Passage 1

My Favorite Zoo Animal

Last weekend my mother took my younger brother and I to the zoo. The zoo, it is not far from our house, is my favorite place to visit. My brother, too. My brother asked me which animal I liked best. I told him I had trouble choosing among the giraffe and the zebra, but I finally decided on the latter. We stood and watched the giraffe for an hour. The keeper, noticing our interest, and coming over to us to tell us about the animal, I learned a lot I didn’t know before.
For example, I learned that the word giraffe is thought to be derived from the Arabic word zirafah, which means “tallest of all.” The name is not inappropriate. Giraffes are the tallest animals on earth, and may reach a height of more than 15 feet. The more detailed scientific name is also interesting. Scientists officially call this animal *Giraffa camelopardalis* because they consider the animal to look like a camel with the markings of a leopard.

It appears that no two sets of markings are alike. While most visitors to the zoo consider all giraffes to have the same markings, a trained eye can distinguish subtle differences. The patterns vary from subspecies to subspecies, as does the location of the patterns. Some giraffes, for example, have spots running down their legs, and others do not. The colors can also vary, from a blackish hue to a light yellow. The colors serve the purpose of camouflaging the giraffe, being that it blends in well with the leaves of the trees in which it hides.

The long neck of the giraffe is mistaken for a tree branch. The theory that the markings on a giraffe are comparable to the fingerprints of a human has gained ground.
Passage 2

Alex Haley, Roots Author


[2]

As a child, Alex wasn’t desirous of becoming a writer. As an adult, Alex took a variety of jobs, eventually joining the Coast Guard and becoming a cook. Unchallenged by his daily routine in the U.S. Coast Guard, Haley wrote articles which he sent to many different magazines, hoping to catch an editor’s attention. Eventually his submissions were accepted, and occasionally he received payment for his work. Haley’s literary abilities afforded him an opportunity to change his career. It is not every cook who can become a military journalist. By 1959 when Haley retired from military service, he held the title of Chief Journalist.

16. F. NO CHANGE
   G. stories about his African ancestors
   H. his (African) ancestors
   J. African, his ancestors’ stories

17. A. NO CHANGE
   B. whos’
   C. who is
   D. whose

18. F. NO CHANGE
   G. Alex’s early years were spent
   H. Alex spent his early years
   J. the years that Alex was early, he was spending

19. A. NO CHANGE
   B. Tennessee — the oldest of
   C. Tennessee because he was the oldest of
   D. Tennessee. Alex was the oldest of

20. Which of the following is true about sentence 3 of paragraph 1?
   F. It should be the first sentence of the passage.
   G. It should be deleted because it adds little to the narrative and doesn’t forward the passage.
   H. It disagrees with information presented earlier in the passage.
   J. It repeats information given elsewhere in the passage.

21. A. NO CHANGE
   B. Alex’s desires to become a writer were unstated when he was a child.
   C. Alex didn’t write much as a child.
   D. OMIT the underlined portion.

22. F. NO CHANGE
   G. articles written by Haley
   H. Haley, writing articles
   J. and writing articles

23. A. NO CHANGE
   B. Although
   C. Because
   D. Nonetheless

24. F. NO CHANGE
   G. allow him an opportunity
   H. enabled him an opportunity
   J. give him an opportunity
Alex Haley wrote many articles on a variety of topics, both domestic and international. Eventually, he did family history research in the National Archives in Washington, D.C. Haley took more than a dozen years to do the research and he traveled more than a half a million miles to work in huge archives and small libraries ranging over three continents. Researching his ancestors took them to Juffure, a small village in The Gambia. The Gambia’s historian spoke about Kunta Kinte, who was sent to the United States on a British slave ship. After Haley completed his research, then he knew he had to tell everyone the story of Kunta Kinte. The author emphasized that this was the saga of not only the Haley family but also the story of Black Americans. That Black Americans agreed was amply demonstrated by the fascination surrounding the mini-series developed from the book. The mini-series Roots has been repeated and continues to earn high ratings every time it shows on television.

25. A. NO CHANGE
B. research; but he traveled
C. research which traveled
D. the research, during which he traveled

26. F. NO CHANGE
G. takes him
H. took him
J. takes us

27. A. NO CHANGE
B. After Haley completed his research, he knew
C. When Haley, after completing his research, knew
D. Then, after having completed his research, Haley knew

28. F. NO CHANGE
G. was not only the saga of
H. was of not only his saga but
J. saga was not only of

Question 29 refers to the passage as a whole.

29. This passage was written as a homework assignment to “Discuss the literary abilities of Alex Haley.” Did the passage fulfill the assignment?
A. Yes, because the derivation of Roots is discussed.
B. Yes, because the reader learns the sources of Haley’s ideas.
C. No, because the emphasis is on Haley’s life, not his skill as a writer.
D. No, because the focus is more on Haley’s family than on Haley.
Passage 3

One Man’s Opinion About Time Travel
by Carl Mack

Want to go back in time and discussing philosophy with Aristotle, rule with Nero, dine with Lincoln? If you want to travel in time, a space ship.

But given that you are on earth now, why would you need a space ship to return to a place you already are? The answer can be explained with a little science (or at least what I, a non-scientist, think is logical). The earth is rotating on its axis, it is also orbiting the Sun. The Sun is traveling along the outer arm of the Milky Way galaxy which is traveling through space on its endless journey to the infinite. Because in the minute you were thinking the earth has moved from where it was to where it is now, moving you with it so you do not notice any change. This is why you think you are not moving when you are. To simplify things, think of the earth as a car traveling down a road and you are a passenger in the car. If the car is moving at one mile an hour and you jump back in time one hour (discounting all the movement of the earth itself), you would find yourself sitting on the road with the car one mile away heading toward you. When you left the time you were in and went back in time, you did not take the car with you; therefore, it moved back in time and space to when and where it was one...
hour earlier. The same if you moved in time accounting for the earth’s movement. You would end up somewhere in space waiting for the earth to catch up to you!

And this is the reason because you need a space ship, so you could travel to where the earth was at that time to which you return. Not only do you have to jump back in time, you have to go back to a time earlier than you wanted so you can travel to the earth and arrive “on time.”

They say that the proof that time travel is impossible is that there are no time travelers here right now, it could be that time travel is possible but space travel has not advanced enough to get them here yet.

39. A. NO CHANGE
B. Being the same if you moved
C. The same being true if you moved
D. The same would be true if you moved

40. F. NO CHANGE
G. And this being the reason why you
H. Because of this is the reason you
J. You

41. A. NO CHANGE
B. Scientists say
C. They are saying (scientists)
D. OMIT the underlined portion

42. F. NO CHANGE
G. now, it
H. now, and therefore it
J. and

43. Which of the following best summarizes the idea of this passage?
A. Time travel is impossible.
B. Time travel would require going backwards to return to the same time.
C. Time travel would require more technology than we currently have.
D. Time travel would allow people from different eras to converse.
Passage 4

The Findings of the Paleontologists

Paleontologists have called the preserved burrows "devil's corkscrews" (or Daemonelix) when the time they were first found. At that time, scientists thought the corkscrews might be holes left by the giant tap roots of some unknown plant. But when, however, Palaeocastor skeletons were found in the bottoms of the spirals, almost everyone had to concede that they were truly beaver burrows. Admittedly, the skeleton of a Nothocyon been found in one burrow; but this predator probably followed a beaver home for supper and just stayed. Three other kinds of beavers lived around Agate in the early Miocene epoch, but their bones have never been found in the burrows, in fact, no one knows what they did for homes. Perhaps there burrows were much shallower or were in the river banks where running water soon destroyed them.
[2]

[1] The paleontologists’ findings seem incompatible with the divisions of epochs, periods, and eras until one considers that the divisions were based on breaks in the European sedimentary record reflecting local events that did not necessarily show up in North America’s sediments. [2] Paleontologists can tell that no dramatic change layed in store for the fauna at the beginning of the Miocene epoch and that many Oligocene genera carried over into the new epoch. [3] Most of the primitive animals that had survived in the extensive forests become extant when the forests began to retreat: but for the most part, the record continued undisturbed. [4] This is to be expected where the accumulation of sediments continued nonstop without interruption.

53. A. NO CHANGE
   B. lay
   C. lies
   D. was laying

54. F. NO CHANGE
   G. extensive forests, became extant
   H. extensive forests became extinct
   J. OMIT the underlined portion.

55. A. NO CHANGE
   B. retreat. However, for the most part, the
   C. retreat. Moreover, for the most part, the
   D. retreat. But most of the part of the

56. F. NO CHANGE
   G. nonstopping
   H. nonstop but
   J. OMIT the underlined portion.

57. Is the word reflecting in sentence 1 of paragraph 2 used appropriately in this passage?
   A. Yes, because it means “indicating” or “corresponding.”
   B. Yes, because it refers to the smooth, mirrorlike lake in which the fossils were found.
   C. No, because reflecting means “thinking back on, examining.”
   D. No, because it means the same as record, making the sentence redundant.

Question 58 refers to the passage as a whole.

58. The passage as a whole is best expressed by which of the following titles?
   F. Tracking Ancient Rodents
   G. What Fossils Reveal
   H. A Paleontologist’s Duties
   J. The Extinction of Species

59. Which of the following represents the best order of the sentences in the second paragraph?
   A. 2 — 3 — 4 — 1
   B. 3 — 2 — 1 — 4
   C. 3 — 4 — 1 — 2
   D. 2 — 4 — 3 — 1
Passage 5

Vietnam

In 111 B.C., ancestors of the present-day Vietnamese, inhabiting part of what is now southern China and northern Vietnam, were conquered, there being the warlike forces of China’s Han dynasty. Chinese rule lasted more than 1,000 years, since A.D. 939, when the Vietnamese ousted their conquerors and began a southward expansion, that by the mid-eighteenth century, reached the Gulf of Siam.

The Vietnamese were rent by internal political divisions, however, and for nearly two centuries contending families in the north and south struggled to control the powerless kings of the Le dynasty. During this period, Vietnam affectively was divided near the 17th parallel, just a few kilometers above the demarcation line established at the 1954 Geneva Conference.

Vietnam having been reunited following a devastating civil war in the eighteenth century but soon fell prey to the expansion of European colonialism. While the French conquest of Vietnam began in 1858 with an attack on what is now the city of Da Nang. France imposed control gradually, to meet heavy resistance, and only in 1884 was Vietnam officially incorporated into the French empire.
Vietnam’s resistance was the precursor of nationalist activity directed against foreign rule. By 1930, the Vietnam Nationalist Party had staged the first significant armed uprising against the French, but its virtual destruction in the ensuing French repression left the leadership of the anticolonial movement to those more adept at underground organization and survival — the Communists. In that same year, the recently formed Indochinese Communist Party (ICP) lead the way in setting up short-lived “soviets” in Nghe An and Ha Tinh provinces, an action that identified the ICP with peasant unrest.

The Vietnamese communist movement began in Paris in 1920 when Ho Chi Minh became a charter member of the French Communist Party. Two years later, Ho went to Moscow to study Marxist doctrine, then he went to China. While in China, he formed the Vietnamese Revolutionary Youth League, setting the stage for the formation of the ICP in 1930. French repression of nationalists and Communists forced some of the insurgents underground. Other dissidents were imprisoned, some emerging later to play an important role in the anticolonial movement.
Mathematics Test

60 Minutes — 60 Questions

DIRECTIONS: Each question has five answer choices. Choose the best answer for each question and shade the corresponding oval on your answer grid.

1. A sales department wants to make a 12% profit on its product. If the cost of the product is $87, what will the selling price of the product have to be to achieve the desired profit?
   A. $98.44
   B. $97.44
   C. $95.04
   D. $92.14
   E. $90.00

2. A board exactly 11/3 yards long is cut into three pieces. The first piece is 25 inches. The second piece is 10 inches. How long is the third piece?
   F. 15 inches
   G. 14 inches
   H. 131/3 inches
   J. 13 inches
   K. 101/3 inches

3. Three friends, Mike, Ken, and Debi, earned an average of $50,000 each on a project. Their total earnings were exactly 40% of the total earnings of everyone in their company. How much were the total earnings of the entire company?
   A. $600,000
   B. $450,000
   C. $375,000
   D. $340,000
   E. $40,000

4. Given that \((a + 5)(a - 6) = 0\), which of the following is a true statement?
   F. \(a\) could be 5 or 6
   G. \(a\) could be -5 or -6
   H. \(a\) could be -5 or 6
   J. \(a\) could be +5 or -6
   K. \(a\) could be 0

5. An office receives 80 calls a day for 6 days. In order to average 100 calls per day for 12 days, how many calls must the company get in the next 6 days?
   A. 1,200
   B. 1,100
   C. 1,020
   D. 720
   E. 120

6. If \(x\) is an integer between 6 and 10, which of the following could be a true statement?
   F. \(x^2 = 144\)
   G. \(\sqrt{x} = 2+\)
   H. \(2x = 14.5\)
   J. \(3x = 24\)
   K. \(3x = 1.5\)

7. If one of the angles in a triangle is obtuse, which of the following is a true statement regarding the other two angles in the triangle?
   A. They are in a ratio of 2:1.
   B. They total 90 degrees.
   C. One must be a right angle.
   D. Both angles must be acute.
   E. Both angles must be obtuse.

8. 5% of \((a + b)\) = 10% of \(b\). Which of the following must be a true statement?
   F. \(a > b\)
   G. \(a < b\)
   H. \(a = b\)
   J. \(a + b = 0\)
   K. \(a < 0, b < 0\)
9. A square (Figure I) and an isosceles triangle (Figure II) have equal areas. \( x = \)

[Diagram of a square and a triangle]

- A. \( 4 \sqrt{2} \)
- B. \( 8 \sqrt{2} \)
- C. \( 4 \sqrt{3} \)
- D. \( 8 \sqrt{3} \)
- E. \( 12 \sqrt{3} \)

10. The sides of a triangle are 6, 8, and 10. What is the degree measure of the angle between the sides measuring 6 and 8?

- F. 15
- G. 30
- H. 45
- J. 60
- K. 90

11. The cost of a textbook increased by 25% from 1998 to 1999. In 2000, the cost of the textbook was \( \frac{3}{4} \) below its 1998 cost. By what percentage did the cost of the textbook decrease from 1999 to 2000?

- A. 0
- B. 20
- C. 25
- D. 40
- E. 75

12. Which of the following is a factor of \( a^2 - 8a + 15? \)

- F. \( a + 5 \)
- G. \( a + 3 \)
- H. \( a - 1 \)
- J. \( a - 3 \)
- K. \( a - 15 \)

13. Jim was \( y \) years old \( m \) years ago. How many years old will he be in terms of \( y \) in 12 years?

- A. \( y + m + 12 \)
- B. \( y m + 12 \)
- C. \( y - m + 12 \)
- D. \( y m - 12 \)
- E. \( y - m - 12 \)

14. \( (5x^3 y^2)^2 (3x^2 y^3)^3 = ? \)

- F. \( 675x^{13} y^{12} \)
- G. \( 675x^{10} y^{12} \)
- H. \( 15x^{10} y^{12} \)
- J. \( 15x^{12} y^{22} \)
- K. \( 15x^3 y^{14} \)

15. A circle with a radius of 4 inches has \( \frac{1}{4} \) the area of a circle with a radius of how many inches?

- A. 1
- B. 2
- C. 8
- D. 16
- E. 64

16. A hiker walks nonstop for 2 hours and 20 minutes and travels 7 miles. At what rate did he walk?

- F. 2 mph
- G. 2\( \frac{1}{10} \) mph
- H. 2\( \frac{1}{2} \) mph
- J. 3 mph
- K. 3\( \frac{1}{2} \) mph

17. A dollhouse is to be an exact replica of a collector’s own home on a reduced scale. If the main bedroom of the dollhouse is 18 inches long by 24 inches wide, the real bedroom of 12 feet long will be how many feet wide?

- A. 24
- B. 18
- C. 16
- D. 10
- E. 8

18. Triangles I and II (not shown) are similar figures. The angles of triangle I are in the ratio 1:2:3. If the perimeter of triangle I is \( 15 + 5 \sqrt{3} \), and the shortest side of triangle II is 15, then what is the perimeter of triangle II?

- F. 150 + 20 \( \sqrt{3} \)
- G. 60 + 15 \( \sqrt{3} \)
- H. 60 + 5 \( \sqrt{3} \)
- J. 45 + 15 \( \sqrt{3} \)
- K. 45
19. When asked her age, Lael responded, “Take the square root of 625, add it to the square of 5, and take 40 percent of the resulting sum.” Which of the following expresses Lael’s age?

A. \( L = \sqrt{625} + 5 \cdot 0.4 \)
B. \( L = 5 \cdot 0.4 + \sqrt{625} + 5 \)
C. \( L = 5 \cdot 0.4 + \sqrt{625} \cdot 5 \)
D. \( L = 5 \cdot 0.4 + \sqrt{625} + 5^2 \)
E. \( L = 0.4(\sqrt{625} + 5^2) \)

20. In a classroom of children, every child has either blond, brown, or red hair. The probability of randomly selecting a child with red hair is \( \frac{1}{6} \). The probability of randomly selecting a child with brown hair is \( \frac{1}{3} \). If 30 children have blond hair, how many children are in the classroom?

F. 30
G. 45
H. 60
J. 90
K. 120

21. If \( a \) is six greater than \( b \), and the sum of \( a \) and \( b \) is -18, then \( b^2 =

A. 144
B. 36
C. 16
D. 4
E. 0

22. What is the interior degree measure of figure ABCDE?

F. 900
G. 720
H. 540
J. 360
K. 300

23. A city is visited one month by 200 German, 320 American, 140 Moroccan, 180 French, and 240 Japanese tourists. If a circle graph were made representing the various categories, the angle made by the segment representing the French would be how many degrees?

A. 360
B. 270
C. 60
D. 1
E. \( \frac{1}{6} \)

24. Nine friends intend to buy class rings at $85.00 each. The rings cost $864 per dozen if bought in a full dozen batch. If the friends can bring in three more students to purchase rings, how much would each friend save on the price of the ring?

F. $15.00
G. $14.33
H. $13.00
J. $12.75
K. $11.90

25. For all \( x \) and \( y \), \((3x^2y + xy^2) - (2x^2y - 2xy^2) = ?\)

A. \( x^2 - x \)
B. \( x^2y - xy^2 \)
C. \( x^2y + 3xy^2 \)
D. \( 5x^2 - xy^2 \)
E. \( xy^2 + 3x^2y^2 \)

26. If line segment XY (not shown) goes from \((-2, 6)\) to \((4, 6)\), what are the coordinates of the midpoint of XY?

F. \((-1,6)\)
G. \((0,0)\)
H. \((1,6)\)
J. \((3,0)\)
K. \((3,6)\)

27. The ratio of olives to dates is 3:5 and the difference between the number of dates and the number of olives is 18. What is the total number of olives and dates?

A. 144
B. 72
C. 40
D. 27
E. 24
28. Given that $x$ is an integer, for what value of $x$ is $x + \frac{7}{6}x > 15$ and $x + 4 < 15$?
   F. 8
   G. 9
   H. 10
   J. 11
   K. 12

29. A third of the product of 6 and 4 is the same as 3 less than 2$x$. What is $x$?
   A. 8
   B. 7
   C. 6
   D. $\frac{1}{3}$
   E. $\frac{1}{6}$

30. A gambler’s lucky number is 12. On any roll of two dice, what is the probability that he will roll his lucky number?
   F. $\frac{1}{6}$
   G. $\frac{1}{9}$
   H. $\frac{1}{6}$
   J. $\frac{1}{2}$
   K. $\frac{1}{3}$

31. Isosceles right triangle ABC has a perimeter of $20 + 10\sqrt{2}$. What is the area of the triangle?
   A. $200\sqrt{2}$
   B. 200
   C. $100\sqrt{2}$
   D. 100
   E. 50

32. Paul wants to buy a new aquarium with the same volume as the old. His old aquarium measures $6 \times 4$ units on the base and is 10 units tall. If his new aquarium has a base in which each side is 50 percent longer than the corresponding side in the old aquarium, approximately how many units tall will the new aquarium be?
   F. 4.4
   G. 4.5
   H. 4.9
   J. 5.0
   K. 5.1

33. Triangles ABC and DEF are similar figures. What is the perimeter of triangle DEF?
   \[\text{Area of ABC} = 32\]
   A. $56 + 28\sqrt{2}$
   B. 84
   C. $84\sqrt{2}$
   D. $84 + 28\sqrt{2}$
   E. $90\sqrt{2}$

34. Given that $|3 - 3a| = 12$, which of the following could be $a$?
   F. 5
   G. 4
   H. 3
   J. 2
   K. 1

35. Triangle ABC is an equilateral triangle with an area of 32. Triangle DEF is an isosceles right triangle of area 64. Which of the following represents the ratio of the sum of the interior angles in triangle ABC to the sum of the interior angles in DEF?
   A. 4:1
   B. 3:1
   C. 2:1
   D. 1:1
   E. 1:2

36. Marcy bought eight items costing $x$ cents each. She gave the clerk $y$ dimes. In terms of $x$ and $y$, how much change should Marcy get back?
   F. $y - 8x$
   G. $10y + 8x$
   H. $10y - 8x$
   J. $8x - y$
   K. $8x - 10y$
37. Arc $AB = 3$ units. What is the circumference of Circle O in units?

A. $9\pi$
B. 36
C. $36\pi$
D. 108
E. $108\pi$

38. Kim starts at point X and walks 50 yards straight north. Scott starts at the same point X and walks due east. The shortest distance between Kim and Scott is 120 yards. How many yards did Scott walk?

F. 13,000
G. 11,900
H. $\sqrt{13,000}$
J. $\sqrt{11,900}$
K. 50

39. What point on the graph of $x^2 - y = 4$ has an $x$ coordinate of 3?

A. (3, -5)
B. (3, $\sqrt{5}$)
C. (3, 4)
D. (3, 5)
E. (3, 13)

40. An equilateral triangle has an altitude of $10\sqrt{3}$ units. What is the perimeter of the triangle?

F. 80
G. 60
H. 30
J. $20\sqrt{3}$
K. 20

41. An automatic water system fills an empty pool half full in one hour. Each hour thereafter the system fills one-half of the capacity that is still empty. After how many hours is the pool $\frac{3}{4}$ empty?

A. 12
B. 10
C. 7
D. 6
E. 5

42. If $m$ pencils cost $n$ cents, which of the following expresses the cost of $p$ pencils?

F. $mp$ cents
G. $m + \frac{mp}{n}$ cents
H. $m + \frac{p}{n}$ cents
J. $n + \frac{p}{n}$ cents
K. $\frac{np}{m}$ cents

43. Hal can assemble 600 widgets in $\frac{21}{2}$ hours. Faye can pack 200 widgets in 45 minutes. If Faye wants to work for exactly $\frac{4}{3}$ hours and finish the same number of widgets as Hal, how many hours will Hal have to work?

A. 5
B. $\frac{4}{3}$
C. 4$rac{1}{3}$
D. 4
E. 3$rac{3}{5}$

44. The cost of a swimsuit goes up 50 percent in June, down 20 percent in July, and down another 30 percent in August. The cost of the swimsuit in August is what percent of the cost of the swimsuit before June?

F. 110
G. 100
H. 90
J. 84
K. 61
45. A wheel covers a distance of $300\pi$ meters in 15 revolutions. What is the radius of the wheel?
   A. $30\pi$
   B. 25
   C. 20
   D. $10\pi$
   E. 10

46. A prime number times a composite number must be
   F. prime
   G. composite
   H. zero
   J. a fraction
   K. even

47. Sector AOC has an area of $120\pi$ square units. What is the circumference of the circle?
   A. $34,600\pi$
   B. $1,200\pi$
   C. $120\pi$
   D. $120/\pi$
   E. $\sqrt{120/\pi}$

48. On a circle with the equation $x^2 + y^2 = 25$, if the $x$-coordinate is -3, the $y$-coordinate could be
   F. -3
   G. 0
   H. 4
   J. 9
   K. 16

49. $(a + 3)^2 + (a - 4)^2 = $
   A. $2a^2 - 2a + 25$
   B. $2a^2 + 14a + 25$
   C. $a^2 + 2a + 25$
   D. $a^2 - 2a - 25$
   E. $2a^2 - 2a - 4$

50. A jar that is now empty is going to be filled with red marbles and blue marbles. The person filling the jar wants the probability of drawing a red marble at random from the jar to be twice as great as the probability of drawing a blue marble at random. If the jar is going to contain 36 marbles, how many more must be red marbles than blue marbles?
   F. 30
   G. 24
   H. 20
   J. 18
   K. 12

51. In the right triangle $XYZ$ below, what is the value of $\tan Z$?
   A. $7/25$
   B. $7/24$
   C. $24/25$
   D. $25/24$
   E. $24/7$

52. Which of the following is best expressed by the figure below?
   F. $x > -4$
   G. $x < -4$
   H. $-4 \leq x < 0$
   J. $-4 < x \leq 0$
   K. $-5 < x \leq 1$

53. If $4cx - \frac{3d}{e} = 4cy$, then $x - y = ?$
   A. $- \frac{3d}{4ce}$
   B. $- \frac{3d}{e} + \frac{1}{4c}$
   C. $\frac{3d}{4ce} - c$
   D. $\frac{3d}{4ce}$
   E. $\frac{3c}{e} + 4c$
54. For all \( a \neq 0, \) and \( b \neq 0, \) what is the slope of the line passing through \((a,b)\) and \((-a,-b)\)?

\[
\begin{align*}
F. & \quad 0 \\
G. & \quad 1 \\
H. & \quad \frac{a}{b} \\
J. & \quad \frac{b}{a} \\
K. & \quad -\frac{b}{a}
\end{align*}
\]

55. From a lookout point on a cliff, the angle of depression to a boat on the water is 14 degrees, and the distance from the boat to the shore just below the cliff is 2 km. How far is the lookout from the water surface?

\[
A. \quad \frac{2}{\sin 14^\circ} \\
B. \quad \frac{2}{\tan 14^\circ} \\
C. \quad \frac{2}{\cos 14^\circ} \\
D. \quad 2 \sin 14^\circ \\
E. \quad 2 \tan 14^\circ
\]

56. A computer is printing a novel. It prints 60 pages in the first hour, after which it breaks. Two hours later, the computer is fixed and resumes printing at the rate of 60 pages per hour. To finish the job on time, another computer that prints at the same rate is brought in and begins printing when the first computer is repaired. The two computers finish printing one hour later. The graphs of the number of pages printed \( (p) \) as a function of time \( (t) \) would most resemble which of the following?

\[
\begin{align*}
F. & \quad p(t) \\
G. & \quad p(t) \\
H. & \quad p(t) \\
J. & \quad p(t) \\
K. & \quad p(t)
\end{align*}
\]

57. Which of the following is equivalent to \( \frac{\sin^2 \theta + \cos^2 \theta}{\sec \theta} \)?

\[
\begin{align*}
A. & \quad \cos \theta \\
B. & \quad \sin \theta \\
C. & \quad \tan \theta \\
D. & \quad \frac{1}{\cos \theta} \\
E. & \quad \sin^2 \theta + 1
\end{align*}
\]

58. On average, a cow and a half can give a pint and a half of milk in 36 hours. How many pints can three cows give on average in 72 hours? (All cows give milk at the same rate.)

\[
\begin{align*}
F. & \quad 3 \\
G. & \quad 4 \\
H. & \quad 5 \\
J. & \quad 6 \\
K. & \quad 7
\end{align*}
\]
59. From an observer on the ground, the angle of elevation to a hot-air balloon is 21 degrees and the distance from the observer to a point on the ground directly underneath the balloon is 1,500 meters. How many meters high is the balloon?

A. \( \frac{1500}{\cos 21°} \)
B. \( \frac{1500}{\tan 21°} \)
C. \( 1500 \sin 21° \)
D. \( 1500 \cos 21° \)
E. \( 1500 \tan 21° \)

60. If \( A \) measures between 0° and 180° and \( \tan A = \frac{4}{3} \), what are the possible values of \( \cos A \)?

F. \(-\frac{3}{5}\) only
G. \(-\frac{3}{5}\) and \(\frac{3}{5}\)
H. \(-\frac{4}{5}\) and \(\frac{4}{5}\)
J. \(\frac{3}{5}\) only
K. \(\frac{4}{5}\) only
Thrombosis refers to abnormal clotting that causes the blood flow in a blood vessel to become obstructed. Venous thrombosis refers to such an obstruction in a vein, often at some site of inflammation, disease, or injury to the blood vessel wall. The clot (thrombus) may remain fixed at the site of origin, adhering to the wall of the vein. Or the clot (or a fragment of it) may break loose to be carried elsewhere in the circulatory system by the blood.

In pulmonary embolism, the clot or fragment breaks free from its site of origin, usually a deep vein of the leg or pelvis, and is carried by the blood through progressively larger veins into the inferior vena cava, a very large abdominal vein that empties into the right side of the heart. The embolus is pumped through the right side of the heart and into the pulmonary artery, whose branches supply blood to the lungs. Depending on its size, the embolus may pass through the larger pulmonary branches, but may eventually enter a branch too narrow to allow it to pass. Here it lodges, obstructing blood flow to the lung tissues supplied by that vessel and its finer divisions “downstream” from the embolus.

The clinical consequences of pulmonary embolism vary with the size of the embolus and the extent to which it reduces total blood flow to the lungs. Very small emboli cause so little circulatory impairment that they may produce no clinical signs or symptoms at all. In fact, among the estimated 300,000 patients who experience pulmonary embolism each year, the great majority suffer no serious symptoms or complications, and the disorder clears up without significant aftereffects. However, in a significant percentage of patients, the pulmonary embolism is massive, sometimes reducing total pulmonary blood flow by 50 percent or more; and the consequences may be grave: seriously strained circulation, shock, or acute respiratory failure. Massive pulmonary embolism causes some 50,000 deaths each year in the U.S. Certain classes of patients are more likely than others to develop venous thrombosis with its attendant risk of pulmonary embolism. Disorders that increase susceptibility include venous inflammation (phlebitis), congestive heart failure, and certain forms of cancer. Women are more susceptible during pregnancy and during recovery from childbirth than at other times, and those taking birth control pills appear to be at slightly higher risk than are women who do not. Postoperative patients constitute a high-risk group, particularly following pelvic surgery and orthopedic procedures involving the hip. Any operations requiring that the patient be immobilized for prolonged periods afterward exacerbate the risk of this problem. Among patients recovering from hip fractures, for example, the incidence of venous thrombosis may run as high as 50 percent.

Venous thrombosis can sometimes be diagnosed by the presence of a swollen extremity with some evidence of inflammation or a clot that can be felt when the affected vein is examined. But sometimes venous thrombosis produces no clear-cut clinical signs so that other tests may be needed to confirm the diagnosis.

One such test entails injecting fibrinogen tagged with a radioactive isotope of iodine into the blood. Fibrinogen has a strong affinity for blood clots and is incorporated into them, carrying its radioactive label with it. The clot can then be located with a radiation-sensing device.

Another diagnostic technique, called venography, involves injecting a dye (one that shows clearly on X-rays) into the vein where obstruction is suspected. The X-ray venogram provides very detailed information on the extent and location of the obstruction.

A third technique uses sensitive instruments that measure blood flow in vessels of the extremities to detect any circulatory impairment that may result from thrombosis.

Signs of nonfatal pulmonary embolism may include sudden shortness of breath, chest pain, increased heart rate, restlessness and anxiety, a fall in blood pressure, and loss of consciousness. But clinical symptoms may vary by their presence or...
absence and in their intensity, and their similarity to symptoms that may result from other disorders can make the diagnosis of pulmonary embolism difficult on this basis alone.

Pulmonary angiography (X-ray visualization of the pulmonary artery and its branches after injection of a radiopaque dye) is the most reliable diagnostic technique, but it is a complex test that cannot be done routinely in all patients. A somewhat simpler test involves injecting extremely fine particles of a radioactively labeled material such as albumin into a vein and then scanning the lungs with a radiation detector while the particles traverse the pulmonary blood vessels.

1. The purpose of the first paragraph is
A. to analyze the causes of blood clots.
B. to describe types of blood clots.
C. to predict who is most likely to get a blood clot.
D. to inform the readers of steps to take for the prevention of blood clots.

2. Which of the following best describes the difference between a thrombosis and an embolus?
F. A thrombosis is in the lung; an embolism may be anywhere.
G. A thrombosis is usually fatal; an embolism is rarely fatal.
H. A thrombosis remains stationary; an embolism moves within the circulatory system.
J. A thrombosis is larger than an embolism.

3. Which of the following may you infer about pulmonary embolism?
A. It may cure itself.
B. It is invariably fatal.
C. It is more severe in children than in adults.
D. It is directly related to diet.

4. According to the passage, a common origin for a pulmonary thrombosis is in the
F. heart.
G. brain.
H. leg.
J. arm.

5. In lines 45–46, the phrase “attendant risk” means
A. risks faced by those who aid others.
B. risks that accompany something else.
C. minimal, almost nonexistent risks.
D. risks for women only, not for men.

6. In lines 57 and 58, “exacerbate” means
F. reduce.
G. cure.
H. heal.
J. make worse.

7. Which of the following may you substitute for “clinical signs” (line 67)?
A. Hospitals
B. Deaths
C. Diseases
D. Symptoms

8. Which of the following may be the best title for the passage?
F. How to Cure Embolisms
G. How Blood Clots Develop
H. Means of Preventing Blood Clots and Embolisms
J. Description and Diagnosis of Blood Clots

9. The three tests discussed in lines 69–84 are introduced for which of the following purposes?
A. to lament the high cost of diagnosis
B. to prove that any blood clot can eventually be diagnosed
C. to describe the means of confirming a suspected diagnosis
D. to reject the premise that all blood clots are fatal

10. According to the author, using clinical symptoms to diagnose pulmonary embolism
F. is cheaper and more time-effective than using high-tech machinery.
G. should be done cautiously and in conjunction with other tests.
H. may be done only in the least-acute cases.
J. cannot be done routinely on all patients.
Passage 2

Prose Fiction

(From Nicholas Nickleby by Charles Dickens)

Line 1 This was a young lady who could be scarcely eighteen, of very slight and delicate figure, but exquisitely shaped, who, walking timidly up to the desk, made an inquiry, in a very low tone of voice, relative to some situation as governess, or companion to a lady. She raised her veil, for an instant, while she preferred the inquiry, and disclosed a countenance of much uncommon beauty, though shaded by a cloud of sadness, which, in one so young, was doubly remarkable. Having received a card of reference to some person on the books, she made the usual acknowledgment, and glided away.

She was neatly, but very quietly attired; so much so, indeed, that it seemed as though her dress, if it had been worn by one who imparted fewer graces of her own to it, might have looked poor and shabby. Her attendant — for she had one — was a red-faced, round-eyed slovenly girl, who, from a certain roughness about the bare arms that peeped from under her dragged shawl, and the half-washed-out-traces of smut and blacklead which tattooed her countenance, was clearly of a kin with the servant-of-all-work on the farm: between whom and herself there had passed various grins and glances, indicative of the freemasonry of the craft.

The girl followed her mistress; and before Nicholas had recovered from the first effect of his surprise and admiration, the young lady was gone. It is not a matter of such utter improbability as some sober people may think, that he would have followed them out, had he not been restrained by what passed between the fat lady and her bookkeeper.

“When is she coming again, Tom?” asked the fat lady.

“Tomorrow morning,” replied Tom, mending his pen.

“Where have you sent her to?” asked the fat lady.

“Mrs. Clark’s,” replied Tom.

“She’ll have a nice life of it, if she goes there,” observed the fat lady, taking a pinch of snuff from a tin box.

Tom made no other reply than thrusting his tongue into his cheek, and pointing the leather of his pen towards Nicholas — reminders which elicited from the fat lady an inquiry of, “Now, sir, what can we do for you?”

Nicholas briefly replied, that he wanted to know whether there was any such post to be had, as secretary or amanuensis to a gentleman.

“Any such!” rejoined the mistress; “a dozen such. Ain’t there, Tom?”

“I should think so,” answered that young gentleman; and as he said it, he winked towards Nicholas with a degree of familiarity which he, no doubt, intended for a rather flattering compliment, but with which Nicholas was most ungratefully disgusted.

Upon reference to the book, it appeared that the dozen secretariats had dwindled down to one. Mr. Gregsburry, of Manchester Buildings, Westminster, wanted a young man, to keep his papers and correspondence in order; and Nicholas was exactly the sort of young man that Mr. Gregsburry wanted.

“I don’t know what the terms are, as he said he’d settle them himself with the party,” observed the fat lady; “but they must be pretty good ones, because he’s a member of Parliament.”

Inexperienced as he was, Nicholas did not feel quite assured in the face of this reasoning, or the justice of this conclusion; but without troubling himself to question it, he took down the address, and resolved to wait upon Mr. Gregsburry without delay.

“I don’t know what the number is,” said Tom, “but Manchester Buildings isn’t a large place; and if the worst comes to worst, it won’t take you very long to knock at all the doors on both sides of the way till you find him out. I say, what a good-looking girl that was, wasn’t she?”

“What girl?” demanded Nicholas sternly.

“Oh yes, I know — what gal. eh?” whispered Tom, shutting one eye, and cocking his chin in the air. “You didn’t see her, you didn’t — I say, don’t you wish you was me, when she comes tomorrow morning?”
Nicholas looked at the ugly clerk, as if he had a
mind to reward his admiration of the young lady by
beating the ledger about his ears, but he refrained
and strode haughtily out of the office; setting at
defiance, in his indignation, those ancient laws of
civilly, which not only made it proper and lawful
for all good knights to hear the praise of the ladies
to whom they were devoted, but rendered it incum
bent upon them to roam about the world, and
knock on the head all such matter-of-fact and unpo
tical characters, as declined to exalt, above all th
ear.

11. Which of the following is the best way of
rewording the expression “preferred the
inquiry” (line 7) without changing the
author’s original meaning?
A. liked one question better than another
B. asked the question
C. recommended one specific question
D. answered a question

12. The author probably chose the word “glided”
in line 12 to
F. create a feeling of subterfuge and cunning
on the part of the young woman.
G. show how unusual the young woman’s
conduct was in a person so young.
H. make the reader feel the young woman’s
shyness and quietness, or grace.
J. indicate the speed with which the entire
transaction took place.

13. The first sentence in the second paragraph
A. demonstrates a bias towards brighter
clothing.
B. expresses contempt and scorn at the
girl’s unfashionable attire.
C. contrasts the quality of the clothing with
the shabbiness of the surroundings.
D. indicates that the author believes that
“the woman makes the clothes,” rather than “the clothes make the woman.”

14. Which of the following is another way to
express the author’s statement, “… was
clearly of a kin with the servant-of-all-work on
the farm…” (lines 22 and 23)?
F. held the same status as the farm servant
G. was obviously a relative of the farm
servant
H. had previously worked as a laborer on a
farm
J. was trying to better her position in life

15. The statement that “It is not a matter of such
utter improbability as some sober people may
think…” (lines 29–31) means that
A. the narrator was intoxicated at the time
this event occurred.
B. the event was obviously inevitable.
C. it would not be as surprising or as unex-
pected as some people might think
D. it is completely impossible.

16. The conversation between Tom and the fat
lady about the young woman’s coming again
tomorrow (lines 34–43) indicates that
F. the girl comes to the office every day as
part of her routine.
G. the girl will probably not enjoy the post
to which she was sent.
H. the girl will begin working for Tom and
the fat lady the next day.
J. the girl wants to see the narrator again.

17. “I should think so,” answered that young gen-
tleman, and as he said it, he winked towards
Nicholas with a degree of familiarity which he,
no doubt, intended for a rather flattering com-
pliment…” (lines 54–57). The author implies
by this statement
A. that Tom and Nicholas are friends.
B. that Tom recognized and approved of
Nicholas’s interest in the young woman
who had just left.
C. that Tom meant to imply that Nicholas
was such a man that his services would
be greatly valued.
D. that the young gentleman knew that the
fat lady was going to cheat Nicholas.

18. The fat lady’s comments about Mr.
Greggsbury’s being a member of Parliament
(lines 67–70)
F. are meant to reassure Nicholas as to the
superiority of the position offered.
G. are untrue.
H. are intended to demonstrate the high-
class clientele of which the fat lady
boasts.
J. are given as an excuse for her having but
the one listing.
Passage 3  

Natural Science

The bushmaster can very well be classified as a pit viper. The pit (50) in the snake’s name comes from the fact that it has a hollow pit close to the eye. The pit is covered by skin to protect it. The purpose of the pit is to sense heat. The heat is given off by the bushmaster’s prey, which consists of warm-blooded animals. The most common prey of the pit viper is a rodent. Usually, a viper will bite its prey, then retreat, letting the venom do the actual killing of the smaller animal. Should the animal wander away during its death throes, the bushmaster can follow the animal’s scent to find it later. Some bushmasters, however, bite their prey, then hold their fangs in the animal, often lifting it off the ground. Bushmasters

19. In the context of the passage, “to wait upon” (line 75) means
   A. to be delayed by.
   B. to visit.
   C. to serve.
   D. to doubt.

20. Which of the following most closely captures the meaning of the last paragraph of the passage?
   F. Nicholas and the clerk both chivalrously agreed that the young woman was beautiful and were determined to fight each other for her affections.
   G. Nicholas was insulted that the clerk would think that he, Nicholas, would be interested in a woman as obviously low class as the young lady.
   H. Nicholas had a duty to defend the young woman against what he perceived as slurs upon her character made by the clerk.
   J. The clerk had motivated Nicholas to forget the job and go seek the young woman in order to tell her of his feelings toward her.

Passage 3

Tales abound of the large snake of Trinidad, Surinam, and Bolivia known as the bushmaster. The bushmaster, found primarily in South and Central America, is the largest venomous (poisonous) snake in the New World. The names of this snake tell much about it. The Latin name of the bushmaster is Lachesis muta. The Lachesis comes from Greek mythology, and refers to one of the three Fates. The Greeks believed that the Fates were women who determined how long the “string” of a person’s life would be. When the Fates cut the string, the person’s life would cease. The bite of the Lachesis muta, the bushmaster snake, can indeed kill. It has been known to kill even humans (although the actual death or injury may come from the bacteria on the snake’s fangs, rather than from the venom itself). The muta part of the name is similar to our common word mute, and derives from the fact that although the snake shakes its tail — as does the rattlesnake, to which it is related — when it senses danger, because there are no rattles on the bushmaster’s tail, no noise is made.

A second name for the bushmaster is concha pita, meaning pineapple tail. This name reflects the fact that the snake is covered in raised scales. The bushmaster can vary in color (most frequently in shades of brown), but is often tan with dark brown markings in the shape of diamonds. The snake’s coloring serves as an excellent camouflage in the forests where it lies. Bushmasters are usually solitary animals, coming together only during breeding. After breeding, the bushmaster female lays up to 12 eggs in a group called a clutch. While the eggs are in the clutch, the bushmaster exhibits a strong maternal instinct, coiling around and protecting the eggs. This maternal instinct is quite rare among reptiles. When the eggs hatch — usually in two to three months — the young are immediately capable of survival on their own.

The bushmaster is a type of pit viper. The “pit” in the snake’s name comes from the fact that it has a hollow pit close to the eye. The pit is covered by skin to protect it. The purpose of the pit is to sense heat. The heat is given off by the bushmaster’s prey, which consists of warm-blooded animals. The most common prey of the pit viper is a rodent. Usually, a viper will bite its prey, then retreat, letting the venom do the actual killing of the smaller animal. Should the animal wander away during its death throes, the bushmaster can follow the animal’s scent to find it later. Some bushmasters, however, bite their prey, then hold their fangs in the animal, often lifting it off the ground. Bushmasters
can patiently stalk their prey, hiding under the leaves or trees of the forest and waiting for the prey to pass. For this reason, some scientists refer to bushmasters as ambush predators.

The bushmaster itself has few enemies. Some larger species of snakes that are not susceptible to the pit viper’s venom, such as certain constrictors, can feed on the bushmaster. And like all snakes, the bushmaster may be attacked by the large birds of prey. However, in the final analysis, the greatest foe of the snake is encroaching civilization. More and more of the animal’s habitat — forests that until recently were considered remote and uninhabitable by humans — is being cleared. The bushmaster, while not an endangered species, is undergoing an alarming decline in numbers.

Some think that the bushmaster’s reputation for ferocity is misplaced. True, the animal is daunting by its sheer size. Some can reach lengths of 12 feet. However, except when hunting or attempting to breed, bushmasters are relatively placid, unaggressive creatures. Most of the injuries reported from bushmasters occurred when hikers accidentally stepped on drowsing snakes (whose coloration and silent warning system rarely alert humans to the snake’s presence). They are nocturnal, and thus more aggressive at night than in the daytime.

The primary purpose of the passage is to

A. explain why bushmaster snakes are the most poisonous snakes in the world
B. distinguish between the truths and myths regarding the bushmaster snake
C. suggest ways to use the bushmaster snakes to benefit mankind
D. explain the origins of the bushmaster’s name

Which of the following best describes the question that remains unanswered in the passage?

F. Why is the snake colored the way it is?
G. What is the purpose of the pits in the viper’s head?
H. What does the bushmaster eat?
J. How does a bushmaster attract its mate?

According to the passage, which of the following characteristics of a bushmaster is rare among reptiles?

A. the pits around its head
B. the number of eggs it lays in one clutch
C. its maternal instincts
D. the lack of rattles on its tail

It can be inferred from the passage that

F. the bushmaster is not the world’s largest venomous snake
G. the bushmasters have more brightly colored skins in the tropics
H. a bushmaster attacks only when threatened
J. because the central American rainforests are being threatened, the bushmaster is an endangered species

Which of the following is the reason the bushmaster is called an ambush predator?

A. It lives primarily in bushes in the Amazon.
B. It hides from its prey and then attacks it secretly.
C. It attacks only smaller animals.
D. It feeds off only live flesh, not carrion.

Which of the following does the author mean in lines 70–71 by stating that “the bushmaster’s reputation for ferocity is misplaced”?

F. The bushmaster is fierce only when outside of its normal habitat.
G. The bushmaster is becoming more and more fierce because it is endangered.
H. People are wrong in considering the bushmaster fierce.
J. People fear the bushmaster.

Which of the following is most reasonable to infer from the second to last paragraph?

A. Bushmasters may become endangered soon.
B. Bushmasters’ venom is not deadly to any birds.
C. Bushmasters’ venom is not deadly to humans.
D. Bushmasters cannot survive.

The passage suggests that the reason hikers are more frequently attacked by bushmasters is

F. hikers disturb the snakes at sleep
G. hikers enter the territories most fiercely defended by the snakes
H. hikers disturb the snake’s breeding grounds
J. snakes are out more in the night than in the daytime
29. The main point of the last paragraph is that
A. bushmasters sleep during the day
B. bushmasters will attack to protect their young and their food
C. bushmasters are quiet and hard to detect
D. bushmasters are not as aggressive as some people believe

30. Which of the following questions is NOT answered in the passage?
F. Who are the primary enemies of the bushmaster?
G. How does a bushmaster locate its prey?
H. Why is the bushmaster considered aggressive?
J. Why is a bushmaster’s maternal instinct stronger than that of other snakes?

Passage 4

Social Science

Symbolism in architecture is often overlooked by those who simply enjoy the beauty of the buildings. The United States Capitol is one such example of a building that is rarely examined more than superficially, yet has a wealth of symbols of interest to the American people. Starting off with one small wing in 1800, the Capitol has been the site of the inauguration of most of the presidents since Thomas Jefferson in 1801. Abraham Lincoln’s inaugural took place under scaffolding of increased construction in 1861. During Lincoln’s term, he responded to critics who complained about the cost of the construction by saying that the Capitol is a symbol of the unity of the nation, and that “if people see the Capitol going on, it is a sign we intend the Union shall go on.” Lincoln may be said to have begun and ended his presidency in the Capitol: His body lay in state in the Rotunda after his 1865 assassination.

Farmers are symbolically represented by the products depicted on columns in the original Senate wing, including corn and tobacco. (Oneonders the fact that the sculptors hired to create such American symbols came from abroad.) Of course, some architectural items are more overt than symbolic, such as the Statue of Freedom that atop the Capitol dome. On the base of the statue is incised “E Pluribus Unum,” which is Latin for “Out of many, one,” and is also found on the Great Seal of the United States.

In 1814, the British, fighting the war of 1812, captured Washington and set fire to most of its buildings, including the Capitol. While there was much damage inflicted upon the building, including the gutting of the interiors and the scarring of exteriors, there was not complete destruction during the conflagration because of a fortuitous rainstorm that hit Washington that evening. It was followed the next day by a windstorm that killed British officers and set off gunpowder explosions and destroyed houses. The British officers decided to retreat and the Capitol was spared.

One of the most striking features of the Capitol is its collection of artworks. Most tell a story about American history; some also present interesting facts about their artists. Samuel Morse, before he invented the telegraph for which he is best known, was a painter. He painted a night session of the House that featured each individual member, having painstakingly convinced each member to sit for him in order that he could get the likeness correct. A painting of the Marquis de Lafayette (who, incidentally, was the first foreign visitor to speak before a Joint Meeting of Congress) hangs in the House. Paintings trace the expansion of the country as well. An Emanuel Leutze 1862 painting called “Westward the Course of Empire Takes Its Way” showed pioneers crossing a divide. And it’s not just paintings that portray American history. A Thomas Crawford bronze door shows Washington saying goodbye in New York to his officers. The frieze on the Rotunda depicts William Penn’s treaty with the Indians. Statues abound, including, perhaps surprisingly, one of a Confederate general, Floridian Edmund Kirby Smith. Women are remembered as well. Amusingly nicknamed “Women in a Bathtub,” an eight-ton block of marble honors a trio of suffragettes: Elizabeth Cady Stanton, Susan B. Anthony, and Lucretia Mott. Also found are statues of Ethan Allen, the Revolutionary War hero from Vermont, Robert Fulton, the creator of the steamboat, and John Gorrie, M.D., a physician who patented the first ice-cream making machine in 1851, in an attempt to find something to cool down his fevered patients.

31. The primary point of the first paragraph is
A. Presidents are usually sworn into office on the steps of the Capitol.
B. The Capitol is over 200 years old.
C. The Capitol holds much symbolism for Americans.
D. A beautiful building cannot truly be appreciated unless one understands its symbolism.
32. What did the author mean by saying that Lincoln ended his presidency in the Capitol?
   F. Lincoln said goodbye to his party members on the steps of the Capitol.
   G. Lincoln was involved in a scandal in the Capitol that brought down his presidency.
   H. Lincoln’s body was returned to the Capitol after he’d been shot.
   J. Lincoln used the Capitol, not the White House, as his office of the Presidency.

33. Which of the following would the author most probably use to describe the fact that American symbols found in the Capitol were sculpted by foreign artists?
   A. irony
   B. ingenuity
   C. perspicacity
   D. pride

34. As it is used in line 25, the word “overt” most nearly means
   F. large
   G. obvious
   H. mysterious
   J. artistic

35. In line 37, “conflagration” most nearly means
   A. rainstorm
   B. evening
   C. bombing
   D. fire

36. Which of the following may best be implied by paragraph three?
   F. American forces were superior to British forces of the time.
   G. The British were too superstitious to fight after the occurrences that seemed to favor the American cause.
   H. The Capitol was completely destroyed by the British and had to be rebuilt.
   J. The Capitol was saved from destruction by natural forces.

37. According to the passage, one function of the art in the Capitol is
   A. to support and finance American art classes
   B. to provide physical proof to Americans of the use of their tax dollars
   C. to portray American history
   D. to put on public display various artworks presented to the President and Congress over the years

38. The passage answers all of the following questions EXCEPT
   F. How did the sculpture “Women in a Bathtub” get its nickname?
   G. What does E Pluribus Unum mean?
   H. Who was the first foreign citizen to speak before a joint session of Congress?
   J. Other than paintings, what type of artwork is found in the Capitol?

39. It is reasonable to infer that the author uses the phrase “perhaps surprisingly” in lines 63–64 to imply
   A. one wouldn’t expect a tribute to a former enemy in the Capitol
   B. one wouldn’t expect a Southerner to be honored in the North
   C. most statues are of civilians, not military people
   D. most statues are of more famous people, not a relatively unknown general

40. Which of the following was most probably the author’s reason for listing all the people portrayed in statues in the Capitol?
   F. to prove that there is an equal representation of men and women
   G. to signify the different types of artworks found in the building
   H. to demonstrate the variety of people who have contributed to America
   J. to provide a touch of comic relief
Passage 1

The amount of moisture in the air is designated as humidity. Weather reports typically present relative humidity, the percentage of the maximum amount of moisture the air can contain that is currently in the air. Air can contain more moisture at higher temperatures than at lower temperatures.

Relative humidity can be measured by comparing the temperature reading on a wet-bulb thermometer with the reading on a dry-bulb thermometer. Less humid air causes more moisture to evaporate from the wet bulb, thus lowering the temperature reading. Table 1 shows the relative humidity that is calculated at various air temperatures (dry-bulb) as a function of the difference between the wet-bulb and dry-bulb readings.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Difference Between Wet-Bulb and Dry-Bulb Reading (°C)</th>
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<tr>
<td></td>
<td>Dry-Bulb Reading (°C)</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>81</td>
</tr>
<tr>
<td>2</td>
<td>84</td>
</tr>
<tr>
<td>4</td>
<td>85</td>
</tr>
<tr>
<td>6</td>
<td>86</td>
</tr>
<tr>
<td>8</td>
<td>87</td>
</tr>
<tr>
<td>10</td>
<td>88</td>
</tr>
<tr>
<td>12</td>
<td>89</td>
</tr>
<tr>
<td>14</td>
<td>90</td>
</tr>
<tr>
<td>16</td>
<td>90</td>
</tr>
<tr>
<td>18</td>
<td>91</td>
</tr>
<tr>
<td>20</td>
<td>91</td>
</tr>
<tr>
<td>22</td>
<td>92</td>
</tr>
<tr>
<td>24</td>
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<tr>
<td>26</td>
<td>92</td>
</tr>
<tr>
<td>28</td>
<td>93</td>
</tr>
<tr>
<td>30</td>
<td>93</td>
</tr>
</tbody>
</table>

Humid air feels warmer to a human than does dry air at the same temperature because the moisture in the air makes it harder for the human body to cool itself by evaporating water from its body. Table 2 shows what various temperatures feel like to a typical human at different relative humidities.
### Table 2: Relationship Between Relative Humidity and Apparent Temperature (°C)

<table>
<thead>
<tr>
<th>Relative Humidity</th>
<th>Apparent Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21.1</td>
</tr>
<tr>
<td>0%</td>
<td>17.8</td>
</tr>
<tr>
<td>10%</td>
<td>18.3</td>
</tr>
<tr>
<td>20%</td>
<td>18.9</td>
</tr>
<tr>
<td>30%</td>
<td>19.4</td>
</tr>
<tr>
<td>40%</td>
<td>20.0</td>
</tr>
<tr>
<td>50%</td>
<td>20.6</td>
</tr>
<tr>
<td>60%</td>
<td>21.1</td>
</tr>
<tr>
<td>70%</td>
<td>21.1</td>
</tr>
<tr>
<td>80%</td>
<td>21.7</td>
</tr>
<tr>
<td>90%</td>
<td>21.7</td>
</tr>
<tr>
<td>100%</td>
<td>22.2</td>
</tr>
</tbody>
</table>

1. Which of the following is the best estimate of the apparent temperature when the air temperature is 35.0°C and the relative humidity is 75%?
   - A. 51.6
   - B. 54.0
   - C. 56.9
   - D. 57.3

2. Which of the following statements about the relationship between air temperature and apparent temperature is true?
   - F. As air temperature increases, the relative humidity that produces an equivalent apparent temperature increases.
   - G. As air temperature increases, the relative humidity that produces an equivalent apparent temperature remains constant.
   - H. As air temperature increases, the relative humidity that produces an equivalent apparent temperature decreases.
   - J. There is no relationship between air temperature and equivalent apparent temperature.

3. When the dry-bulb reading is 12°C, what is the wet-bulb reading, in °C, when the relative humidity is 78%?
   - A. 2
   - B. 10
   - C. 12
   - D. 14

4. The dry-bulb reading is the same as the air temperature. For a dry-bulb reading of 24°C and wet-bulb reading that is 4 degrees different, which of the following is the approximate apparent temperature in °C?
   - F. 20
   - G. 25
   - H. 28
   - J. 69

5. According to Table 1, under which of the following conditions is the amount of moisture in the area the least?
   - A. Dry-bulb reading of 0°C; wet-bulb reading 4°C different
   - B. Dry-bulb reading of 8°C; wet-bulb reading 6°C different
   - C. Dry-bulb reading of 16°C; wet-bulb reading 8°C different
   - D. Dry-bulb reading of 24°C; wet-bulb reading 10°C different
Passage 2

A pharmaceutical company has developed a new drug for treating hay fever. It claims that the new drug causes less drowsiness than the current best-selling brand. To test this claim, the company ran the following three studies.

Study 1

Subjects were asked to perform a motor coordination task that requires a high degree of alertness. Subjects who made fewer errors were judged to be less drowsy. Eight subjects were given a standard dosage of the new drug, and eight other subjects were given a standard dosage of the old drug. Four persons of each group of eight were tested one hour after ingesting the drug while the other four persons were tested eight hours after ingesting the drug. Realizing that drug effects often depend on a subject’s weight, the researchers weighed each subject who participated in the study. The number of errors and weights for each subject are presented in Table 1.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Errors</th>
<th>Weight (kg)</th>
<th>Subject</th>
<th>Errors</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38</td>
<td>75</td>
<td>5</td>
<td>37</td>
<td>71</td>
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<td>2</td>
<td>52</td>
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<td>6</td>
<td>33</td>
<td>73</td>
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<td>3</td>
<td>44</td>
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<td>7</td>
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<td>4</td>
<td>57</td>
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<tr>
<td>Average</td>
<td>47.75</td>
<td></td>
<td>Average</td>
<td>41.75</td>
<td></td>
</tr>
</tbody>
</table>

Study 2

After observing a wide range in the number of errors made by the subjects, the researchers repeated Study 1 but restricted the study to males who weighed 72 kilograms (kg). The results of this study appear in Table 2.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Errors</th>
<th>Subject</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>2</td>
<td>44</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>3</td>
<td>42</td>
<td>7</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>8</td>
<td>36</td>
</tr>
<tr>
<td>Average</td>
<td>41.25</td>
<td>Average</td>
<td>34.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Errors</th>
<th>Subject</th>
<th>Errors</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>30</td>
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<td>31</td>
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<tr>
<td>11</td>
<td>34</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>12</td>
<td>34</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Average</td>
<td>32.25</td>
<td>Average</td>
<td>30.75</td>
</tr>
</tbody>
</table>

Table 1  Number of Errors on Coordination Task After Ingesting Drug

Table 2  Coordination Task Errors for 72-kg Males
Study 3

This study was identical to Study 2 except that 54-kg females were used. The results of this study are shown in Table 3.

<table>
<thead>
<tr>
<th>Subject</th>
<th>One hour after ingestion</th>
<th>Eight hours after ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>56</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>53</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>54.25</td>
<td>Average 49.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>One hour after ingestion</th>
<th>Eight hours after ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>44</td>
<td>13</td>
</tr>
<tr>
<td>10</td>
<td>48</td>
<td>14</td>
</tr>
<tr>
<td>11</td>
<td>44</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>46</td>
<td>16</td>
</tr>
<tr>
<td>Average</td>
<td>45.5</td>
<td>Average 47.25</td>
</tr>
</tbody>
</table>

6. Which of the following is the most reasonable conclusion that can be made on the basis of Study 1?
   F. The new drug is more effective than the old drug one hour after ingestion but not eight hours after ingestion.
   G. Performance on the motor coordination task deteriorates as time after ingestion of the old drug increases.
   H. As compared to the old drug, the new drug improved the ability of experimental subjects to perform the motor coordination task.
   J. The new drug causes less drowsiness than the old drug one hour after ingestion but not eight hours after ingestion.

7. Which of the following best summarizes why the researchers conducted Studies 2 and 3?
   A. They wished to examine the effects of weight on drowsiness produced by the drug.
   B. They were interested in whether the drug would affect men and women differently.
   C. They wanted to eliminate a factor that caused variability in the results.
   D. Most people who suffer from hay fever weigh approximately what the subjects in those studies weighed.

8. In comparison to Study 1, what is a primary limitation of Study 2?
   F. Study 2 does not measure the effects of the drugs on females.
   G. Study 1 suggests that the new drug may be more effective for a variety of subjects.
   H. Study 1 shows that the new drug caused less drowsiness in a wider range of subjects.
   J. Study 2 produced results that were more difficult to interpret.

9. If Study 3 included a group that was tested two hours after ingesting the old drug, which of the following predictions for the average number of errors made by this group would be reasonable?
   I. 44
   II. 51
   III. 52
   IV. 56
   A. II only
   B. I and II only
   C. II, III, and IV only
   D. I, II, III, and IV
10. Suppose that further study revealed that the group of subjects given the old drug and tested at eight hours in Study 1 was, under normal conditions, particularly proficient at performing the motor coordination task. How would this finding affect the overall results of the study?

F. It would add evidence that the new drug causes less drowsiness than the old drug at eight hours after ingestion.

G. It would suggest that side effects associated with the old drug are more common eight hours after ingesting the drug than at only one hour after ingestion.

H. It would suggest that the new drug is more effective than the old drug at any time after ingestion.

J. It would require that the entire experiment be repeated with the same subjects being tested at both one hour and eight hours.

11. If later studies show that the new drug is at least as effective as the old drug in relieving hay fever and that the new drug produces no side effects other than drowsiness, would it be reasonable to recommend the new drug over the old drug to lightweight individuals suffering from hay fever?

A. Yes, but only if such individuals are given a lower dose than what was used in the current three studies.

B. Yes, because the evidence supports the claim that the new drug is at least as effective and produces less drowsiness.

C. No, because the individuals may operate dangerous machinery within eight hours after ingesting the drug.

D. No, because the new drug differs from the old system with regard to how it affects the immune system, which is responsible for hay fever.

Passage 3

A wide beach protects bluffs by spreading out the energy of waves and keeping them from eroding the soil and rocks that comprise the bluff (see Figure 1).

Figure 1: Simplified illustration of waves hitting a wide beach.

When water levels rise, bluffs are vulnerable to erosion because much of the beach is now underwater, and the bluffs now bear the brunt of the waves’ force (see Figure 2).

Figure 2: Simplified illustration of waves hitting a bluff when water level rises above beach.

To gain a better understanding of how natural forces can affect future water levels and bluff erosion, scientists studied the relationship between some key meteorological factors and water depth (deeper water means a higher water level) near the shore of an inland lake.

Study 1

Scientists measured precipitation and lake depth over a 30-year period and plotted the average depth against annual precipitation, as shown in Figure 3.

Figure 3: The average depth against annual precipitation.
Study 2

Because temperature affects water evaporation rate and a higher evaporation rate lowers water levels, scientists plotted the average depth against the mean annual temperature. This relationship is shown in Figure 4.

![Figure 4](image1)

**Figure 4**: The average depth versus the mean annual temperature.

Study 3

Wind is another factor that affects water evaporation rate, so scientists plotted the average depth against wind speed, as shown in Figure 5.

![Figure 5](image2)

**Figure 5**: The average depth versus wind speed.

12. Suppose that only 10 cm of precipitation occurs in one year. Which of the following is the most reasonable lake depth estimate for that year?
   F. 5.5 m  
   G. between 5.0 m and 5.5 m  
   H. less than 5.0 m  
   J. 2.5 m

13. What is the most likely relationship between temperature and evaporation rate?
   A. When temperature increases, evaporation rate increases.  
   B. When temperature increases, evaporation rate decreases.  
   C. When temperature increases, evaporation rate is unaffected.  
   D. When temperature decreases, evaporation rate increases.

14. After a year of low precipitation, high temperatures, and strong winds, the lake depth would probably be
   F. low.  
   G. average.  
   H. high.  
   J. extremely high.

15. Are strong winds definitely good for the bluff?
   A. Yes, because strong winds tend to lower water levels and help stimulate plant growth.  
   B. Yes, because strong winds deposit soil on the bluff and reduce soil fertility.  
   C. No, because strong winds raise temperatures.
   D. No, because strong winds produce more powerful waves, which can crash into the bluff.

16. Which of the following is the dependent variable of the investigation?
   F. precipitation  
   G. lake depth  
   H. mean annual temperature  
   J. wind speed

17. Without any additional information, which of the following would further knowledge of how weather affects the bluff?
   I. counting the number of homes built on the bluff  
   II. investigating the feasibility of constructing a protective seawall  
   III. measuring erosion as a result of precipitation, temperature, and wind speed  
   IV. measuring the tides over the course of several years
   A. III only  
   B. I and III only  
   C. II and IV only  
   D. II, III, and IV only

Passage 4

The use of gasoline is directly related to the number of pollutants, such as hydrocarbons, nitrous oxide, and carbon monoxide, present in the air. As a result, drivers should take steps to minimize their gasoline consumption. One way to reduce this consumption is to drive at slower speeds. Figure 1 shows how gasoline mileage is affected by freeway driving speeds.

Go on to next page
Figure 1: Gas mileage as a function of speed.

18. Which of the following will produce the most pollutants on a 100-mile trip?
   F. a compact car driven at 50 mph
   G. a midsize car driven at 60 mph
   H. a full-size car driven at 50 mph
   J. a full-size car driven at 60 mph

19. You are in the desert with no gas in sight, and your gas gauge shows that you have very little gas left. Should you speed up to get to your destination?
   A. No, because you use more gas at a higher speed.
   B. No, because you need more time to find a gas station.
   C. Yes, because the desert has very little pollution.
   D. Yes, because your car operates for less time and, as a consequence, burns less gas.

20. A full-size car driven at 55 mph will get approximately how many miles per gallon?
   F. 23
   G. 25
   H. 32
   J. 37

21. On the basis of the graph, which of the following statements is the most reasonable regarding compact gas mileage at 25 mph?
   A. Gas mileage is about 40 miles per gallon.
   B. Gas mileage is about 50 miles per gallon because gas mileage increases eight miles per gallon for every 10 mph increase in speed.
   C. Gas mileage is about 80 miles per gallon because gas mileage doubles when speed is cut in half.
   D. Gas mileage can’t be determined with any reasonable certainty because 25 mph is outside the range of numbers presented in the graph.

22. Which of the following graphs best represents the relationship between freeway speed and pollutants emitted?

F.

G.

H.
Passage 5

From stimulating the brains of patients undergoing neurosurgery, scientists have determined that a strip of the brain just in front of the central sulcus controls the motor neurons throughout the body. That is, this part of the brain controls the neurons that control the voluntary muscles. This motor area is illustrated in Figure 1.

Further work has mapped out the specific parts of this motor area that control certain parts of the body. The regions of the left half of the brain, which controls the right side of the body, are illustrated in Figure 2. The right side of the brain, which controls the left side of the body and is not illustrated, shows a mirror image of the left side of the brain.

Figure 1: Side view of the brain.

Figure 2: Simplified front view of left brain through motor area. Bands indicate region of brain that control stated part of body.

23. Which of the following is/are true regarding the organization of the motor area, shown in Figure 2?
   I. No systematic relationship exists between how the motor area is organized and how the body is organized.
   II. The sequence of controlling regions in the motor area is similar to the sequence of body parts.
   III. Some parts of the body are controlled by larger regions of the motor area than others.
   A. II only
   B. III only
   C. I and II only
   D. II and III only

24. From an inspection of Figure 2, which of the following areas involves the most complex coordination of muscles?
   F. Hip
   G. Shoulder
   H. Hand
   J. Brow
25. Damage to the part of the motor area marked in the above figure would most likely affect movement in which of the following areas of the body?
A. Right lips
B. Right knee
C. Left knee
D. Left jaw

26. The brain is organized so that related functions are under control of areas that are close to one another in the brain. Which of the following is the most likely location for the part of the brain that controls speech production?
F. location F
G. location G
H. location H
J. location J

27. Damage to the part of the motor area marked in Figure 4 will most likely affect
A. vision.
B. hearing.
C. the ability to feel touching on the face.
D. the ability to move facial muscles.

---

**Passage 6**

Homing pigeons received their name because of their ability to find their way home even when they are hundreds of kilometers away. Scientists know that pigeons do not use visible landmarks to navigate, because the birds can find their way home even after they have been transported in a covered box and released in an unfamiliar area. Scientists have offered several explanations for this acute navigational ability. Following are two of these hypotheses.

**Sun Compass**

Pigeons use the sun as a compass to orient themselves. Evidence for this theory comes from an experiment in which pigeons were placed in a circular cage with identical food cups evenly spaced just outside the cage. After being trained to go to the cup due east of the cage’s center, pigeons were observed to go to the same cup even after the cage was rotated and the background scenery was changed. Pigeons failed to go to the east cup when the skies were overcast or when the experimenters used mirrors to alter the apparent position of the sun.

The pigeons use their internal clocks in conjunction with the sun to find their way home. For example, if the internal clock of a pigeon indicates noon while the bird observes the sun about to set, the pigeon knows that it is far east of its home and...
flies west to get there. A northern hemisphere bird that is due south of home at noon sees that the sun is in the correct position as far as east and west are concerned but observes that the sun is higher in the sky than normal and therefore flies north to get home. Support for this mechanism comes from observing birds whose internal clocks have been experimentally shifted. Their orientation, with respect to the sun, is consistent with their internal clock, but because the clock is off, the pigeons fly in the wrong direction.

**Magnetic Field**

Pigeons do not rely on a sun-internal clock calculation to orient themselves. Clock-shifted birds are just as accurate and fast as normal birds at finding their way home on overcast days.

Disruptions in the magnetic field surrounding the birds, on the other hand, affect the birds’ orientation under such conditions. When bar magnets are placed on pigeons, they fly in random directions on overcast days. Similar results were obtained when scientists used electrical wires to induce an electrical field in a particular direction. When the wires induced a magnetic field that pointed up through the birds’ heads, the pigeons flew away from home. When the field pointed in the opposite direction, the birds flew toward home. These findings, along with the discovery that pigeons are capable of responding to a magnetic field much weaker than that of earth, indicate that pigeons use the earth’s magnetic field for orientation.

28. According to the sun-compass hypothesis, how would the pigeons with the disrupted magnetic fields orient on a sunny day?
   A. They would fly in random directions.
   B. They would fly toward home.
   C. They would fly in a direction that is a compromise between the information provided by the magnetic field and the information provided by the sun.
   D. They would fly straight but in a direction away from home.

29. Scientists have found that large disturbances in the earth’s magnetic field affect the pigeons’ flight direction on sunny days. Which of the following is the most reasonable statement that can be made on the basis of this finding?
   A. The sun-compass hypothesis is false.
   B. Pigeons don’t use the sun for orientation.
   C. The Earth’s magnetic field is the only factor that affects pigeon navigation.
   D. The finding supports the magnetic-field hypothesis.

30. Which finding presented in the passage is consistent with the sun-compass hypothesis but inconsistent with the magnetic-field hypothesis?
   F. The caged pigeons don’t fly to the right cup on overcast days.
   G. The clock-shifted pigeons fly the wrong way on a sunny day.
   H. The clock-shifted pigeons fly home on an overcast day.
   J. Magnetic-field disturbances affect pigeon navigation.

31. The author of the magnetic-field hypothesis assumes that
   A. pigeons with magnets are not affected by the mere presence of metal.
   B. magnets have absolutely no effect on pigeons on sunny days.
   C. no birds use internal clocks to navigate.
   D. pigeons do not use the sun to navigate.

32. According to the entire passage, which of the following statements are most reasonable to make regarding clock-shifted pigeons that are placed at their home?
   I. They will fly away from their home on a sunny day because the clock-sun calculation will indicate that they are away from home.
   II. They will stay home on a sunny day because they will recognize familiar landmarks.
   III. They will stay home on an overcast day because the magnetic field will indicate that they are home.
   F. I and II only
   G. I and III only
   H. II and III only
   J. I, II, and III

33. Some evidence indicates that homing pigeons can use barometric pressure to navigate. How does this evidence relate to the sun-compass and magnetic-field hypotheses?
   A. This evidence disprove both hypotheses.
   B. This evidence is inconsistent with both hypotheses.
   C. This evidence is consistent with the sun-compass hypothesis but inconsistent with the magnetic-field hypothesis.
   D. This evidence may be consistent with both hypotheses.
Table 1 Results of Combining Chemicals

<table>
<thead>
<tr>
<th>Concentration (moles/liter)</th>
<th>H₃AsO₄</th>
<th>I⁻</th>
<th>H⁺</th>
<th>Formation rate (rate units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.20</td>
<td>0.10</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>0.02</td>
<td>0.20</td>
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<td>5.6</td>
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</tr>
<tr>
<td>0.03</td>
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<td>0.10</td>
<td>8.4</td>
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<tr>
<td>0.04</td>
<td>0.20</td>
<td>0.10</td>
<td>11.2</td>
<td></td>
</tr>
</tbody>
</table>

Experiment 2

This experiment was identical to Experiment 1 except that the scientists varied the concentration of I⁻ while holding the concentration of the other reactants constant. The results of these experimental trials are presented in Table 2.

Table 2 Results of Holding the Concentration of Other Reactants Constant

<table>
<thead>
<tr>
<th>Concentration (moles/liter)</th>
<th>H₃AsO₄</th>
<th>I⁻</th>
<th>H⁺</th>
<th>Formation rate (rate units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.20</td>
<td>0.10</td>
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<tr>
<td>0.01</td>
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<td>0.01</td>
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<td>0.01</td>
<td>0.80</td>
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</tbody>
</table>

Experiment 3

This experiment was identical to the other two, except that the concentration of H⁺ was the one that varied. The results are presented in Table 3.

Table 3 Results of Varying H⁺ Concentration

<table>
<thead>
<tr>
<th>Concentration (moles/liter)</th>
<th>H₃AsO₄</th>
<th>I⁻</th>
<th>H⁺</th>
<th>Formation rate (rate units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.20</td>
<td>0.10</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
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<td>0.20</td>
<td>0.20</td>
<td>11.2</td>
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<tr>
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<td>0.40</td>
<td>44.8</td>
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</tbody>
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35. A chemist must make as much \( \text{H}_3\text{AsO}_4 \) as possible in a minute. If she can change the concentration of only one reactant, which reactant should she choose?
   A. \( \text{H}_3\text{AsO}_4 \)
   B. \( \Gamma \)
   C. \( \text{H}^+ \)
   D. Any reactant

36. Why did the chemists vary the concentration of only one reactant at a time?
   F. Varying the concentration of more than one reactant causes a violent explosion.
   G. When the concentration of more than one reactant varies and the formation rate changes; how each reactant affects the formation rate is unclear.
   H. Measuring the concentration of more than one reactant at the same time is difficult.
   J. When the concentration of more than one reactant is varied, the amount of product formed is too great to make an accurate determination of the formation rate.

37. If the concentrations of \( \text{H}_3\text{AsO}_4 \), \( \Gamma \), and \( \text{H}^+ \) are 0.02 moles/liter, 0.40 moles/liter, and 0.10 moles/liter, respectively, what is the formation rate?
   A. 2.8 rate units
   B. 5.6 rate units
   C. 8.4 rate units
   D. 11.2 rate units

38. If scientists combine 0.01 moles \( \text{H}_3\text{AsO}_4 \), 0.20 moles of \( \Gamma \), and 0.10 moles of \( \text{H}^+ \) in two liters of solution instead of one liter that was used in the first trial of each experiment, what happens to the formation rate?
   F. The formation rate decreases.
   G. The formation rate remains the same.
   H. The formation rate increases for a few seconds and then decreases.
   J. The formation rate increases.

39. If a fifth trial is performed in Experiment 3 at which 0.80 moles/liter of \( \text{H}^+ \) are used and all other concentrations remain unchanged, what is the likely formation rate?
   A. 22.4 rate units
   B. 44.8 rate units
   C. 89.6 rate units
   D. 179.2 rate units

40. What happens to the formation rate of \( \text{H}_2\text{O} \) when the concentration of one or more reactant is increased?
   F. The formation rate decreases.
   G. The formation rate is zero.
   H. The formation rate remains the same.
   J. The formation rate increases.