water in this region corresponds with strong and prolonged rains, increased cloud cover, and warmer air over equatorial parts of Africa. These characteristics favor the proliferation of mosquitoes and help keep them alive long enough for the virus to become easily transmittable.

In September 2007, Linthicum and his team became alerted to similar environmental changes. Over the next few months, they warned local health officials in Kenya, Somalia, and Tanzania that conditions were ripe for a mosquito-based outbreak. As a result, only 300 lives were lost, an almost miraculous improvement from the devastation of the 1997 outbreak. While it is impossible to know if this outbreak would have been as far-reaching as that of 1997, it seems likely that the advance warning succeeded in saving thousands, if not tens of thousands, of lives.

Similarly, a study by David Rogers at Oxford University has helped to predict outbreaks of sleeping sickness, a parasitic disease caused by West African tsetse flies. Here, Rogers first calibrated regional levels of photosynthesis to the size of a vein in the wings of the flies. The vein size is a good measure of how numerous and robust the tsetse fly population is. Today, by reading the photosynthetic levels from satellite data, even researchers outside of West Africa can predict potential epidemics in the region.

This type of research is encouraging to many in the disease prevention field, because traditional methods involve slow, costly research. The newfound ability to cull massive amounts of meteorological data from satellites and to run that data through computer models has been much more efficient.

The goal of these models is to study the relationships between disease data and climate data. However, to do so requires decades’, if not centuries’, worth of high quality data to identify correlating factors with accuracy. Currently, the climatic data is much more reliable than the disease data. Nevertheless, excitement about the potential usefulness of satellite-based predictions is persuading health agencies to compile and integrate their disease data more efficiently to give easier access to those trying to discover climate-disease links.

It may still take a good deal of time and energy before this technology is ready for practical application. Critics claim that the number of variables underlying the spread of disease are too numerous and varied for a climate-based approach ever to be reliable. Fluctuations in the immunity of local populations, human and animal migrations, and the resistance to drugs used to commonly treat certain diseases could confuse climate-based models. Advocates respond, though, that these non-climatic factors can similarly be incorporated into their research as long as the relevant data is collected, and the resulting models will have even better accuracy.

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31. According to Calwell, scientists may be able to predict cholera outbreaks more than a month in advance by:
- A. noticing increased activity in a known food chain.
 - B. using accurate climatic models derived from weather in Bangladesh.
 - C. measuring the decline of zooplankton with falling sea temperatures.
 - D. finding connections between chlorophyll levels and diseased marine life.
32. According to the passage, levels of sunlight can influence cholera because:
- F. phytoplankton feed on sunlight and contaminate the water.
 - G. the *V. cholerae* bacterium increases its photosynthetic rate.
 - H. sunlight promotes the growth of organisms upon which copepods depend.
 - J. many epidemics are caused by direct, prolonged exposure to sunlight.
33. According to the passage, the use of satellite data has aided the attempts of Oxford University researchers to predict outbreaks of sleeping sickness by providing information about:
- A. the number of West African parasites.
 - B. which areas globally have the most photosynthesis.
 - C. the health and number of tsetse flies.
 - D. which flies have the biggest veins.
34. The passage states that Linthicum is conducting similar efforts to Calwell's in that Linthicum:
- F. studies the climatic triggers of cholera.
 - G. works at the University of Maryland.
 - H. managed to save thousands of lives in 2007.
 - J. uses satellite data to build predictive models.
35. According to the passage, the use of satellite data to predict potential epidemics is encouraging because:
- A. computer number-crunching is quicker and less expensive than traditional research methods.
 - B. it allows scientists to control the photosynthetic levels in West Africa.
 - C. satellites do not make the same mathematical errors that human forecasters often do.
 - D. there is already a large supply of long-term disease data available from satellites.
36. As it is used in line 44, the word *favor* most nearly means:
- F. errand.
 - G. task.
 - H. promote.
 - J. request.
37. It can reasonably be inferred that the phrase *similar environmental changes* (line 48) refers to:
- A. the beginning of the rainy season in Kenya.
 - B. the amount of bacteria circulating in the jet stream.
 - C. the proliferation of mosquitoes throughout central Africa.
 - D. warmer ocean water influencing rain and cloud cover.
38. The passage states that climatic satellite data has helped to do all of the following EXCEPT:
- F. measure sea height.
 - G. predict tsetse fly populations.
 - H. forecast disease outbreaks.
 - J. raise the ocean temperature.
39. The phrase *confuse climate-based models* (line 85–86) refers directly to the fact that:
- A. current models do not account for non-climate related factors.
 - B. drug resistance sometimes results in disorientation.
 - C. epidemics sometimes vanish more quickly than they arise.
 - D. researchers are not used to non-climate data.
40. It can reasonably be inferred from the passage that the information about the use of satellite-based data is presented primarily to:
- F. demonstrate the various kinds of data that must be collected.
 - G. analyze the data's potential use in disease-prevention.
 - H. illustrate how few scientists do on-the-ground research.
 - J. show how West African tsetse fly populations have been predicted.

END OF TEST 3

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.
DO NOT RETURN TO A PREVIOUS TEST.



SCIENCE TEST

35 Minutes—40 Questions

Directions: There are seven passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

Two ways to measure the quality of soil are *bulk density* and the *soil organic matter test*, SOM (a measure of the active organic content). High quality soil provides structure to plants and moves water and nutrients, so plants grow in larger quantities, leading to higher crop yields at harvest.

Bulk density is measured as the dry weight of a sample of soil divided by the volume of the sample. A bulk density measure above 1.33 g/cm^3 negatively affects soil quality. Figure 1 shows the bulk density levels for 5 different years at Fields A and B.

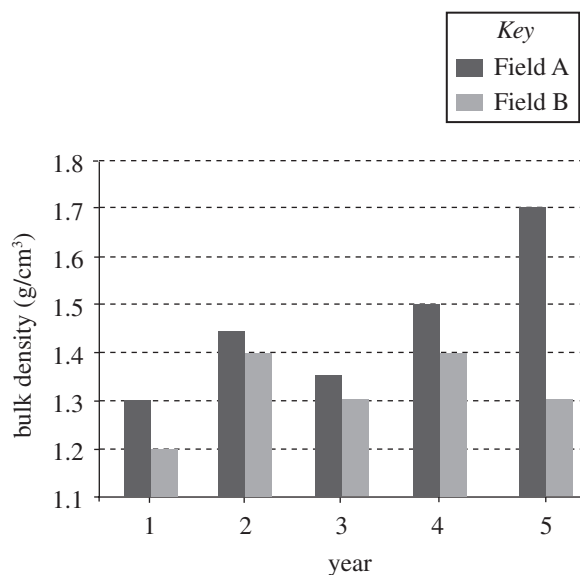


Figure 1

Table 1 shows how soil quality varies with SOM. Table 2 shows the average SOM at the end of each of the 5 years.

Table 1	
SOM	Soil quality rating
<0.25	poor
0.25 to 0.50	fair
0.51 to 0.75	good
>0.75	excellent

Table 2	
Field	Average SOM
A	0.89
B	0.28

Figure 2 shows the total crop yield at each field at the end of the 5 years.

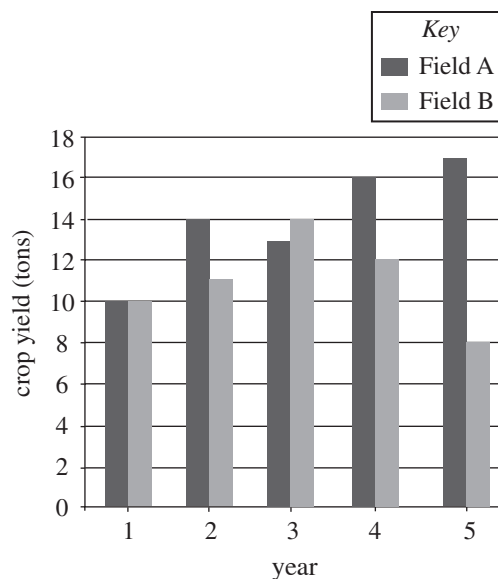


Figure 2

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1. Which set of data best supports the claim that Field A has *lower* soil quality than Field B?
- A. Figure 1
B. Figure 2
C. Table 1
D. Table 2
2. If 8 tons or fewer in crop yields were considered a failed harvest, in which year and in which field would there have been a failed harvest?
- F. Field A in Year 1
G. Field A in Year 3
H. Field B in Year 4
J. Field B in Year 5
3. Suppose a new crop rotation for Field B included legumes and other deep-rooted and high-residue crops. The SOM of this field will most likely change in which of the following ways? The SOM will:
- A. decrease, because soil quality is likely to increase.
B. decrease, because soil quality is likely to decrease.
C. increase, because soil quality is likely to increase.
D. increase, because soil quality is likely to decrease.
4. Based on Figures 1 and 2, consider the average bulk density and the average crop yields for Fields A and B over the study period. Which site had the lower average crop yield, and which site had the higher average bulk density?
- | | <u>Lower crop yield</u> | <u>Higher bulk density</u> |
|----|-------------------------|----------------------------|
| F. | Field A | Field A |
| G. | Field B | Field B |
| H. | Field A | Field B |
| J. | Field B | Field A |
5. As soil quality improves, the number of earthworms increases. Students hypothesized that more earthworms would be found in Field B. Are the data presented in Table 2 consistent with this hypothesis?
- A. Yes; based on SOM, Field B had a soil quality rating of fair and Field A had a soil quality rating of poor.
B. Yes; based on SOM, Field B had a soil quality rating of excellent and Field A had a soil quality rating of fair.
C. No; based on SOM, Field B had a soil quality rating of poor and Field A had a soil quality rating of fair.
D. No; based on SOM, Field B had a soil quality rating of fair and Field A had a soil quality rating of excellent.

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Passage II

Ferric oxide (Fe_2O_3) is more commonly known as rust. This is produced in a reaction between iron, a common metal, and water, H_2O .



Table 1 shows the amount of Fe_2O_3 produced over time from 15 g Fe submerged in different liquids: 100 mL distilled water, a salt solution made from dissolving 20 g of salt in 100 mL of distilled water, and a sugar solution made from dissolving 20 g of sugar in 100 mL of distilled water.

Table 1				
Solution	g Fe_2O_3 produced			
	Day 2	Day 4	Day 6	Day 8
Distilled water	0.34	0.40	0.59	0.72
Salt solution	0.56	0.81	1.23	1.84
Sugar solution	0.00	0.05	0.11	0.19

The distilled water trial was repeated four times, but for each trial, a total volume of 100 mL of water was buffered to different pH levels.

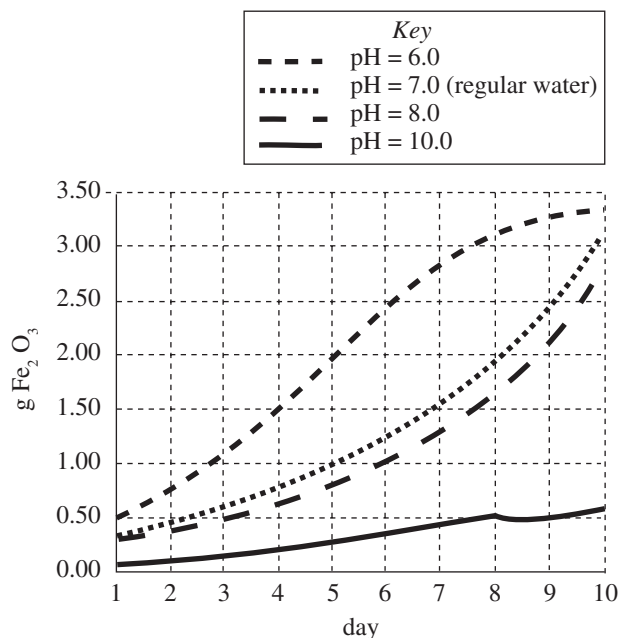


Figure 1

6. Based on Table 1, if the amount of Fe_2O_3 produced on Day 9 had been measured for the salt solution, it would most likely have been:

F. less than 0.56 g.
 G. between 0.59 g and 0.72 g.
 H. between 1.23 g and 1.84 g.
 J. greater than 1.84 g.

7. In the experiments shown in Table 1 and Figure 1, by measuring the rate at which Fe_2O_3 was formed every day, the experimenters could also measure the rate at which:

A. H_2O was produced.
 B. H_2 was produced.
 C. Fe was produced.
 D. FeO was produced.

8. Consider the amount of Fe_2O_3 produced by the salt solution on Day 2. Based on Table 1 and Figure 1, the water buffered to pH = 10.0 produced approximately the same amount of Fe_2O_3 on which of the following days?

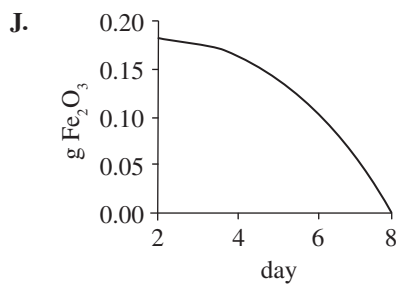
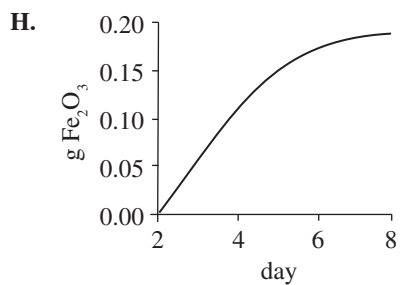
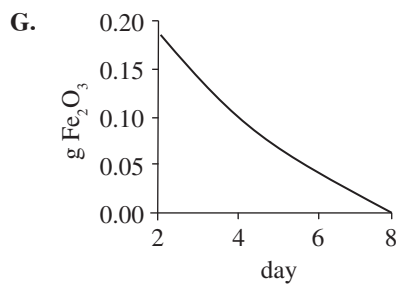
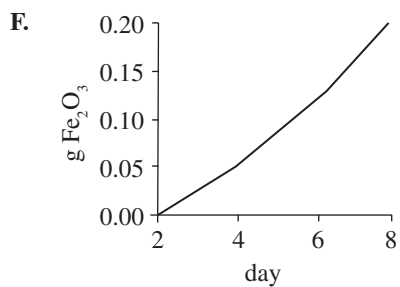
F. Day 1
 G. Day 3
 H. Day 6
 J. Day 10

9. According to Table 1, what was the amount of Fe_2O_3 produced by the sugar solution from the time the amount was measured on Day 6 until the time the amount was measured on Day 8?
- A. 0.08 g
 B. 0.11 g
 C. 0.19 g
 D. 0.30 g

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10. Based on Table 1, which graph best shows how the amount of Fe_2O_3 produced by the sugar solution changes over time?



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Passage III

Some physics students conducted experiments to study forces and springs. They used several identical springs attached to the bottom of a level platform, shown below in Figure 1.

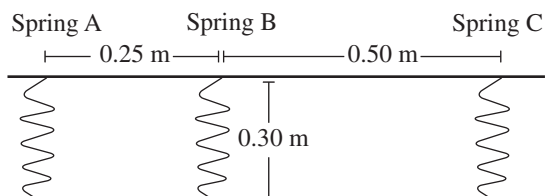


Figure 1

The length of each spring was 0.30 m when there were no weights attached. The springs had identical spring constants. When weights were attached, the length of the springs increased as the force of the weights stretched the springs downward. The length the springs stretched was proportional to the force of the weight.

Experiment 1

The students attached different weights to two springs at once. When the springs stopped oscillating and came to a rest, the students measured their length. In Trial 1, a 10.0 N weight was attached to Spring A and Spring B, which were attached 0.25 m apart on the board. In Trial 2, a 15.0 N weight was attached to Spring A and Spring B. In Trial 3, a 20.0 N weight was attached to Spring A and Spring B. The effects of the weights on Springs A and B for the three trials are shown below in Figure 2.

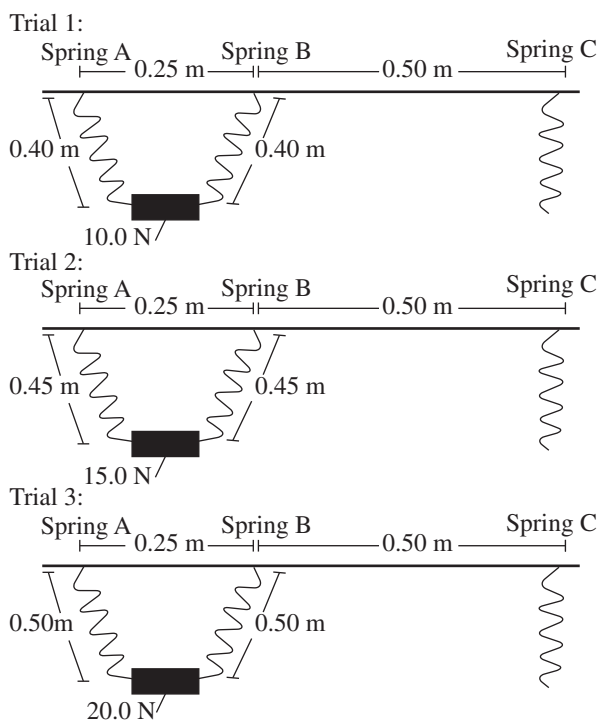


Figure 2

Experiment 2

The students attached a 0.25 m board with a high friction surface to Spring B and Spring C (see Figure 3). The students then placed a 5.0 N weight at different locations along the board. Because of the high friction surface, the weights stayed in place when the board was at an angle.

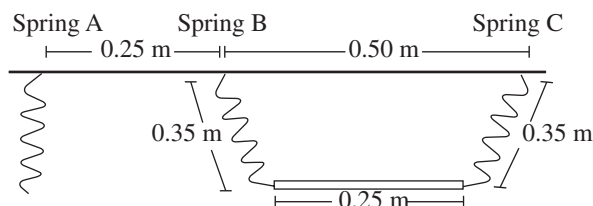
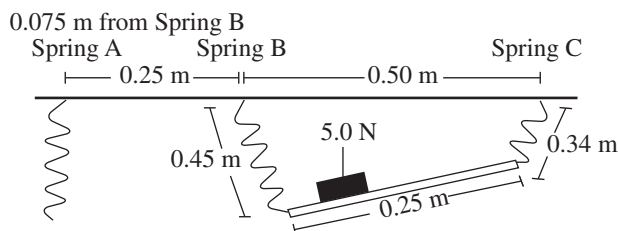


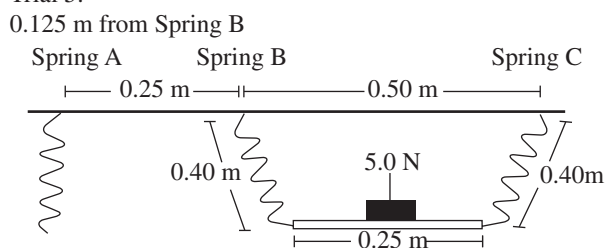
Figure 3

In each of these 3 trials, a 5.0 N weight was placed at various distances along the board from the attachment with Spring B (see Figure 4). In Trial 4, the weight was placed so its center was 0.075 m along the board from the attachment with Spring B. In Trial 5, the weight was placed so its center was 0.125 m along the board from the attachment with Spring B. In Trial 6, the weight was placed so its center was 0.200 m along the board from the attachment with Spring B. The effects of the weight position on the lengths of Springs B and C for the 3 trials are also shown in Figure 4.

Trial 4:



Trial 5:



Trial 6:

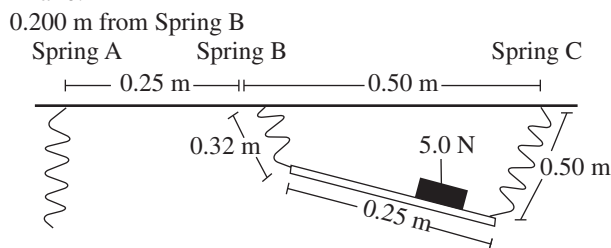
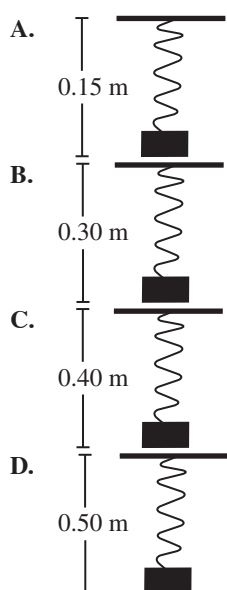


Figure 4

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11. In a new study, suppose the students had placed a 10.0 N weight on Spring A only. Which of the following drawings most likely represents the results of this experiment?



12. In Experiment 2, as the distance between the 5.0 N weight and the attachment of the board to Spring B increased, the force exerted on Spring B:
- F. increased only.
 - G. decreased only.
 - H. increased, then decreased.
 - J. decreased, then increased.
13. Which of the following statements is most likely the reason that the students used identical springs in Trials 1–3?
- A. To ensure that the springs stretched similarly when a weight was attached.
 - B. To ensure that the springs did not share the weight evenly.
 - C. To compensate for the effects of oscillation on the results of the experiment.
 - D. To compensate for the weight of the board exerted on each of the springs.
14. Based on the results of Trials 1 and 5, the weight of the board used in Experiment 2 was:
- F. 0 N.
 - G. 2.5 N.
 - H. 5.0 N.
 - J. 10.0 N.
15. In which of the following trials in Experiment 2, if any, was the force exerted by the weight and the board equally distributed between Springs B and C?
- A. Trial 4
 - B. Trial 5
 - C. Trial 6
 - D. None of the trials
16. Assume that when a spring is stretched from its normal length, it stores the energy to return to its normal state as potential energy. Assume also that the greater the force of the weight stretching the spring, the more the spring will stretch. Was the potential energy stored by Spring C higher in Trial 5 or Trial 6?
- F. In Trial 5, because the force of the weight on Spring C was greater in Trial 5.
 - G. In Trial 5, because the force of the weight on Spring C was less in Trial 5.
 - H. In Trial 6, because the force of the weight on Spring C was greater in Trial 6.
 - J. In Trial 6, because the force of the weight on Spring C was less in Trial 6.

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Passage IV

Sodium chloride, or salt, is used to de-ice roads and sidewalks during the winter because it lowers the freezing point of water. Water with sodium chloride freezes at a lower temperature than water alone, so putting sodium chloride on icy sidewalks and roads can cause the ice to melt. Sodium chloride is highly effective as a de-icer and is given a *de-icer proof* of 100. Distilled water is ineffective as a de-icer and is given a de-icer proof of 0.

Different proportions of sodium chloride and distilled water were combined to create mixtures with de-icer proofs between 0 and 100.

De-icer proof	Volume of distilled water	Volume of sodium chloride
100	0 ml	50 ml
80	10 ml	40 ml
60	20 ml	30 ml
40	30 ml	20 ml
20	40 ml	10 ml
0	50 ml	0 ml

Experiment 1

A 125-g cube of ice, frozen from distilled water, was submerged in 500-mL of each de-icing mixture listed in Table 1. After 300 seconds, the portion of the cube that had not been melted was removed and weighed. The de-icing rate was calculated by determining the weight of ice melted per second. By doing this, it was possible to determine de-icer proof for a solution based on the rate at which ice was melted.

Experiment 2

The addition of magnesium chloride to a de-icer changes its de-icer proof. Different amounts of magnesium chloride were added to 500-mL samples of sodium chloride. Each de-icing mixture was tested under the same conditions as Experiment 1 and the measured de-icing rate was used to calculate the de-icer proof. The results are shown in Figure 1.

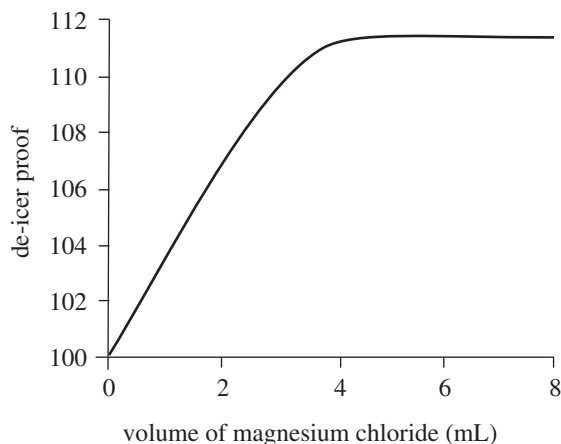


Figure 1

Experiment 3

The *temperature rating* (TR) is the minimum de-icer proof of a de-icing solution for a de-icer to have any effect on ice. 125-g cubes of ice were submerged in 500-mL samples of De-icers A and B and the samples were then placed in freezers at different temperatures. Table 2 shows the de-icer proof determined for each de-icer at each freezer temperature and the known TR for that temperature.

Freezer temperature	TR	Proof of:	
		De-icer A	De-icer B
-10°C	24.1	90.3	70.1
-25°C	36.9	78.9	64.9
-50°C	49.7	68.8	59.7
-75°C	52.3	56.6	51.7

17. Suppose a trial had been performed in Experiment 3 with a freezer temperature of -30°C . At this temperature, which of the following sets of proofs would most likely have been determined for De-icer A and De-icer B?

	De-icer A	De-icer B
A.	68.8	59.7
B.	70.1	70.5
C.	75.5	61.8
D.	78.9	64.9

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18. Based on Table 1, if 1 mL distilled water were added to 4 mL sodium chloride, the proof of this mixture would be:
- F. 4.
G. 8.
H. 40.
J. 80.
19. Based on Experiment 3, as temperature decreases, the minimum proof for a de-icer to be effective:
- A. increases only.
B. decreases only.
C. increases, then decreases.
D. decreases, then increases.
20. Which of the following expressions is equal to the proof for each de-icer mixture listed in Table 1?
- F. $\frac{\text{volume of sodium chloride}}{\text{volume of water}} \times 100$
G. $\frac{\text{volume of water}}{\text{volume of sodium chloride}} \times 100$
H. $\frac{\text{volume of sodium chloride}}{(\text{volume of water} + \text{volume of sodium chloride})} \cdot 100$
J. $\frac{\text{volume of water}}{(\text{volume of water} + \text{volume of sodium chloride})} \cdot 100$
21. Based on Table 1 and Experiment 2, if 6 mL magnesium chloride were added to a mixture of 10 mL distilled water and 40 mL sodium chloride, the proof of the resulting de-icer would most likely be:
- A. less than 60.
B. between 60 and 80.
C. between 80 and 112.
D. greater than 112.
22. Which of the 2 de-icers from Experiment 3 would be better to use to melt ice if the temperature were between -10°C and -75°C ?
- F. De-icer A, because its proof was lower than the TR at each temperature tested.
G. De-icer A, because its proof was higher than the TR at each temperature tested.
H. De-icer B, because its proof was lower than the TR at each temperature tested.
J. De-icer B, because its proof was higher than the TR at each temperature tested.

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Passage V

Comets originate from regions of our solar system that are very far from the sun. The comets are formed from debris thrown from objects in the solar system: they have a nucleus of ice surrounded by dust and frozen gases. When comets are pulled into the earth's atmosphere by gravitational forces and become visible, they are called *meteors*. Meteors become visible about 50 to 85 km above the surface of Earth as air friction causes them to glow. Most meteors vaporize completely before they come within 50 km of the surface of Earth.

The Small Comet debate centers on whether dark spots and streaks seen in images of the Earth's atmosphere are due to random technological noise or a constant rain of comets composed of ice. Recently, images were taken by two instruments, UVA and VIS, which are located in a satellite orbiting in Earth's magnetosphere. UVA and VIS take pictures of the aurora borealis phenomenon, which occurs in the magnetosphere. The UVA and VIS technologies provide images of energy, which cannot be seen by the human eye.

The pictures taken by VIS and UVA both show dark spots and streaks. Scientists debate whether these spots and streaks are due to a natural incident, such as small comets entering the atmosphere, or random technological noise. The layers of Earth's atmosphere are shown in Figure 1.

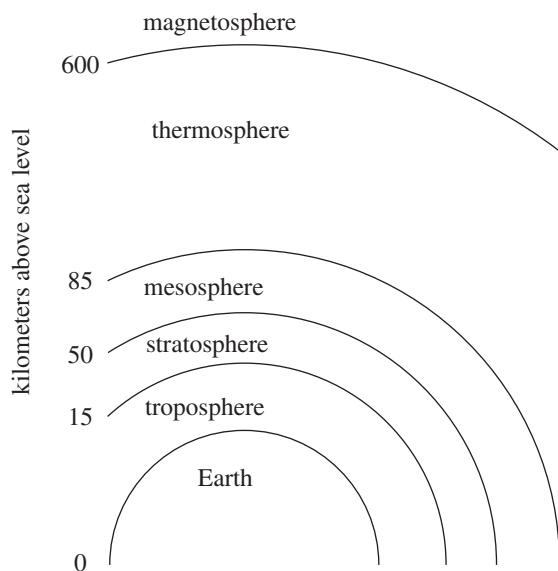


Figure 1

Two scientists debate whether there is a constant rain of comets burning up in Earth's magnetosphere.

Scientist 1

Small comets are pulled into Earth's atmosphere by gravitational effects and burn up in the magnetosphere. They are about 20 to 30 feet in diameter and burn up in the magnetosphere because they are much smaller than the comets that become meteors. Comets with larger radii will burn up in portions of the atmosphere much closer to Earth. About 30,000 small comets enter the Earth's magnetosphere every day. The dark spots and streaks on UVA and VIS images occur when the small comets begin to boil in the magnetosphere, releasing krypton and argon and creating gaseous H_2O , which interacts with hydroxyl, OH^- , radicals. Images taken by these instruments at different points in time show the same frequency of dark spots and streaks and give conclusive evidence in favor of the Small Comet theory. If the spots and streaks were due to random technological noise, then the frequency of their appearance would fluctuate.

Scientist 2

The dark spots and streaks in the UVA and VIS images are due to technological noise, not small comets. If the Small Comet Theory were true, and 20 small comets bombarded Earth's atmosphere per minute, there would be a visible bright object at least twice every five minutes. This is because, as objects enter the Earth's mesosphere, they burn up, creating large clouds of ice particles. As the ice particles vaporize, they have a brightness in the sky approximately equal to that of Venus. Because comets rarely enter Earth's atmosphere, such bright flashes are rare occurrences, far less than two times every five minutes, so the Small Comet theory cannot be correct. Further, since comets originate from regions of space beyond the orbit of the farthest planet, they contain argon and krypton. If the Small Comet theory were true and Earth were bombarded by 30,000 comets per day, there would be 500 times as much krypton in the atmosphere as there actually is.

23. According to Scientist 2, which of the following planets in our solar system is most likely the closest to the region of space where comets originate?
- A. Jupiter
 - B. Venus
 - C. Neptune
 - D. Saturn

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24. Based on Scientist 1's viewpoint, a comet that burns up in the thermosphere would have a diameter of:
- F. 5–10 ft.
 - G. 10–20 ft.
 - H. 20–30 ft.
 - J. greater than 30 ft.
25. Which of the following generalizations about small comets is most consistent with Scientist 1's viewpoint?
- A. No small comet ever becomes a meteor.
 - B. Some small comets become meteors.
 - C. Small comets become meteors twice every five minutes.
 - D. All small comets become meteors.
26. During the *Perseids*, an annual meteor shower, more than 1 object burning up in the atmosphere is visible per minute. According to the information provided, Scientist 2 would classify the *Perseids* as:
- F. typical comet frequency in the magnetosphere.
 - G. unusual comet frequency in the magnetosphere.
 - H. typical meteor frequency in the mesosphere.
 - J. unusual meteor frequency in the mesosphere.
27. Given the information about Earth's atmosphere and Scientist 1's viewpoint, which of the following altitudes would most likely NOT be an altitude at which small comets burn up?
- A. 750 km
 - B. 700 km
 - C. 650 km
 - D. 550 km
28. Suppose a study of the dark holes and streaks in the UVA and VIS images revealed krypton levels in the atmosphere 500 times greater than normal levels. How would the findings of this study most likely affect the scientists' viewpoints, if at all?
- F. It would strengthen Scientist 1's viewpoint only.
 - G. It would strengthen Scientist 2's viewpoint only.
 - H. It would weaken both Scientists' viewpoints.
 - J. It would have no effect on either Scientist's viewpoint.
29. Scientist 1 would most likely suggest enhanced imaging technology that can take pictures of objects in the atmosphere be used to look at what region of the atmosphere to search for small comets?
- A. The region between 15 km above sea level and 50 km above sea level.
 - B. The region between 50 km above sea level and 85 km above sea level.
 - C. The region between 85 km above sea level and 600 km above sea level.
 - D. The region between above 600 km above sea level.

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Passage VI

A cotton fiber is composed of one very long cell with two cell walls. During a 2-week period of cell life called elongation, cotton fibers grow 3 to 6 cm. The level of hydrogen peroxide in cotton fiber cells during elongation is very high. Scientists wanted to study whether the level of hydrogen peroxide affected the length of the cotton fiber.

The amount of hydrogen peroxide is controlled by an enzyme called *superoxide dismutase* (SOD). This enzyme turns superoxide into hydrogen peroxide. Four identical lines of cotton fiber plants were created. Each line was able to express only one of three types of superoxide dismutase. The gene for SOD1 was incorporated into L1, the gene for SOD2 was incorporated into L2, and the gene for SOD3 was incorporated into L3.

Experiment

Five cotton plants of each line were grown in nutrient solution until cotton fibers completed the elongation period. The average length of cotton fibers and the average concentration of hydrogen peroxide were determined. This information is shown in Table 1.

Table 1			
Line	At the end of elongation period:		
	Average elongation period length (days)	Average amount of hydrogen peroxide ($\mu\text{mol}/\text{mg}$)	Average cotton fiber length (cm)
L1	8	2.1	3.6
L2	4	0.2	1.4
L3	20	5.6	5.9
L4	12	2.3	4.5

Next, because the scientists had determined the average elongation period, they measured the amount of hydrogen peroxide and the length of the cotton fibers halfway through their elongation period. This information is shown in Table 2.

Table 2			
Line	At the midpoint of elongation period:		
	Day of elongation period	Average amount of hydrogen peroxide ($\mu\text{mol}/\text{mg}$)	Average cotton fiber length (cm)
L1	4	4.1	2.7
L2	2	5.3	1.0
L3	10	12.4	2.0
L4	6	8.7	3.2

Finally, the scientists measured the amount of hydrogen peroxide and the length of cotton fibers on the first day of the elongation period. This information is shown in Table 3.

Table 3			
Line	On the first day of elongation period:		
	Day of elongation period	Average amount of hydrogen peroxide ($\mu\text{mol}/\text{mg}$)	Average cotton fiber length (cm)
L1	1	1.2	0.2
L2	1	6.0	0.5
L3	1	5.7	0.1
L4	1	1.9	0.2

30. For L2, as the elongation period moved from the first day to the end, the amount of hydrogen peroxide:
- F. increased only
 - G. decreased only
 - H. increased, then decreased
 - J. decreased, then increased
31. Which of the following is a dependent variable in the experiment?
- A. The point in time during the elongation period
 - B. The type of superoxide dismutase the plant could express
 - C. The length of the cotton fiber
 - D. The type of cotton plant
32. A cotton fiber is one very long cell with two cell walls. A cotton fiber is a special kind of what type of cell?
- F. Prokaryotic
 - G. Animal
 - H. Plant
 - J. Bacterial
33. One plant had an average cotton fiber length of 0.5 cm, and the average amount of hydrogen peroxide in its fibers was $5.9 \mu\text{mol}/\text{mg}$. Which of the following most likely describes this plant?
- A. It was from L1 and at the end of its elongation period.
 - B. It was from L1 and at the midpoint of its elongation period.
 - C. It was from L2 and at the beginning of its elongation period.
 - D. It was from L2 and at the end of its elongation period.

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34. The scientists used one of the four lines of cotton plants as a control. Which line was most likely the control?
- F. L1
 - G. L2
 - H. L3
 - J. L4
35. Suppose the data for all the plants were plotted on a graph with the time of the elongation period on the x -axis and the average length of the cotton fiber on the y -axis. Suppose also that the best-fit line for these data was determined. Which of the following would most likely characterize the slope of this line?
- A. The line would have a positive slope.
 - B. The line would have a negative slope.
 - C. The line would have a slope equal to zero.
 - D. The line would have no slope, because the line would be vertical.

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Passage VII

Convection is a heat transfer process caused by moving liquid or gas currents from a hot region to a cold region. As a liquid or gas cools, it gets more dense. An example of a convection process is a cup of hot coffee: the liquid toward the top is cooled by the air, so it becomes more dense and sinks to the bottom of the cup; the hotter liquid toward the bottom of the cup is less dense, so it rises toward the top. See Figure 1, below.

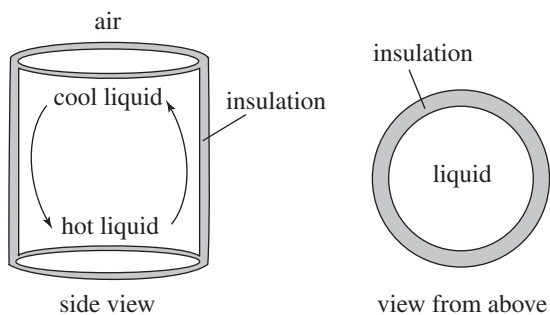


Figure 1

The temperature of the liquid at the hot end of the insulated system is higher than the temperature at the cool end of the system. The difference (ΔT) between the hot liquid at the bottom and the cold liquid at the top changes depending on the starting temperature of the system. Table 1 gives ΔT for 500 mL of water in an insulated container with a height of 6.0 cm and a cross-sectional area of 4.0 cm² when the container is heated to different temperatures.

Table 1	
Heated temperature (°C)	ΔT (°C)
80	1
100	4
120	10
140	19

Figure 2 shows how ΔT changes with cross-sectional area for 500 mL of 100°C water in a container with a height of 6.0 cm. Figure 3 shows how ΔT changes with height for 500 mL 100°C water in a container with a cross-sectional area of 4.0 cm².

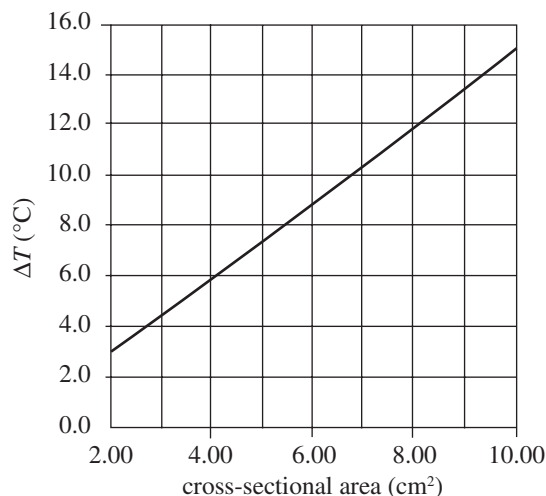


Figure 2

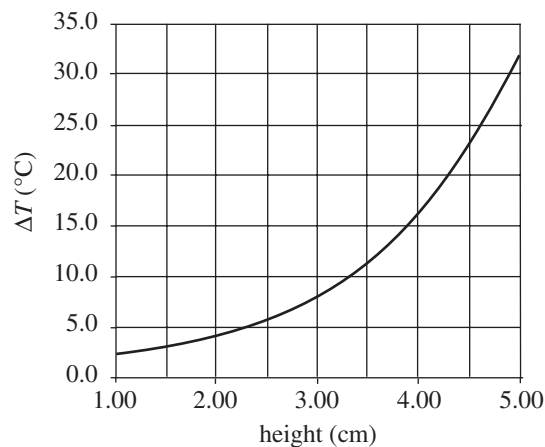


Figure 3

36. System 1 and System 2 are two convection systems. Based on Figure 2, if System 1 were the same height as System 2, but had two times the cross-sectional area and the systems were heated to the same temperature, the ratio of ΔT for System 1 to ΔT for System 2 would be:

F. 1:1
 G. 1:2
 H. 2:1
 J. 3:1

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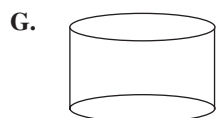
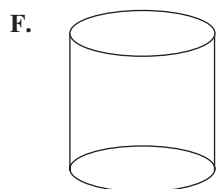


37. For the systems described in the passage, if the containers were metal containers rather than insulated containers, heat would be transferred from the water to the container by which of the following heat transfer processes?

I. Convection
 II. Conduction
 III. Radiation

- A. I only
 B. II only
 C. I and III only
 D. I and II only

38. Which of the following systems, if all were heated to the same temperature, would have the greatest ΔT ?



39. Based on the information in Table 1, if an insulated container of 500 mL of water with a height of 6.0 cm and a cross-sectional area of 4.0 cm² were heated to 120°C, which of the following pairs could represent the temperatures of the liquid at the top and bottom ends of the container?

	<u>Bottom end</u>	<u>Top/Exposed to air end</u>
A.	140°C	120°C
B.	140°C	110°C
C.	115°C	115°C
D.	120°C	110°C

40. The data in the passage supports the hypothesis that ΔT increases as which of the following increases?

- F. Amount of insulation
 G. Volume of liquid
 H. Radius of the container
 J. Air temperature

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.