Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

Questions 1-10 are based on the following passage.

This passage is from James Baldwin, *Another Country*. ©1990 by Gloria Baldwin Karefa-Smart. Originally published in 1962. Eric, an actor, and Vivaldo, a writer, are watching Vivaldo's girlfriend, Ida, sing with a band that her brother, the Kid, once played with.

Line

She was not announced; there was merely a brief huddle with the piano-player; and then she stepped up to the mike. The piano-player began the first few bars, but the crowd did not take the hint.

"Let's try it again," said Ida, in a loud, clear voice.

At this, heads turned to look at her; she looked calmly down on them. The only sign of her agitation was in her hands, which were tightly, restlessly clasped before her—she was wringing her hands, but she was not crying.

Somebody said, in a loud whisper, "Dig, man, that's the Kid's kid sister."

There were beads of sweat on her forehead and on her nose, and one leg moved out, trembling, moved back. The piano-player began again, she grabbed the mike like a drowning woman, and abruptly closed her eyes:

You
Made me leave my happy home.
You took my love and now you've gone,
Since I fell for you.

She was not a singer yet. And if she were to be judged solely on the basis of her voice, low, rough-textured, of no very great range, she never would be. Yet, she had something which made Eric look up and caused the room to fall silent; and Vivaldo stared at Ida as though he had never seen her before. What she lacked in vocal power and, at the moment, in skill, she compensated for by a quality so mysteriously and implacably egocentric that no one has ever been able to name it. This quality involves a sense of the self so profound and so powerful that it does not so much leap barriers as reduce them to atoms—while still leaving them standing, mightily, where they were; and this awful sense is private, unknowable, not to be articulated, having, literally, to do with something else; it transforms and lays waste and gives life, and kills.

She finished her first number and the applause was stunned and sporadic. She looked over at Vivaldo with a small, childish shrug. And this gesture somehow revealed to Eric how desperately one could love her, how desperately Vivaldo was in love with her. The drummer went into a down-on-the-levee-type song, which turned out to be a song Eric had never heard before:

Betty told Dupree
She wanted a diamond ring.
And Dupree said, Betty,
I'll get you most any old thing.

"My God," muttered Vivaldo, "she's been working."

His tone unconsciously implied that he had not been, and held an unconscious resentment. And this threw Eric in on himself. Neither had he been working—for a long time; he had merely been keeping his hand in. He looked at Vivaldo's white, passionate face and wondered if Vivaldo were now thinking that he had not been working because of

CONTINUE

Ida: who had not, however, allowed *him* to distract *her*. There she was, up on the stand, and unless all the signs were false, and no matter how hard or long the road might be, she was on her way. She had started.

She and the musicians were beginning to enjoy each other and to egg each other on as they bounced through a ballad of cupidity, treachery, and death; and Ida had created in the room a new atmosphere and a new excitement. Even the heat seemed less intolerable. The musicians played for her as though she were an old friend come home and their pride in her restored their pride in themselves.

The number ended and Ida stepped off the stand, wet and triumphant, the applause crashing about her ears like foam. She came to the table, looking at Vivaldo with a smile and a small, questioning frown, and, standing, took a sip of her drink. They called her back. The drummer reached down and lifted her, bodily, onto the stand, and the applause continued.

1

The passage most strongly suggests that Ida's performance has which effect on Eric and Vivaldo?

A) The song lyrics reach them deeply.
B) Her voice bothers their sense of aesthetics.
C) They both begin to perceive her in a new way.
D) They both realize they are in love with her.

2

Lines 31-38 ("This . . . kills") primarily serve to

A) allude to obstacles that Ida had overcome in pursuing a singing career.
B) suggest that Ida has some unpleasant personal qualities.
C) illustrate the remarkable power of Ida's stage presence.
D) describe how Ida's singing affects some listeners negatively.

3

According to the narrator, Ida's singing voice sounds

A) surprisingly loud and high.
B) flawed and untrained.
C) beautiful but limited in range.
D) incapable of reaching low notes.

4

It can most reasonably be inferred that Eric and Vivaldo, when compared to Ida,

A) are less able to captivate a group of people.
B) have significantly less musical knowledge.
C) more strongly prefer the comfort of friendships over the difficulty of work.
D) have expended less effort in pursuing their career goals.

5

Which choice provides the best evidence for the answer to the previous question?

A) Lines 25-27 ("Yet, she . . . before")
B) Lines 41-44 ("And this . . . with her")
C) Lines 44-46 ("The drummer . . . before")
D) Lines 55-57 ("Neither . . . hand in")

6

In lines 60 and 61, the author italicizes the words "*him*" and "*her*" primarily to

A) reveal the envy Vivaldo harbors toward Ida for putting more effort toward her singing career than their relationship.
B) suggest a contrast between the effect Ida has on Vivaldo's work and the effect Vivaldo has on Ida's work.
C) highlight the positive effect Ida's relationship with Vivaldo has had on her self-confidence.
D) underscore the mutual distractions that both Ida and Vivaldo must face as creative artists.

CONTINUE

7

As used in line 62, "signs" most nearly means

A) indications.
B) symbols.
C) directions.
D) warnings.

8

Based on the passage, which statement best describes the relationship between Ida and the band?

A) Ida sings with the band to help them achieve a musical comeback.
B) Ida and the band develop a musical rapport that is mutually exhilarating.
C) The band members promote Ida's career out of regard for her brother.
D) The band members restrain their resentment over Ida's quick success.

9

Which choice provides the best evidence for the answer to the previous question?

A) Lines 3-4 ("The piano-player . . . hint")
B) Lines 15-17 ("The piano-player . . . eyes")
C) Lines 64-68 ("She and . . . excitement")
D) Lines 76-78 ("They . . . continued")

10

As used in line 71, "restored" most nearly means

A) fixed.
B) updated.
C) retrieved.
D) revived.

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from Ian Tattersall, *Masters of the Planet: The Search for Our Human Origins*. ©2012 by Ian Tattersall.

Some of the most notable technological advances in hominid history, including the domestication of fire, the invention of compound tools, and the building of shelters, predated language. Such achievements are impressive indeed. But language facilitated the imposition of symbolic information processing upon older cognitive processes. And this added an entirely new dimension to the way in which hominids saw the world, and eventually reimagined it.

That this momentous event took place in Africa—the continent in which we find the first fossil evidence of creatures who looked just like us, and (somewhat later) the earliest archaeological suggestions of symbolic activities—is corroborated by a recent study of the sounds used in spoken languages around the world. The study of comparative linguistics makes it clear that languages have evolved much as organisms have done, with descendant versions branching away from the ancestral forms while still retaining for some time the imprint of their common origins. Many scientists have accordingly used the differentiation of languages as a guide to the spread of mankind across the globe. And in doing this they have traditionally concentrated on the words that make up those languages. But this has proved a tricky endeavor, for individual words change quite rapidly over time: so rapidly that beyond a time depth of about five thousand years, or ten at the very most, it turns out to be fairly hopeless to look for substantial traces of relationship. As a result, while language has indeed proven useful in tracing the movement of peoples around the Earth over the last few thousand years, linguists have been somewhat stymied when it comes to its very early evolution.

Cognitive psychologist Quentin Atkinson has recently suggested an alternative. According to Atkinson, in seeking the origins of language we are better off looking not at words as a whole, but at the individual sound components—the phonemes—of which they are comprised. This makes sense, because the phonemes are much more bound by biology than are the ideas that their combinations represent. And when Atkinson looked at the distribution of

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phonemes in languages around the world, he found a remarkable pattern. The farther away from Africa you go, the fewer phonemes are typically used in producing words. Some of the very ancient "click" languages of Africa, spoken by people with very deep genetic roots, have over a hundred phonemes. English has about 45; and in Hawaii, one of the last places on Earth to be colonized by people, there are only 13.[1] Atkinson attributes this pattern to what is known as "serial founder effect": a phenomenon, well known to population geneticists, that is due to the drop in effective population size each time a descendant group buds off and spreads away from an ancestral one. With each successive budding, genetic—and apparently also phonemic—diversity diminishes.

The signal of this effect in the five hundred or so languages analyzed by Atkinson is weaker than the one found in the genes, but this difference is plausibly due to the rapidity with which languages evolve. The key thing, though, is that the genetic and phonemic patterns are essentially the same, and that both point to an origin in Africa. Atkinson's analysis suggests that the convergence point may be in southwestern Africa, which is also in line with one recent genetic study. And his results imply not only that modern *Homo sapiens* originated in a single place, but also that the same thing was true for language (or at least, for the form of language that survives today). In which case, there is a strong argument for a fundamental synergy between biology and language in the rapid takeover of the world by articulate modern humans.

[1] The author refers to the Polynesian language Hawaiian, the main language spoken by the people of Hawaii prior to their contact with Europeans in the eighteenth century.

Phonemic Diversity and Distance from Postulated Language Origin Site for 10 Language Families

Language family	Examples of languages in family	Mean phoneme diversity (0 = global mean; increasing values = increasing diversity)	Distance from postulated language origin site in southwestern Africa to geographic center of language family (kilometers)
Afro-Asiatic	Arabic, Somali	0.316	4,164
Altaic	Turkish, Uzbek	−0.040	10,703
Australian	Alawa, Tiwi	−0.738	17,922
Indo-European	English, Hindi	0.069	9,025
Khoisan	Deti, Sandawe	0.652	1,161
Mayan	Huastec, Jakaltek	−0.198	22,267
Niger-Congo	Igbo, Swahili	0.665	3,050
Sino-Tibetan	Burmese, Mandarin	0.543	12,153
Trans-New Guinea	Ekari, Kewa	−0.152	18,038
Yanomam	Shiriana, Sanuma	−0.623	25,619

Adapted from Quentin D. Atkinson, "Phonemic Diversity Supports a Serial Founder Effect Model of Language Expansion from Africa." ©2011 by American Association for the Advancement of Science.

CONTINUE

11

It can reasonably be inferred from the passage that the author views the advent of language as

A) inevitable, because early hominids possessed the biological capacity for speech.

B) pivotal, because it changed the way that hominids made sense of their existence.

C) overvalued, because important advancements in technology had already taken place.

D) fortunate, because it accelerated hominids' expansion across the African continent.

12

Which choice best supports the idea that the pace at which languages evolve has posed a challenge to research into the migration of modern humans?

A) Lines 22-25 ("Many . . . globe")

B) Lines 25-27 ("And in . . . languages")

C) Lines 27-32 ("But this . . . relationship")

D) Lines 38-42 ("According . . . comprised")

13

As used in line 43, "bound" most nearly means

A) restricted.

B) resolved.

C) secured.

D) bordered.

14

According to the passage, which statement best describes the relationship between phonemes and population shifts?

A) The number of phonemes used by a population determines the diversity of descendant groups.

B) When descendant groups of a population merge with one another, the total number of their phonemes increases.

C) Phonemic diversity in a population changes only with early branching of descendant groups.

D) As a population's size decreases in descendant groups, the number of phonemes also decreases.

15

As used in line 61, "diminishes" most nearly means

A) relaxes.

B) criticizes.

C) removes.

D) declines.

16

Lines 49-51 ("Some . . . phonemes") mainly serve to

A) provide an example in support of a claim made by the author.

B) note an exception to a pattern described in the passage.

C) define a term that may be unfamiliar to some readers.

D) describe an occurrence that raises additional research questions.

CONTINUE

17

Based on the passage, Atkinson's research suggests which relationship between genetic and phonemic diversity?

A) Genetic diversity provides stronger evidence of the effects of a group's divergence from ancestral populations than phonemic diversity does.

B) The genetic diversity of a group tends to increase at a steadier rate than does the phonemic diversity of the language spoken by that group.

C) When genetic and phonemic diversity in a group reach a certain threshold, the group is likely to diverge into multiple descendant groups.

D) Genetic diversity points to a single origin event for language, while phonemic diversity suggests the possibility of more than one such event.

18

Which choice provides the best evidence for the answer to the previous question?

A) Lines 54-59 ("Atkinson . . . one")

B) Lines 59-61 ("With . . . diminishes")

C) Lines 62-66 ("The signal . . . evolve")

D) Lines 71-75 ("And his . . . today")

19

According to the table, what is the distance between the geographic center of the Trans-New Guinea language family and the postulated language origin site in southwestern Africa?

A) 12,153 kilometers

B) 17,922 kilometers

C) 18,038 kilometers

D) 25,619 kilometers

20

The table indicates that the language family with the greatest distance from the postulated language origin site to its geographic center includes which two languages?

A) Turkish and Uzbek

B) Huastec and Jakaltek

C) Ekari and Kewa

D) Shiriana and Sanuma

21

Based on the passage and the table, the Indo-European language family arose through a smaller number of successive buddings from ancestral populations than did which other language family?

A) Khoisan

B) Niger-Congo

C) Mayan

D) Afro-Asiatic

CONTINUE

Questions 22-32 are based on the following passage and supplementary material.

This passage is adapted from Stephen M. Roth, "Why Does Lactic Acid Build Up in Muscles? And Why Does It Cause Soreness?" ©2006 by Scientific American, a division of Nature America, Inc.

As our bodies perform strenuous exercise, we begin to breathe faster as we attempt to shuttle more oxygen to our working muscles. The body prefers to generate most of its energy using aerobic methods, meaning with oxygen. Some circumstances, however, require energy production faster than our bodies can adequately deliver oxygen. In those cases, the working muscles generate energy anaerobically. This energy comes from glucose through a process called glycolysis, in which glucose is broken down or metabolized into a substance called pyruvate through a series of steps. When the body has plenty of oxygen, pyruvate is shuttled to an aerobic pathway to be further broken down for more energy. But when oxygen is limited, the body temporarily converts pyruvate into a substance called lactate, which allows glucose breakdown—and thus energy production—to continue. The working muscle cells can continue this type of anaerobic energy production at high rates for one to three minutes, during which time lactate can accumulate to high levels.

A side effect of high lactate levels is an increase in the acidity of the muscle cells, along with disruptions of other metabolites. The same metabolic pathways that permit the breakdown of glucose to energy perform poorly in this acidic environment. On the surface, it seems counterproductive that a working muscle would produce something that would slow its capacity for more work. In reality, this is a natural defense mechanism for the body; it prevents permanent damage during extreme exertion by slowing the key systems needed to maintain muscle contraction.

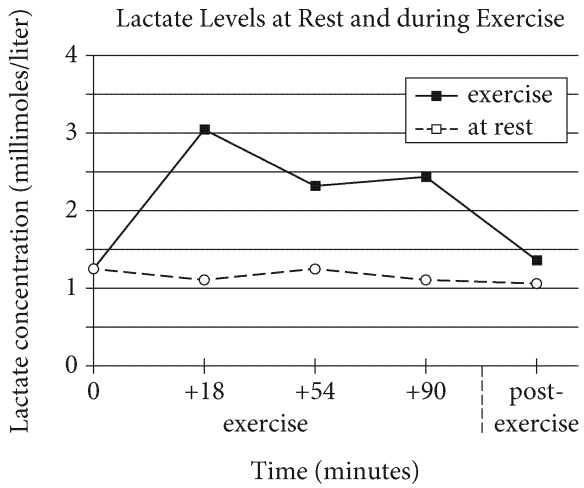
Contrary to popular opinion, lactate or, as it is often called, lactic acid buildup is not responsible for the muscle soreness felt in the days following strenuous exercise. Rather, the production of lactate and other metabolites during extreme exertion results in the burning sensation often felt in active muscles, though which exact metabolites are involved remains unclear. This often painful sensation also gets us to stop overworking the body, thus forcing a recovery period in which the body clears the lactate and other metabolites.

Researchers who have examined lactate levels right after exercise found little correlation with the level of muscle soreness felt a few days later. This delayed-onset muscle soreness, or DOMS as it is called by exercise physiologists, is characterized by sometimes severe muscle tenderness as well as loss of strength and range of motion, usually reaching a peak 24 to 72 hours after the extreme exercise event.

Though the precise cause of DOMS is still unknown, most research points to actual muscle cell damage and an elevated release of various metabolites into the tissue surrounding the muscle cells. These responses to extreme exercise result in an inflammatory-repair response, leading to swelling and soreness that peaks a day or two after the event and resolves a few days later, depending on the severity of the damage. In fact, the type of muscle contraction appears to be a key factor in the development of DOMS. When a muscle lengthens against a load—imagine your flexed arms attempting to catch a thousand pound weight—the muscle contraction is said to be eccentric. In other words, the muscle is actively contracting, attempting to shorten its length, but it is failing. These eccentric contractions have been shown to result in more muscle cell damage than is seen with typical concentric contractions, in which a muscle successfully shortens during contraction against a load.

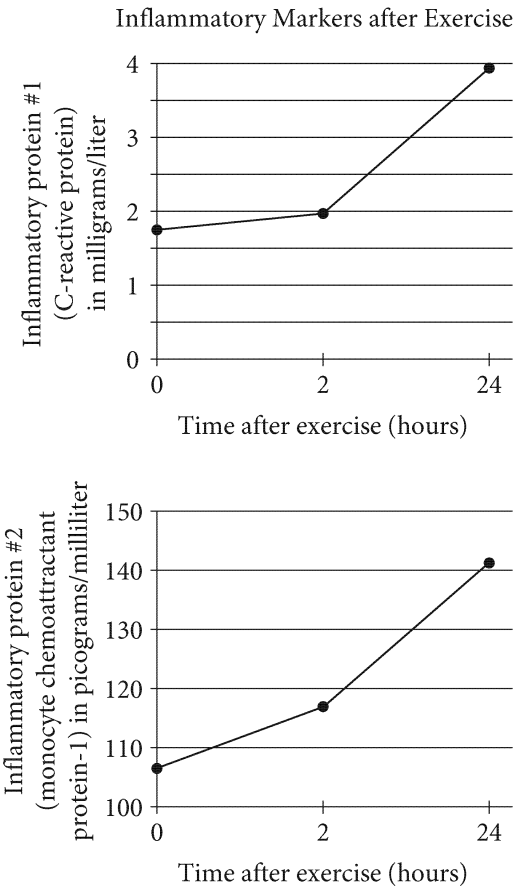
CONTINUE

Figure 1



Adapted from Penny E. Shockett et al., "Plasma Cell-Free Mitochondrial DNA Declines in Response to Prolonged Moderate Aerobic Exercise." ©2016 by Penny E. Shockett et al.

Figure 2



Adapted from Franchek Drobnic et al., "Reduction of Delayed Onset Muscle Soreness by a Novel Curcumin Delivery System (Meriva®): A Randomised, Placebo-Controlled Trial." ©2014 by Franchek Drobnic et al.

22

The passage most strongly suggests that the body can generate energy anaerobically only

A) during rapid breathing.
B) when it has sufficient oxygen.
C) while it breaks down lactate.
D) for a limited amount of time.

CONTINUE

23

Which choice provides the best evidence for the answer to the previous question?

A) Lines 1-3 ("As our . . . muscles")
B) Lines 12-14 ("When . . . energy")
C) Lines 14-18 ("But when . . . continue")
D) Lines 18-22 ("The working . . . levels")

24

The main purpose of the passage is to

A) examine what causes tenderness in muscles after exercise.
B) describe the process by which glucose is broken down.
C) question why lactate accumulates in muscle cells.
D) argue for more research on metabolic pathways.

25

As used in line 33, "maintain" most nearly means

A) justify.
B) contend.
C) sustain.
D) repair.

26

The passage most strongly suggests that the effects of high levels of lactate in the body

A) prevent muscle cells from becoming too acidic.
B) are commonly misunderstood.
C) bring on muscle soreness a few days later.
D) are generally harmful to the body.

27

Which choice provides the best evidence for the answer to the previous question?

A) Lines 23-25 ("A side . . . metabolites")
B) Lines 35-38 ("Contrary . . . exercise")
C) Lines 38-42 ("Rather . . . unclear")
D) Lines 46-48 ("Researchers . . . later")

28

According to the passage, how do high lactate levels function as a defense mechanism?

A) They prevent people from overworking their bodies.
B) They ensure oxygen reaches the muscles.
C) They protect metabolites from disruption.
D) They improve the functioning of metabolic pathways.

29

As used in line 47, "right" most nearly means

A) satisfactorily.
B) appropriately.
C) immediately.
D) exceedingly.

30

Which of the following statements about the inflammatory markers represented in figure 2 is true?

A) The concentration of the markers increased during the first 24 hours after exercise.
B) The concentration of the markers decreased during the first 24 hours after exercise.
C) The concentration of the markers increased during the first 2 hours after exercise but then decreased.
D) The concentration of the markers decreased during the first 2 hours after exercise but then increased.

CONTINUE

31

It can most reasonably be inferred from the passage that high levels of the proteins represented in figure 2 are most likely correlated with high levels of

A) anaerobic energy production.

B) muscle cell damage.

C) lactate buildup.

D) glucose breakdown.

32

According to the passage, which of the following statements best describes the relationship between the information depicted in the two figures and DOMS?

A) Figure 1 depicts information about a factor that indicates DOMS, and figure 2 does not.

B) Figure 2 depicts information about factors that indicate DOMS, and figure 1 does not.

C) Figures 1 and 2 both depict information about factors that indicate DOMS.

D) Neither figure 1 nor figure 2 depicts information about factors that indicate DOMS.

CONTINUE

Questions 33-42 are based on the following passage.

This passage is adapted from a speech delivered in 1928 by Herbert Hoover, "Rugged Individualism." Hoover was campaigning for the office of president of the United States as a member of the Republican Party.

After the war [the First World War], when the Republican Party assumed administration of the country, we were faced with the problem of determination of the very nature of our national life. During one hundred and fifty years we have builded up a form of self-government and a social system which is peculiarly our own. It differs essentially from all others in the world. It is the American system. It is just as definite and positive a political social system as has ever been developed on earth. It is founded upon a particular conception of self-government in which decentralized local responsibility is the very base. Further than this, it is founded upon the conception that only through ordered liberty, freedom, and equal opportunity to the individual will his initiative and enterprise spur on the march of progress. And in our insistence upon equality of opportunity has our system advanced beyond all the world.

During the war we necessarily turned to the government to solve every difficult economic problem. The government having absorbed every energy of our people for war, there was no other solution. For the preservation of the state the Federal Government became a centralized despotism which undertook unprecedented responsibilities, assumed autocratic powers, and took over the business of citizens. To a large degree we regimented our whole people temporarily into a socialistic state. However justified in time of war, if continued in peace-time it would destroy not only our American system but with it our progress and freedom as well.

When the war closed, the most vital of all issues both in our own country and throughout the world was whether governments should continue their war-time ownership and operation of many instrumentalities of production and distribution. We were challenged with a peace-time choice between the American system of rugged individualism and a European philosophy of diametrically opposed doctrines—doctrines of paternalism and state socialism. The acceptance of these ideas would have meant the destruction of self-government through centralization of government. It would have meant the undermining of the individual initiative and enterprise through which our people have grown to unparalleled greatness.

The Republican Party from the beginning resolutely turned its face away from these ideas and these war practices. A Republican Congress co-operated with the Democratic administration to demobilize many of our war activities. At that time the two parties were in accord upon that point. When the Republican Party came into full power it went at once resolutely back to our fundamental conception of the state and the rights and responsibilities of the individual. Thereby it restored confidence and hope in the American people, it freed and stimulated enterprise, it restored the government to its position as an umpire instead of a player in the economic game. . . .

There has been revived in this campaign, however, a series of proposals which, if adopted, would be a long step toward the abandonment of our American system and a surrender to the destructive operation of governmental conduct of commercial business. Because the country is faced with difficulty and doubt over certain national problems—that is, prohibition, farm relief, and electrical power—our opponents propose that we must thrust government a long way into the businesses which give rise to these problems. In effect, they abandon the tenets of their own party and turn to state socialism as a solution for the difficulties presented by all three. It is proposed that we shall change from prohibition to the state purchase and sale of liquor. If their agricultural relief program means anything, it means that the government shall directly or indirectly buy and sell and fix prices of agricultural products. And we are to go into the hydro-electric power business. In other words, we are confronted with a huge program of government in business.

There is, therefore, submitted to the American people a question of fundamental principle. That is: shall we depart from the principles of our American political and economic system, upon which we have advanced beyond all the rest of the world, in order to adopt methods based on principles destructive of its very foundations?

CONTINUE

33

As used in line 7, "peculiarly" most nearly means

A) incomprehensibly.
B) strangely.
C) distinctly.
D) privately.

34

It can reasonably be inferred from the passage that Hoover credits the United States with which advantage over other nations?

A) The equal strength of the two major US political parties leads to policies that are beneficial to all of the nation's citizens.
B) The strength of character of citizens of the United States allows them to solve seemingly intractable conflicts quickly during challenging times.
C) The many prior political influences that led to the US form of self-government also worked to give it a diverse and complex national life.
D) The political organization of the United States embodies a recognition that a nation's well-being depends on its ability to provide personal liberty to its citizens.

35

Which choice provides the best evidence for the answer to the previous question?

A) Lines 1-4 ("After . . . life")
B) Lines 5-9 ("During . . . system")
C) Lines 11-13 ("It is . . . base")
D) Lines 13-17 ("Further . . . progress")

36

Based on the passage, in which of the following scenarios would Hoover likely support government intervention in business affairs?

A) The economy is in a downturn and major corporations are verging on bankruptcy.
B) The price of wheat has fallen dramatically and farmers are unable to sell their crops.
C) An ally of the United States is at war and requires donations of food and clothing.
D) The United States is at war and materials for combat must be manufactured.

37

Which choice provides the best evidence for the answer to the previous question?

A) Lines 20-24 ("During . . . solution")
B) Lines 24-28 ("For . . . citizens")
C) Lines 33-37 ("When . . . distribution")
D) Lines 48-50 ("The Republican . . . practices")

CONTINUE

38

Based on the passage, which choice states a possible inconsistency in Hoover's argument about American political institutions?

A) Although Hoover characterizes foreign political models as potentially injurious to American institutions, he acknowledges the appropriateness of such models during certain times of crisis.

B) Although Hoover insists that American institutions are weakened by the antagonism between Democratic and Republican ideologies, he values the diversity of opinion engendered by the American two-party system.

C) Although Hoover considers America's institutions to have originally grown out of an enterprising spirit, he argues that this spirit has waned as the United States has become a more modern society.

D) Although Hoover believes that American institutions are incompatible with a strong, centralized government, he advocates for a more robust federal role in the enforcement of laws.

39

Hoover indicates in the passage that the continuation of US wartime domestic policies into peacetime would result in a

A) competition among local governments for limited resources.

B) defeat of the Republican Party in national elections.

C) vulnerability to domination by former allies in Europe.

D) lessening of the energy and productivity of US citizens.

40

As used in line 83, "submitted" most nearly means

A) posed.

B) yielded.

C) endorsed.

D) registered.

41

Which choice best identifies the function of the question in lines 84-89 in the context of Hoover's overall argument?

A) It asserts that an earlier course of action recommended by Hoover is both a practical necessity and a moral obligation.

B) It reiterates Hoover's claim that the United States' history as a revolutionary republic makes it superior to other nations.

C) It affirms Hoover's belief that nations advance when their political parties do not take extreme positions but are willing to compromise.

D) It implies Hoover's advocacy of a particular position by positing an alternative that is undesirable by comparison.

42

In the passage, Hoover implies that recent interactions between Republican and Democratic legislators have shifted from

A) effective collaboration on shared goals to stalled negotiations caused by an inability to compromise.

B) cooperation in pursuit of common aims to deep disagreement about fundamental political principles.

C) consensus on a range of issues to mutual suspicion that the opposing party does not have the nation's best interests at heart.

D) collegial goodwill despite disagreements on policy positions to character attacks and personal hostility.

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Questions 43-52 are based on the following passages.

Passage 1 is adapted from The University of Auckland, "Naming Species before Extinction." ©2013 by The University of Auckland. Passage 2 is adapted from Geoffrey Giller, "Are We Any Closer to Knowing How Many Species There Are on Earth?" ©2014 by Scientific American, a division of Nature America, Inc.

Passage 1

Claims that most species will go extinct before they can be discovered have been debunked by researchers in an article published in *Science*.

Line
5 The scientists show that the claims are based on two key misconceptions: an over-estimation of how many species may exist on Earth, and the erroneous belief that the number of taxonomists (people who describe and identify species) is declining.

"Our findings are potentially good news for
10 the conservation of global biodiversity," says lead author Associate Professor Mark Costello from The University of Auckland, who published the work with Professor Nigel Stork from Griffith University and Professor Bob May from Oxford.

15 The authors propose that there are 5, plus or minus 3, million species on Earth—far fewer than has been widely believed—of which 1.5 million species have been named. This re-affirms previous estimates by the three authors, which spanned the
20 upper and lower reaches of this range.

"Over-estimates of the number of species on Earth are self-defeating because they can make attempts to discover and conserve biodiversity appear to be hopeless," says Dr. Costello. "Our work
25 suggests that this is far from the case. We believe that with just a modest increase in effort in taxonomy and conservation, most species could be discovered and protected from extinction."

The authors conclude that there have never been
30 so many people describing new species—including professionals and amateurs, the number may near 50,000. And the community continues to grow, in large part due to the development of science in Asia and South America, regions that are rich in
35 biodiversity and where many new species are being discovered.

While the research suggests that species are more likely to be discovered than to go extinct, the authors do not underplay the seriousness of the threats to
40 species and their habitats. The combination of over-hunting, habitat loss and climate change, now occurring at both local and global scales, means that extinction rates could increase very rapidly in the future.

45 Dr. Costello says that the discovery and naming of species is critical to their conservation. Naming a species gives formal recognition to its existence, making its conservation far easier.

Passage 2

Julian Caley, a researcher at the Australian
50 Institute of Marine Science, and his coauthors looked at published estimates of the total number of species in the world as well as reckonings of the number of terrestrial insects, terrestrial arthropods, marine species and coral reef–dwelling species. Within each
55 group, the researchers found that there was no indication that the estimates were converging on a number or a range.

The main problem, Caley says, is that new estimates usually fail to take previous work into
60 account. "No one really refers to the information that's already gained," he says. Caley also points out that many of these past estimates used multiple different techniques to arrive at their estimates, including extrapolations based on the density of
65 species in a study area or the rate at which new species are being discovered and described. But a larger problem is that many are just single-number estimates. Normally, he explains, statistical calculations have an associated margin of error. This
70 range incorporates the likelihood that the actual number of species is not, say, five million—it could be five million plus or minus three million, for a total range of two million to eight million species globally. (This was, in fact, the estimate of one paper that
75 included a range.)

The team calls for future estimates to include these ranges and to be statistically based, instead of what they call "simple best guesses." When taking past work into account, the authors wrote, estimates
80 that are not statistically based should carry less weight or possibly be excluded altogether.

Nigel Stork, a professor at Griffith University, is a coauthor of the paper that gave the two million to eight million species range. Stork agrees about the
85 need for improved statistical approaches when making estimates. He takes issue, however, with Caley's conclusion that there is no convergence of global species estimates. "[Caley] says that the global

CONTINUE

species richness estimates haven't converged," Stork notes. "I don't necessarily agree." Caley's paper reaches that conclusion by including what Stork calls "sheer guesses." If only papers with statistically based methodologies are included, then there is convergence, as Stork and others wrote in their paper.

43

As used in lines 1 and 4, "claims" most nearly means

A) interests.
B) demands.
C) assertions.
D) possessions.

44

Which choice provides the best evidence that the researchers discussed in Passage 1 are optimistic about the prospects for protecting threatened species?

A) Lines 4-8 ("The scientists . . . declining")
B) Lines 15-20 ("The authors . . . range")
C) Lines 25-28 ("We . . . extinction")
D) Lines 32-36 ("And the . . . discovered")

45

According to Passage 1, before publishing the study discussed in the passage, Costello and his coauthors had

A) made estimates that fell within the range of two million to eight million species.
B) published articles that suggested the number of taxonomists was declining.
C) underestimated the number of species on Earth that had been discovered and named.
D) suggested species were going extinct at a faster rate than new species were being discovered.

46

The main purpose of the third paragraph in Passage 2 (lines 76-81) is to

A) make a recommendation for future researchers to follow based on Caley's findings.
B) offer additional evidence that supports the findings of Caley's research.
C) draw conclusions from Caley's research data.
D) critique the methodology used by Caley when designing his study.

47

In Passage 2, Stork objects to Caley's claim that

A) there is no emerging consensus among global species estimates.
B) species estimates should be presented as a range of numbers.
C) estimates based on guesses should carry less weight.
D) new estimates fail to take previous work into account.

48

As used in line 52, "reckonings" most nearly means

A) inspections.
B) assessments.
C) valuations.
D) critiques.

CONTINUE

49

Which of the following statements best describes a relationship between the two passages?

A) Passage 2 considers the research discussed in passage 1 in the context of other similar studies.

B) Passage 2 discusses a specific instance of a general phenomenon discussed in Passage 1.

C) Passage 2 provides further evidence that serves to strengthen the claims made in Passage 1.

D) Passage 2 refutes the central findings of the study described in Passage 1.

50

Based on the information in the passages, Caley (Passage 2) would most likely approve of which of the following aspects of the study described in Passage 1?

A) The exclusion of data from previous estimates

B) The use of multiple techniques to arrive at the estimate

C) The presentation of the figure as a single-number estimate

D) The inclusion of a range of values in the estimate

51

Which choice provides the best evidence for the answer to the previous question?

A) Lines 58-61 ("The main . . . says")

B) Lines 61-66 ("Caley . . . described")

C) Lines 66-68 ("But . . . estimates")

D) Lines 76-78 ("The team . . . guesses")

52

The researchers described in both passages would most likely agree with which of the following statements about estimates of the number of species on Earth?

A) Estimates that are very large will be more likely to encourage conservation efforts than will estimates that are very small.

B) Estimates that are not statistically based should be considered less credible than estimates that are statistically based.

C) Estimates with very broad margins of error should be considered less accurate than estimates without margins of error.

D) Estimates of individual species are more likely to align with previous estimates than are estimates of the number of species in the world.

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

Predictive Analytics for Actuaries

Dorothy Andrews is an actuary—a professional who calculates and manages risk. Like all actuaries, Andrews uses knowledge of 1 mathematics; statistics; and economics to make projections about risks, such as whether a company will lose money on a product or transaction. Andrews has distinguished 2 herself in the field of actuarial science as a pioneer in the use of predictive analytics, a method that analyzes large amounts of data to determine the variables that contribute to the likelihood of particular outcomes.

1

A) NO CHANGE
B) mathematics, statistics,
C) mathematics statistics,
D) mathematics, statistics;

2

A) NO CHANGE
B) herself—
C) herself,
D) herself;

CONTINUE

Actuaries are dedicated to 3 helping insurance companies improve their insurance policies. This is what drew Andrews to enter the profession more than twenty-five years ago, after she earned an MA in mathematical statistics from Boston University. After doing stints at an insurance company and then a bank, 4 the United States Department of Agriculture (USDA) offered her the opportunity to employ predictive analytics, and she eagerly accepted it. "I have always enjoyed the challenge of applying different statistical theories to new problems where I didn't have any past experience," Andrews reflected in a 2017 interview. Her team's challenge was vital: to 5 examine how predictive analytics is used by USDA.

3

Which choice most effectively sets up the discussion that follows in the passage?

A) NO CHANGE
B) helping banks manage their investments.
C) finding practical solutions to real-world problems.
D) guiding companies to determine the best price for new products.

4

A) NO CHANGE
B) she eagerly accepted the opportunity to employ predictive analytics at the United States Department of Agriculture (USDA).
C) predictive analytics was employed by her after she eagerly accepted the opportunity to work at the United States Department of Agriculture (USDA).
D) the opportunity to employ predictive analytics at the United States Department of Agriculture (USDA) was offered to her, which she eagerly accepted.

5

Which choice most effectively sets up the main idea of the paragraph that follows?

A) NO CHANGE
B) help ensure the safety of the country's food supply.
C) assist banks in establishing cost-effective loans.
D) advise insurance companies of the risks farmers encounter.

CONTINUE

At USDA, Andrews was part of a team that developed the Public Health Information System (PHIS). USDA describes PHIS as "a dynamic, comprehensive data analytic system" that 6 compile and organize data collected by USDA inspectors who 7 monitor food-production facilities. PHIS provides USDA staff with the information needed to analyze trends in inspection data. This information helps them enhance the timeliness and efficiency of inspections. PHIS also enables USDA personnel to access and share inspection reports in real time. As a result, they can act quickly when risk factors such as unusual lab results or code violations are detected. Andrews considers her work at USDA a highlight of her career.

After the 2010 launch of PHIS, Andrews 8 left USDA. When she left, she returned to working in the insurance industry, where she uses predictive analytics to manage financial risk to the benefit of her company's clients. She also 9 educates actuaries about applications of predictive analytics. In 2017, for instance, she delivered a speech on the topic at the annual meeting of the International Association of Black Actuaries. That same

6

A) NO CHANGE
B) are compiling and organizing
C) have compiled and organized
D) compiles and organizes

7

A) NO CHANGE
B) eyeball
C) espy
D) check up on

8

Which choice most effectively combines the sentences at the underlined portion?

A) left and returned to the insurance industry,
B) stopped working at USDA and returned to working again in the insurance industry,
C) left her work on that program at USDA so that she could return to insurance,
D) returned to the insurance industry,

9

Which choice provides a supporting example of the contributions Andrews has made to her field?

A) NO CHANGE
B) sees opportunities for ambitious actuaries in any number of industries.
C) has a background in statistics.
D) adjusts her techniques to appeal to certain categories of clients.

CONTINUE

year, Andrews earned a newly created credential: Certified Specialist in Predictive Analytics. It's not possible to know whether the use of predictive analytics **10** will become even more widespread in actuarial science, **11** especially since Andrews no longer works for USDA.

10

A) NO CHANGE
B) became
C) becomes
D) had become

11

Which choice offers the most effective conclusion for the paragraph and passage?

A) NO CHANGE
B) even though banks and insurance companies have benefited from advice from actuaries.
C) but consumers, as well as many businesses, should attempt to understand it.
D) but Andrews's work increases the likelihood of that outcome.

CONTINUE

Questions 12-22 are based on the following passage.

Monstrous Mash-ups

Seth Grahame-Smith's book *Pride and Prejudice and Zombies* is a genre mash-up that polarized literary critics when it was released in 2009. As the title suggests, *Pride and Prejudice and Zombies* reimagines Jane Austen's 1813 novel *Pride and Prejudice* by placing Austen's characters in a world overrun by zombies. While some saw Grahame-Smith's book as a way to interest younger readers in Austen's novels, others 12 appreciated the extremely engaging narrative that attracted a new generation of readers. "Is nothing sacred?" asked one critic. In the world of literary mash-ups, the answer is likely no. Nevertheless, these genre-blending books may ultimately lead readers to gain a deeper understanding of 13 their literary predecessors and the classic original texts on which they are based.

Mash-up novels can illuminate what a source text might only imply. In his 1877 novel *Anna Karenina*, Leo Tolstoy depicts his characters' machine-like devotion to social convention or to the actual machines of the industrial age. The 2010 mash-up *Android Karenina* makes Tolstoy's figurative world of automatons literal by adding a cyborg revolt plot to the original narrative.

Pride and Prejudice and Zombies, similarly, reveals the underlying tensions in Austen's novel. Austen's heroine, Elizabeth Bennet, initially rejects her 14 families expectations that she marry, fearing her loss of autonomy. Elizabeth's freedom is further threatened by laws that do not allow women to inherit property. In

12

Which choice best sets up the quotation that follows in the paragraph?

A) NO CHANGE
B) were taken aback by the introduction of supernatural horror elements into a beloved work of literature.
C) praised the effort to modernize a classic but somewhat inaccessible text.
D) hailed the novel as one of the first commercially successful reinventions of a classic work.

13

A) NO CHANGE
B) the classic texts
C) the literary predecessors that came before and
D) the original texts that were used as models

14

A) NO CHANGE
B) families' expectation
C) family's expectation
D) family's expectation's

CONTINUE

Pride and Prejudice and Zombies, these restrictive customs 15 are personified as zombie hordes. The mash-up also represents Elizabeth's intellectual strength and refusal to submit to social customs by making 16 it a fearless zombie hunter.

Though some consider mash-up novels unworthy of serious analysis, 17 many published authors find mash-ups enjoyable to write. In his research, PhD candidate John S. Caughey 18 deliberates that by reading a mash-up and the sources on which it is based, students can learn how an author follows genre conventions—such as the choice to set a narrative in a rural, isolated location—when writing. Professor Ryan Cordell also uses mash-ups in the classroom to a creative end. His students craft their own mash-ups, rewriting published fiction in the style of other authors. This prompts them to uncover subtle 19 similarities and differences in authors' styles.

15

A) NO CHANGE
B) were
C) had been
D) will be

16

A) NO CHANGE
B) her
C) them
D) DELETE the underlined portion.

17

Which choice best introduces this paragraph?

A) NO CHANGE
B) others feel mash-ups disrespect their literary predecessors.
C) students are attracted to this genre's horror elements.
D) educators recognize the value of teaching this genre.

18

A) NO CHANGE
B) debates
C) argues
D) combats

19

A) NO CHANGE
B) similarities and differences,
C) similarities, and differences
D) similarities, and, differences

CONTINUE

The sustained popularity of literary mash-ups with today's readers 20 suggest that this genre is more than a passing fad. 21 Helping readers appreciate literature in new ways and inspiring creativity, mash-ups should be seen as useful tools. 22 Given the success of *Pride and Prejudice and Zombies*, all writers should consider penning a mash-up.

20

A) NO CHANGE
B) suggests
C) are suggesting
D) have suggested

21

At this point, the writer is considering adding the following sentence.

Sense and Sensibility and Sea Monsters infuses a classic work with the supernatural aspects of fantasy and horror.

Should the writer make this addition here?

A) Yes, because it provides a specific example to support a claim made in the paragraph.
B) Yes, because it reiterates an important claim about mash-ups mentioned earlier in the passage.
C) No, because it contradicts the main argument of the passage.
D) No, because it introduces unnecessary new information.

22

The writer wants a conclusion that restates the main argument of the passage. Which choice best accomplishes this goal?

A) NO CHANGE
B) Writers should do research when exploring the option of combining a literary classic and a supernatural story.
C) Mash-ups could create challenges for students with limited knowledge of a particular genre.
D) Far from spoiling the originals, they can be enlightening, if occasionally monstrous, supplements.

CONTINUE

Questions 23-33 are based on the following passage.

The Place of Geography

[1] As traditionally defined, the discipline of geography explores the physical properties of Earth's surface and the human societies spread across it. [2] In his 2010 address to the Association of American Geographers (AAG), Thomas J. Baerwald of the National Science Foundation lauded geography's embrace of "diversity, adaptability, multiple perspectives, and an ever-growing range of approaches." [3] Geographers routinely collaborate with scholars and professionals in other fields— 23 some in ecology, sociologists, epidemiologists, and political scientists, to name a few. [4] While interdisciplinarity can raise concerns about geography's survival as a distinct discipline, it's the key to the field's continued success. 24

23

A) NO CHANGE
B) ecologists, or
C) ecologists,
D) ecology,

24

The writer wants to add the following sentence to this paragraph.

> However, this definition fails to account for geography's most salient characteristic: its interdisciplinary nature.

To make this paragraph most logical, the sentence should be placed

A) after sentence 1.
B) after sentence 2.
C) after sentence 3.
D) after sentence 4.

CONTINUE

Recent AAG Presidential Achievement Award winners 25 have made significant contributions to their field. The 2015 winner Diana Liverman works with legislators to enhance sustainability in the United States and Mexico; 2016 winner Audrey Kobayashi helps community activists increase housing options in Vancouver; and 2017 winner Roger Downs 26 has a PhD from the University of Bristol. This diversity is essential to 27 geography. Demonstrating its relevance to other fields and to societies worldwide.

25

Which choice best sets up the examples that follow in the paragraph?

A) NO CHANGE
B) represent a variety of academic institutions.
C) exemplify geographers' wide-ranging endeavors.
D) are deeply committed to advancing the public's understanding of geography.

26

Which choice provides a third example that is most consistent with the other two examples in the sentence?

A) NO CHANGE
B) is a past winner of the Pennsylvania Geographical Society's Distinguished Geographer Award.
C) is the author of several publications about environmental cognition.
D) partners with psychologists in Pennsylvania to study how children apply spatial concepts.

27

A) NO CHANGE
B) geography, demonstrating
C) geography demonstrating,
D) geography demonstrating and

CONTINUE

It's perhaps inevitable, 28 subsequent to its fundamental interdisciplinarity, that geography is experiencing something of an identity crisis, as reflected in name changes at college and university geography departments. In a 2017 article, Oklahoma State University's Amy E. Frazier and Thomas A. Wikle examined the renaming phenomenon, identifying eighty-nine US and Canadian 29 institutions whose geography departments were renamed between 1990 and 2014. The most common change was to include "environment" in the department name. Some departments kept "geography" but added "geology" to their names as a result of department mergers. Many 30 decommissioned the word "geography" altogether, adopting names like "earth and environment."

28

A) NO CHANGE
B) unlike
C) regardless of
D) given

29

A) NO CHANGE
B) institutions, whose geography departments were renamed,
C) institutions whose geography departments were renamed,
D) institutions, whose geography departments were renamed

30

A) NO CHANGE
B) junked
C) dropped
D) ditched

CONTINUE

Fortunately, though, Frazier and Wikle also found that 31 their research showed geography was taught in these renamed departments. 32 However, the responses of the geographers surveyed were "overwhelmingly positive with respect to the impacts of name changes on their department and, more broadly, on the discipline of geography."

Baerwald concluded his address by extolling geographers' interdisciplinary pursuits and 33 securing those assembled that "we can and will continue to . . . engage in the same kinds of unbounded inquiry with others that first attracted us to geography." Thanks in large part to those engagements, geography is well positioned to thrive in the future.

31

A) NO CHANGE
B) the subject of geography continued to still be taught
C) geography as a topic was one that, they discovered, teachers were still teaching
D) geography was still being taught

32

A) NO CHANGE
B) Moreover,
C) Thus,
D) Conversely,

33

A) NO CHANGE
B) insuring
C) assuring
D) ensuring

CONTINUE

Questions 34-44 are based on the following passage and supplementary material.

Acupuncture's Effectiveness

Acupuncture, an ancient Chinese technique in which small needles are applied to specific "acupoints" on the body, has found a role in many Western countries as an alternative means of treating a variety of health conditions, including back pain and headaches. The effectiveness of acupuncture in reducing pain has long been attributed to the stimulation of these acupoints, 34 the locations of them were identified thousands of years ago in China. How does acupuncture relieve pain? Are the acupoints the main factor?

34

A) NO CHANGE
B) the locations of which
C) the acupoints' locations
D) their locations

CONTINUE

35 Having established the acupoints' locations, researchers at the University of Michigan evaluated the effects of acupuncture on patients with chronic pain symptoms. 36 For example, chronic pain is often associated with signaling problems in a patient's endorphin neurotransmitters, which normally block pain by binding to specific protein receptors found on the surface of neurons in the brain. Over a four-week period, patients were given nine sessions of either a traditional acupuncture 37 treatment, with needles inserted at known acupoints or a "sham" acupuncture treatment, in which needles were placed in incorrect locations. The researchers compared how the two treatments affected protein 38 receptors' success in binding to endorphins in different brain regions.

35

Which choice provides the most effective transition from the information in the previous paragraph?

A) NO CHANGE
B) In an attempt to answer these questions,
C) After identifying patients who might benefit from acupuncture,
D) Focusing on the role of protein receptors,

36

A) NO CHANGE
B) Therefore,
C) In addition,
D) DELETE the underlined portion, adjusting the capitalization as needed.

37

A) NO CHANGE
B) treatment: with needles inserted at known acupoints,
C) treatment, with needles inserted at known acupoints,
D) treatment with needles inserted at known acupoints:

38

A) NO CHANGE
B) receptor's success in binding to endorphins in different brain regions.
C) receptors' success in binding to endorphins in different brain region's.
D) receptors success in binding to endorphin's in different brain region's.

CONTINUE

After the monthlong experiment, positron emission tomography (PET) brain scans 39 were used. The PET scans revealed that the binding potential of the receptors

39

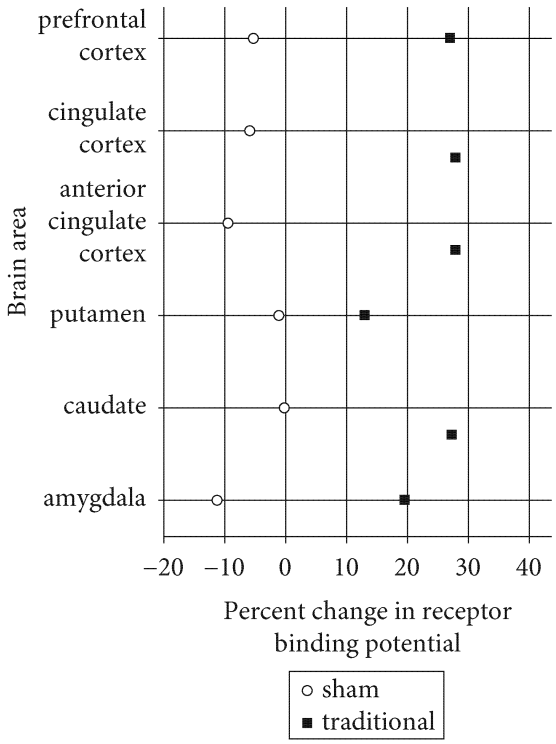
Which choice most effectively combines the sentences at the underlined portion?

A) were used and they revealed
B) that were used revealed
C) were used for revealing
D) revealed

CONTINUE

to endorphins had improved in 40 both those patients treated with traditional acupuncture and those treated with sham acupuncture. Binding potential is a measure of both the density of receptors on neurons and the receptors' ability to attract substances to bind to them. The prefrontal cortex, cingulate cortex, and caudate regions of traditional acupuncture patients all showed a 41 5 percent or greater decrease in receptor binding potential compared to that measured four weeks earlier. In contrast, many brain regions of participants receiving the sham treatment showed small decreases in receptor binding potential.

Effects of Traditional and Sham Acupuncture on Receptor Binding Potential after 4 Weeks



Adapted from Richard E. Harris et al., "Traditional Chinese Acupuncture and Placebo (Sham) Acupuncture Are Differentiated by Their Effects on μ-Opioid Receptors (MORs)." ©2009 by Elsevier.

40

Which choice is best supported by the information in the graph?

A) NO CHANGE
B) patients treated with traditional acupuncture but not in those treated with sham acupuncture.
C) patients treated with both traditional and sham acupuncture.
D) patients treated with sham acupuncture but not in those treated with traditional acupuncture.

41

The writer wants to use accurate information from the graph to highlight the effectiveness of a treatment. Which choice best accomplishes this goal?

A) NO CHANGE
B) 10 percent or greater increase
C) 15 percent or greater decrease
D) 25 percent or greater increase

CONTINUE

The study helps explain the pain-blocking mechanism of traditional acupuncture. However, the study 42 produced and yielded another additional finding that ran counter to the researchers' assumptions. All the patients in the study—whether treated with traditional acupuncture or sham acupuncture—showed significant reductions in pain ratings. If the researchers are correct that traditional acupuncture provides pain relief through receptor-endorphin binding, then there must be a separate mechanism 43 by which sham acupuncture relieves pain. Researchers' next task is to identify 44 that; only then can acupuncture's effectiveness be fully explained.

42

A) NO CHANGE
B) produced another
C) yielded a second
D) yielded an

43

A) NO CHANGE
B) for
C) and
D) DELETE the underlined portion.

44

A) NO CHANGE
B) that pain;
C) that mechanism;
D) that treatment;

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

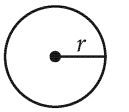
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

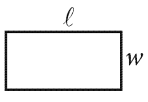
NOTES

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

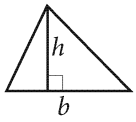
REFERENCE



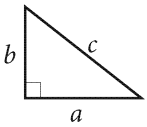
$A = \pi r^2$
$C = 2\pi r$



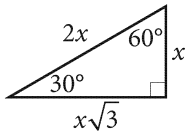
$A = \ell w$

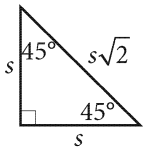


$A = \frac{1}{2}bh$

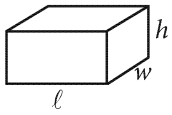


$c^2 = a^2 + b^2$

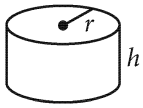




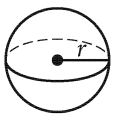
Special Right Triangles



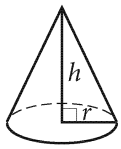
$V = \ell wh$



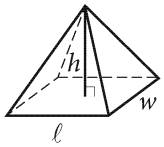
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

Presently, the Moon is at an average distance of 384,400 kilometers (km) from Earth. The average distance of the Moon from Earth increases by approximately 38 km every one million years. Which equation best models the relationship between the average distance of the Moon from Earth d, in km, and the time t, in millions of years, from the present?

A) $d = 38(t + 384,400)$

B) $d = 38t + 384,400$

C) $d = 38(t - 384,400)$

D) $d = 38t - 384,400$

2

$$A = bh$$

The given equation relates the area A, height h, and base length b of a parallelogram. Which equation gives the height in terms of the base length and the area?

A) $h = \frac{A}{b}$

B) $h = \frac{b}{A}$

C) $h = Ab$

D) $h = A - b$

CONTINUE

3

If $6x+12=3$, which of the following must be true?

A) $6x=9$

B) $6x+6=3$

C) $2x+4=1$

D) $3x+6=\frac{2}{3}$

4

$$|3-x|=0$$

If x is the solution to the given equation, what is the value of $-3+x$?

A) -3

B) 0

C) 3

D) 9

5

Which of the following is equivalent to $7w(p+5)$?

A) $p+35w$

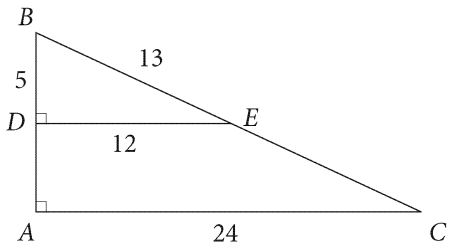
B) $7wp+5$

C) $7wp+35$

D) $7wp+35w$

CONTINUE

6



In triangle ABC, point E lies on line segment BC and point D lies on line segment AB. What is the sine of angle C?

A) $\frac{5}{13}$

B) $2\left(\frac{5}{13}\right)$

C) $\frac{12}{13}$

D) $2\left(\frac{12}{13}\right)$

7

$$P + 0.014P = 507$$

At the start of the year, Malik opened a bank account with P dollars. During that year, Malik made no additional deposits or withdrawals. At the end of the year, the account earned interest and increased to \$507. Which of the following is the best interpretation of $0.014P$ in this context?

A) The amount of interest earned

B) The amount invested at the start of the year

C) The total amount in the account at the end of the year

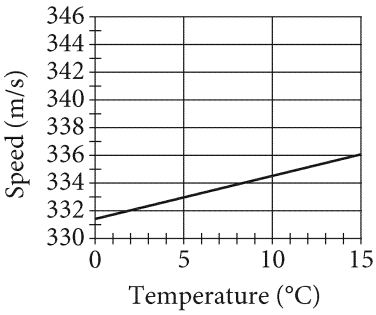
D) The rate at which the investment earned interest during the year

CONTINUE

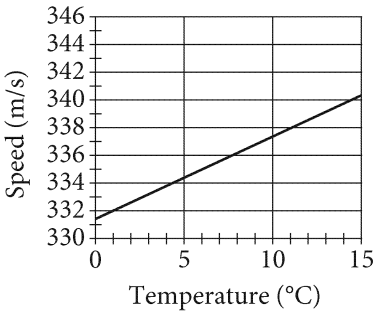
8

The speed of sound in dry air v, in meters per second (m/s), can be approximated by the equation $v = 331.4 + 0.6T$, where T is the air temperature in degrees Celsius (°C). Which graph models the relationship between T and v?

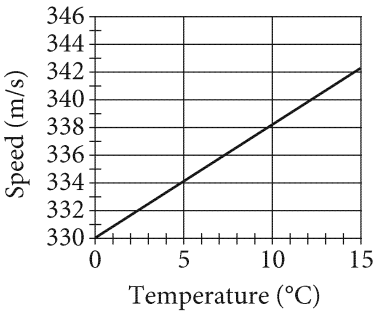
A)



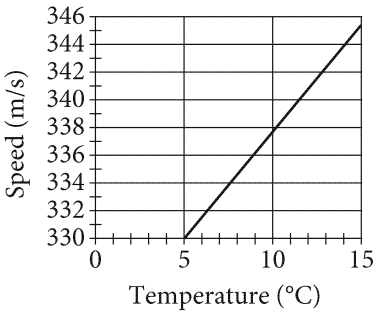
B)



C)

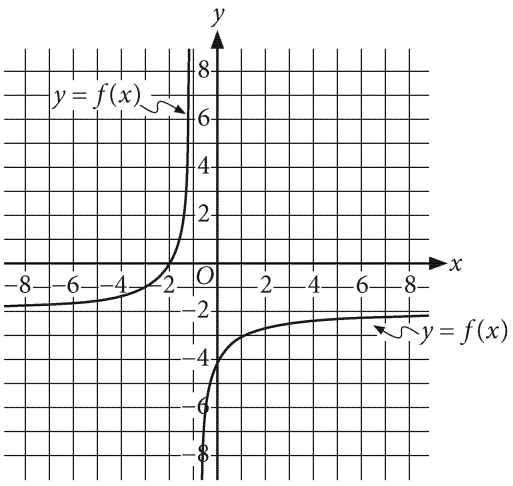


D)



CONTINUE

9



The graph of $y = f(x)$ is shown. If $f(a) = 0$, which of the following could be the values of a ?

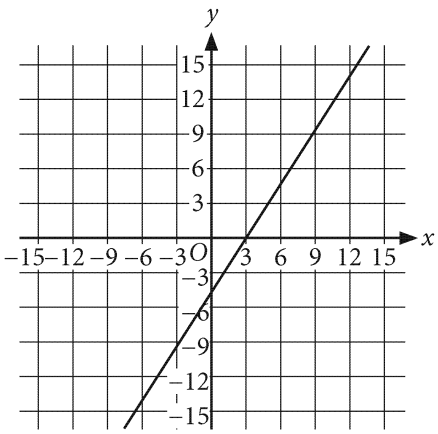
A) -1

B) -2

C) -3

D) -4

10



What is an equation of the line shown?

A) $3x - 2y = 9$

B) $3x + 2y = -5$

C) $x - y = 9$

D) $x + y = -5$

11

The function f is defined by $f(x) = \left(\frac{1}{4}\right)^{-x}$. What is the value of $f(2)$?

A) $\frac{1}{16}$

B) $\frac{1}{2}$

C) 2

D) 16

CONTINUE

12

$$x^2 - 2x - 2 = 0$$

What is a solution to the given equation?

A) $-2+\sqrt{6}$

B) $-1+\sqrt{3}$

C) $1+\sqrt{3}$

D) $2+\sqrt{6}$

13

Which expression is NOT a factor of $x^4 - 5x^2 + 4$?

A) $x+2$

B) $x-1$

C) x^2-4

D) x^2+1

14

$$3x - y = 2$$

The given equation is one of the two equations in a linear system. The system has on solution. Which of the following could be the other equation in the system?

A) $3x - y = 2$

B) $3x - 2y = 4$

C) $6x - 2y = 2$

D) $6x - 2y = 4$

15

Circle A: $x^2 + y^2 = 49$

Circle B: $x^2 + (y-5)^2 = 49$

In the xy-plane, which translation of the graph of circle A would result in the graph of circle B ?

A) 5 units right

B) 5 units left

C) 5 units up

D) 5 units down

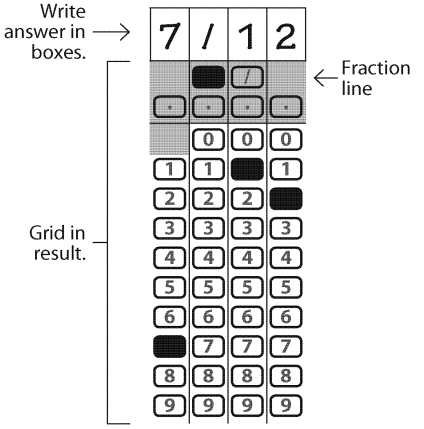
CONTINUE

DIRECTIONS

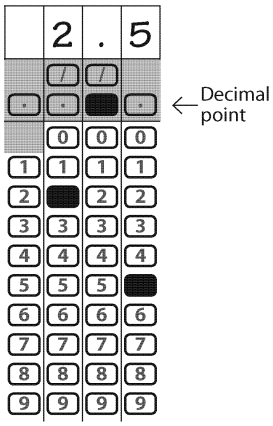
For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

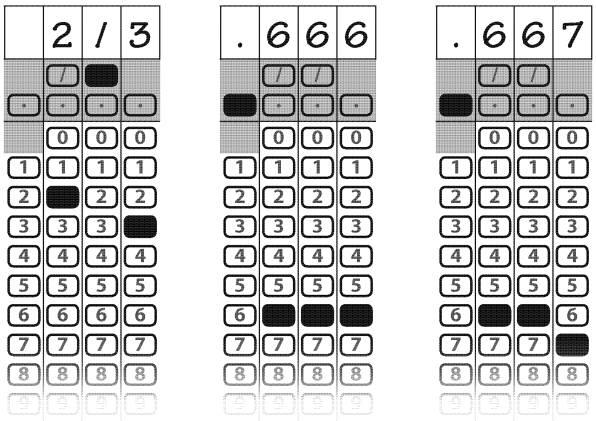
Answer: $\frac{7}{12}$ are:



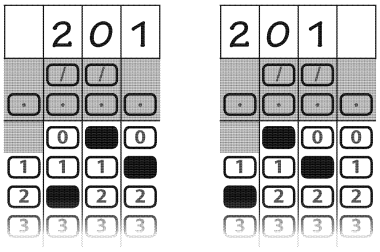
Answer: 2.5



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



NOTE:
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

16

In the xy-plane, the y-intercept of the graph of $y = 700(3)^x$ is $(0, c)$, where c is a constant. What is the value of c ?

17

The function n is defined by $n(x) = 6x - 3$. What is the value of $n(4)$?

18

In the xy-plane, the graph of the quadratic function f is a parabola with vertex $(2, 3)$. The function g is defined by $g(x) = f(x) + 2$, and the graph of g has vertex (h, k). What is the value of h ?

19

$$5x - 2y = -11$$
$$2x + 5y = 13$$

The solution to the given system of equations is (x, y). What is the value of y ?

20

The area of a triangle is 8 square units. A second triangle has side lengths 5 times those of the first triangle. What is the area, in square units, of the second triangle? (The area of a triangle with base b and height h is equal to $\frac{1}{2}bh$.)

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

No Test Material On This Page

Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

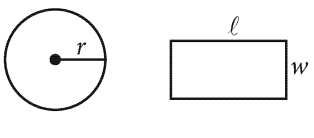
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

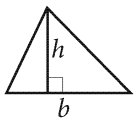
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

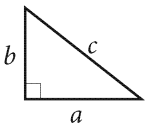


$A = \pi r^2$
$C = 2\pi r$

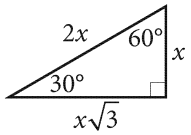
$A = \ell w$

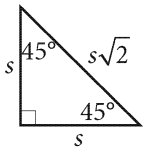


$A = \frac{1}{2}bh$

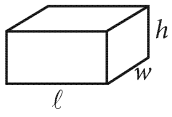


$c^2 = a^2 + b^2$

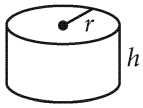




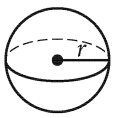
Special Right Triangles



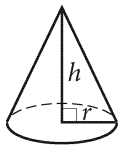
$V = \ell wh$



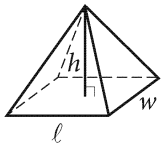
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

CONTINUE

1

The table shows the mean diameter, in kilometers (km), for Saturn's 8 largest moons.

Moon name	Mean diameter (km)
Titan	5,150
Rhea	1,530
Iapetus	1,460
Dione	1,120
Tethys	1,060
Enceladus	498
Mimas	392
Hyperion	286

The mean diameter of Earth's moon is 3,476 km. What fraction of Saturn's 8 largest moons have a mean diameter that is greater than the mean diameter of Earth's moon?

A) $\frac{1}{9}$

B) $\frac{1}{8}$

C) $\frac{7}{8}$

D) $\frac{8}{9}$

2

In 2015, the population of a certain city was 80,000. Each year after 2015, the population increases by 1,000. Which function type best models the population as a function of time?

A) Decreasing exponential

B) Increasing exponential

C) Decreasing linear

D) Increasing linear

3

For the linear function f, the graph of $y = f(x)$ in the xy-plane has a slope of $\frac{1}{4}$ and passes through the point (0, 3). Which equation defines $f(x)$?

A) $f(x) = \frac{1}{4}x - 3$

B) $f(x) = \frac{1}{4}x - \frac{3}{4}$

C) $f(x) = \frac{1}{4}x + \frac{1}{3}$

D) $f(x) = \frac{1}{4}x + 3$

CONTINUE

4

The distance from Earth to the star Proxima Centauri is approximately 1.30 parsecs. Which of the following is the best approximation of the distance from Earth to Proxima Centauri, in light-years? (Use 1 parsec = 3.26 light-years.)

A) 1.96

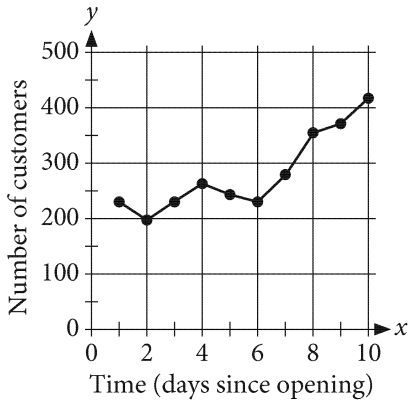
B) 2.51

C) 4.24

D) 4.56

5

The line graph shows the number of customers at a coffee shop for its first 10 days since opening.



For how many of these 10 days did the coffee shop have fewer customers than it did on the previous day?

A) 1

B) 2

C) 3

D) 4

CONTINUE

6

There are 70.0 grams of dissolved salt in a certain 2,000.0 gram sample of seawater. The amount of dissolved salt is p% of the sample of seawater by mass. What is the value of p ?

A) 3.5

B) 96.5

C) 103.6

D) 2,857

7

	Black	Red	Total
Pen	15	5	20
Pencil	8	3	11
Total	23	8	31

The table shows the distribution of type and color of items that are in a jar. If a pen is selected at random from the jar, what is the probability that the pen is red?

A) 0.05

B) 0.20

C) 0.25

D) 0.75

CONTINUE

Questions 8 and 9 refer to the following information.

In a 2016 survey, 200 school administrators were asked about changes at their schools. The administrators indicated whether or not their schools made curriculum changes and whether or not their schools made technology changes. The table summarizes the responses.

	Technology change	No technology change	Total
Curriculum changes	30	80	110
No curriculum change	40	50	90
Total	70	130	200

8

What percentage of the administrators responded "no curriculum changes"?

A) 45%

B) 55%

C) 65%

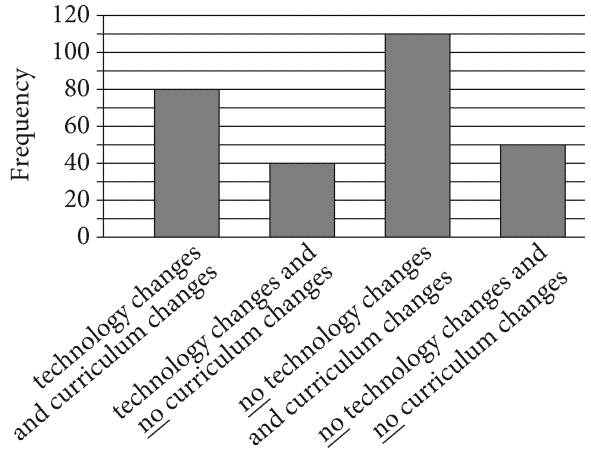
D) 100%

CONTINUE

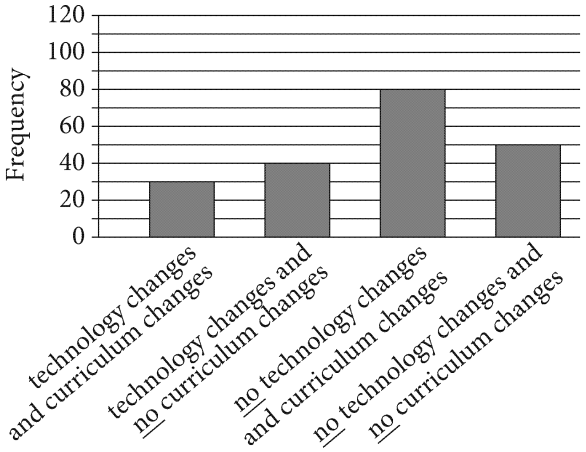
9

Which of the following bar graphs displays the data shown in the table?

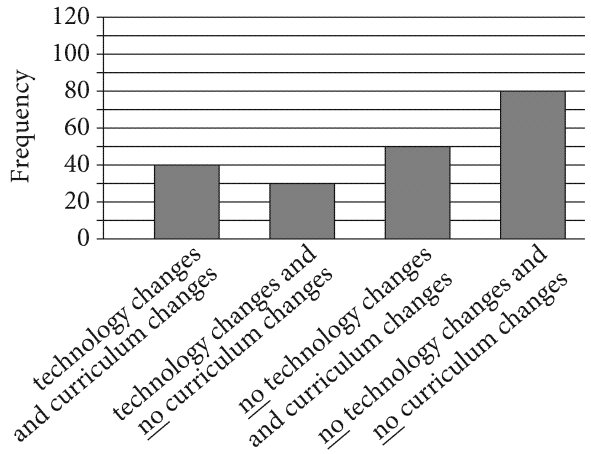
A)



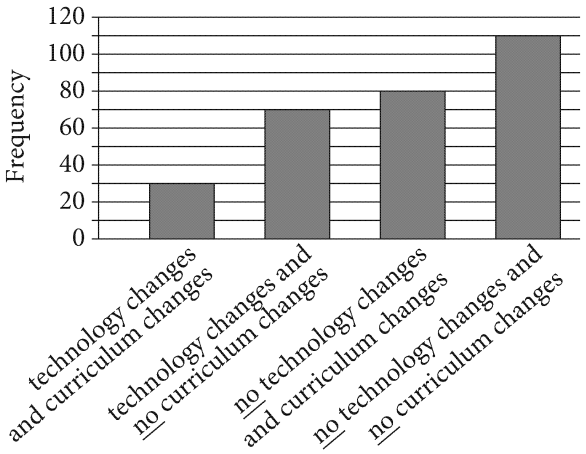
B)



C)



D)



CONTINUE

10

If $5x+6=15$, what is the value of $10x$?

A) 1.8

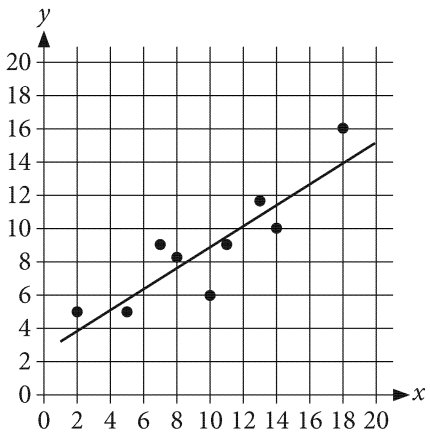
B) 2.4

C) 9

D) 18

11

The scatterplot shows the relationship between two variables, x and y. A line of best fit for the data is also shown.



For how many of the data points does the line of best fit predict a greater y-value than the actual y-value?

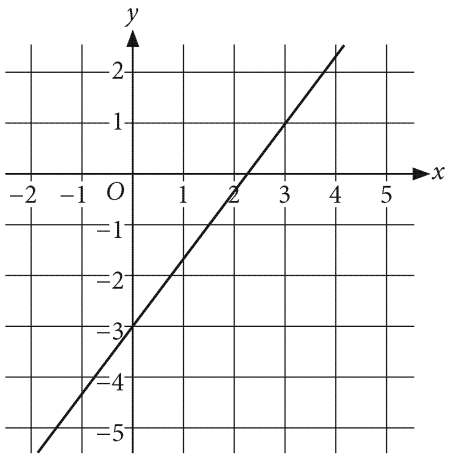
A) 4

B) 5

C) 6

D) 9

12



What is the slope of the line shown in the graph?

A) $-\frac{4}{3}$

B) $-\frac{3}{4}$

C) $\frac{3}{4}$

D) $\frac{4}{3}$

CONTINUE

13

The graph of $y > x$ in the xy-plane contains the point $(a, 2a)$, where a is a constant. What must be true about the value of a ?

A) It is zero.

B) It is positive.

C) It is negative.

D) There is no possible value of a.

14

What is an equation of the line that passes through the points (1, 2) and (3, 6) in the xy-plane?

A) $y = \frac{1}{2}x$

B) $y = \frac{1}{2}x + 2$

C) $y = 2x$

D) $y = 2x + 2$

15

At the beginning of a certain day, a company's stock price was \$29. By the end of that day, the stock price had decreased by p%. Which expression represents the stock price, in dollars, at the end of that day?

A) $29p$

B) $29(1 - p)$

C) $(29p)(100)$

D) $29\left(1 - \frac{p}{100}\right)$

CONTINUE

16

At the start of an experiment, approximately 100 million bacteria were present in a liquid growth solution. Over the next 6 hours, the number of bacteria approximately doubled every hour. Which of the following exponential equations best models the relationship between the number of bacteria P, in millions, and the amount of time t, in hours, after the start of the experiment, where $t \leq 6$?

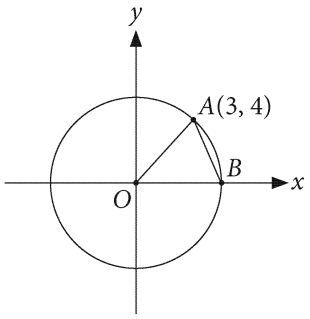
A) $P = 100 + 2^t$

B) $P = 2(100)^t$

C) $P = 100(2)^t$

D) $P = (200)^t$

17



In the xy-plane above, points A and B are on the circle with center O. What is length of $\overline{AB}$?

A) 5

B) 6

C) $2\sqrt{5}$

D) $5\sqrt{2}$

CONTINUE

Questions 18 and 19 refer to the following information.

$$d(t) = 0.88t + 149.60$$

On August 20, 1997, NASA launched the Voyager 2 spacecraft from Earth. The function d models the distance, in millions of kilometers, that Voyager 2 was from the Sun t days after it was launched, for $t \leq 300$.

18

Which of the following is the best interpretation of the value 0.88 in this context?

A) The estimated distance, in millions of kilometers, that Voyager 2 was from Earth when launched

B) The estimated distance, in millions of kilometers, that Voyager 2 was from the Sun when launched

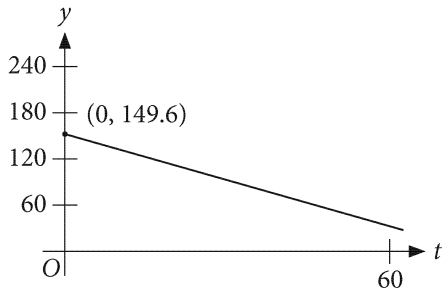
C) The estimated increase per hour in Voyager 2's distance, in millions of kilometers, from the Sun

D) The estimated increase per day in Voyager 2's distance, in millions of kilometers, from the Sun

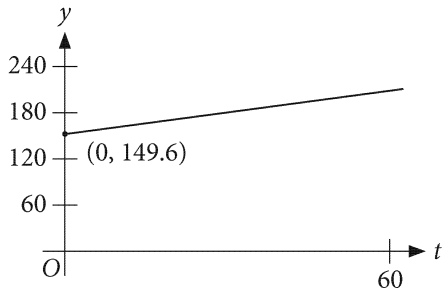
19

Which of the following is the graph of $y = d(t)$ in the ty-plane?

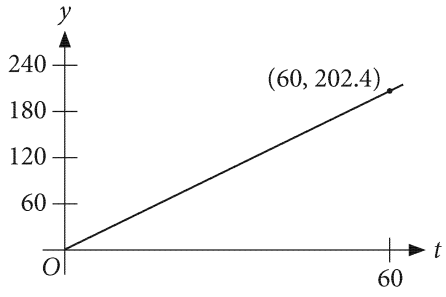
A)



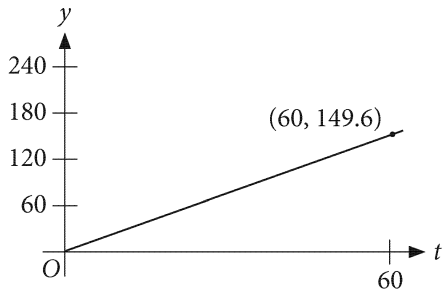
B)



C)

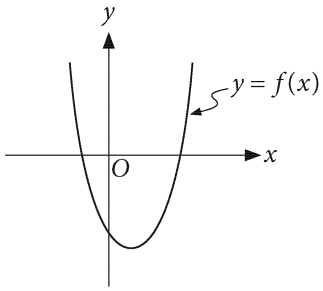


D)



CONTINUE

20



The graph of the function f is shown. Which of the following could define f?

A) $f(x) = -x^2 - 2x - 3$

B) $f(x) = -x^2 + 4x + 3$

C) $f(x) = x^2 - 2x - 3$

D) $f(x) = x^2 + 4x + 3$

Questions 21 and 22 refer to the following information.

A group of friends started a road trip in Miami, Florida, and drove approximately 1,524 miles north along Interstate 95 (I-95). They ended their trip in Houlton, Maine. The table shows the approximate distance, in miles, the friends drove on I-95 in the first three states of their road trip.

State	Distance traveled (miles)
Florida	382
Georgia	112
South Carolina	199

21

During the first x miles of driving in Georgia, the group traveled an average of 8 miles per hour due to slow traffic. For the rest of the drive in Georgia, they traveled an average of 55 miles per hour. The total drive time in Georgia was 2.25 hours. Which of the following equations represents this situation?

A) $8(112 - x) + 55x = \frac{1}{2.25}$

B) $8x + 55(112 - x) = \frac{1}{2.25}$

C) $\frac{1}{8}(112 - x) + \frac{1}{55}(x) = 2.25$

D) $\frac{1}{8}x + \frac{1}{55}(112 - x) = 2.25$

CONTINUE

22

It took the group 2 days to complete the drive through Florida, Georgia, and South Carolina. They traveled twice as many miles the first day as the second day. What is the distance, in miles, that the group traveled the first day?

A) 231

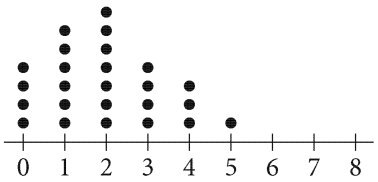
B) 347

C) 462

D) 693

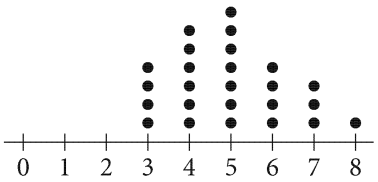
23

Daily Electric Fan Sales



Number sold in a day

April



Number sold in a day

June

The dot plots shown summarize the daily sales of electric fans at a store for the 25 days the store was open in April and June, respectively. Which of the following was(were) the same for daily sales in April and in June?

I. Mean

II. Standard deviation

A) I only

B) II only

C) Both I and II

D) Neither I nor II

CONTINUE

24

$$C(t) = 3.8(1.045)^t$$

The cost $C(t)$, in cents, of a postage stamp t years after 1950 can be modeled by the given exponential function, where $0 \le t \le 64$. What is the best interpretation of the value 3.8 in this context?

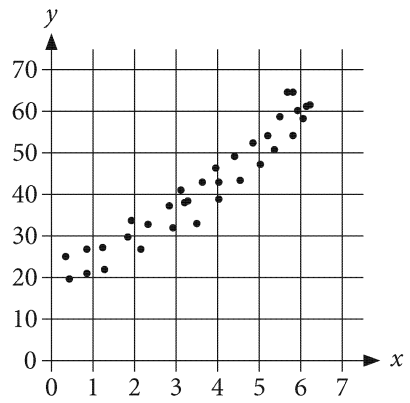
A) The model estimates that the cost of a postage stamp was 3.8 cents in 1950.

B) The model estimates that the cost of a postage stamp was 3.8 cents in 2014.

C) The model estimates that the cost of a postage stamp increased by 3.8 cents each year from 1950 to 2014.

D) The model estimates that the cost of a postage stamp increased by 3.8% each year from 1950 to 2014.

25



The scatterplot for a data set is shown in the xy-plane above. Of the following equations, which best models the data?

A) $y = 20(1.2)^x$

B) $y = 60(1.2)^x$

C) $y = 20(0.8)^x$

D) $y = 60(0.8)^x$

26

$$x^2 + k = 0$$

In the quadratic equation shown, k is a constant. For which of the following values of k will the equation have no real solutions?

A) -2

B) -1

C) 0

D) 1

CONTINUE

27

$$\frac{(x+2)^2-5}{x+2}$$

Which of the following is equivalent to the given expression?

A) $x-3$

B) $\frac{x^2-1}{x+2}$

C) $1-\frac{5}{x+2}$

D) $x+2-\frac{5}{x+2}$

28

Group A and Group B each consist of 60 people. All the people in each group were asked to rate a product on a scale from 1 through 6. The results are summarized in the frequency table.

Rating	Frequency	
	Group A	Group B
1	11	8
2	15	13
3	16	11
4	11	10
5	3	11
6	4	7

Which statement correctly compares the Group A median rating to the Group B median rating?

A) The Group A median rating is equal to the Group B median rating.

B) The Group A median rating is greater than the Group B median rating.

C) The Group A median rating is less than the Group B median rating.

D) There is not enough information to compare the median ratings.

CONTINUE

29

Cube A has a side length of x meters. The volume of Cube B is 8 times as large as the volume of Cube A. What is the side length of Cube B, in meters, in terms of x ? (The volume of a right rectangular prism is equal to ℓwh, where ℓ and w are the length and width of the base, respectively, and h is the height.)

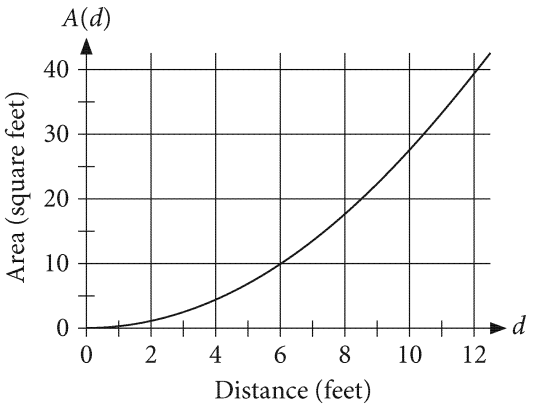
A) $2x$

B) $3x$

C) $8x$

D) $512x$

30



A teacher uses a classroom projector to display an image on a flat surface. The graph shows the relationship between the area $A(d)$, in square feet, of the image and the distance d, in feet, of the projector from the surface. Which of the following best represents this relationship?

A) $A(d)=\frac{18}{5}d^2$

B) $A(d)=\frac{5}{18}d^2$

C) $A(d)=\left(\frac{18}{5}d\right)^2$

D) $A(d)=\left(\frac{5}{18}d\right)^2$

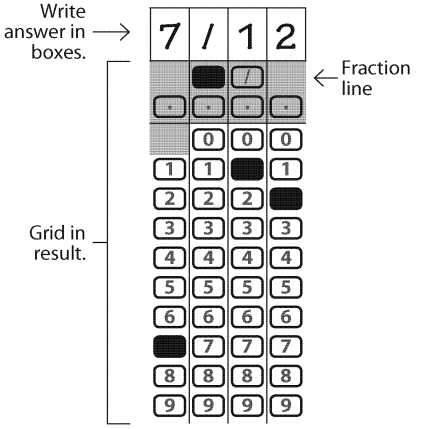
CONTINUE

DIRECTIONS

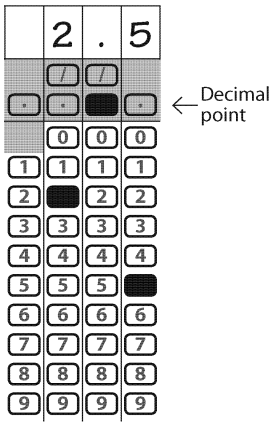
For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

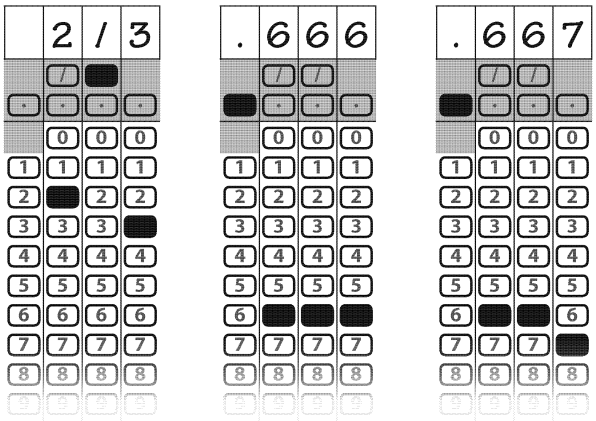
Answer: $\frac{7}{12}$ are:



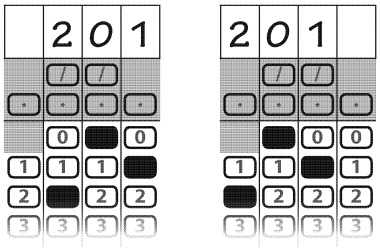
Answer: 2.5



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



NOTE:
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31

Catie is planning a boating trip and needs to bring one 2.5-gallon container of drinking water for every 2 days of the trip. If she is planning an 8-day trip, how many containers of drinking water will she need?

32

The US peck and US bushel are standard units of dry volume. One US peck is equivalent to $\frac{1}{4}$ US bushel. How many US bushels are equivalent to 48 US pecks?

33

A bag of trail mix contains a total of 900 calories. There are 6 servings in the bag and each serving has a mass of 28 grams. What is the number of calories per gram, to the nearest hundredth of a gram, of trail mix?

34

$$x(x-10)(x+8)(x-4)^2=0$$

What is the largest value of x that satisfies the given equation?

35

Length of rule in years	Number of Chinese monarchs
1	4
2	2
3	3
4	2
5	2
6	7
7	1
8	2
9	1
10	1

From 223 BCE to 906 CE, there were 25 Chinese monarchs whose length of rule lasted from 1 to 10 years. The table shows the distribution of the monarchs by length of rule. What is the median length of rule, in years, of the 25 monarchs?

CONTINUE

36

$$9x - 6 = ax + 4$$

In the given equation, a is a positive integer constant less than 10. The equation has exactly one solution. What is the greatest possible value of a ?

37

A circle in the xy-plane has its center at $(1, -7)$ and has a radius of 3. An equation of this circle is $x^2 + y^2 + ax + by + c = 0$. What is the value of c ?

38

$$5(x + y) = 50$$
$$2x + 5y = 10$$

The solution to the given system of equations is (x, y). What is the value of $3x$?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.