Chapter 3
Practice Test 1

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 excerpted from Mary Shelley, *Frankenstein*, originally published in 1818.

My journey was very melancholy. At first I wished to hurry on, for I longed to console and sympathize with my loved and sorrowing friends; but when I drew near my native town, I slackened my progress. I could hardly sustain the multitude of feelings that crowded into my mind. I passed through scenes familiar to my youth, but which I had not seen for nearly six years. How altered every thing might be during that time! One sudden and desolating change had taken place; but a thousand little circumstances might have by degrees worked other alterations, which, although they were done more tranquilly, might not be the less decisive. Fear overcame me; I dared no advance, dreading a thousand nameless evils that made me tremble, although I was unable to define them. I remained two days at Lausanne, in this painful state of mind. I contemplated the lake: the waters were placid; all around was calm; and the snowy mountains, 'the palaces of nature,' were not changed. By degrees the calm and heavenly scene restored me, and I continued my journey towards Geneva. The road ran by the side of the lake, which became narrower as I approached my native town. I discovered more distinctly the black sides of Jura, and the bright summit of Mont Blanc. I wept like a child. "Dear mountains! My own beautiful lake! How do you welcome your wanderer? Your summits are clear; the sky and lake are blue and placid. Is this to prognosticate peace, or to mock at my unhappiness?"

I fear, my friend, that I shall render myself tedious by dwelling on these preliminary circumstances; but they were days of comparative happiness, and I think of them with pleasure. My country, my beloved country! Who but a native can tell the delight I took in again beholding thy streams, thy mountains, and, more than all, thy lovely lake! Yet, as I drew nearer home, grief and fear again overcame me. Night also closed around; and when I could hardly see the dark mountains, I felt still more gloomily. The picture appeared a vast and dim scene of evil, and I foresaw obscurely that I was destined to become the most wretched of human beings. Alas! I prophesied truly, and failed only in one single circumstance, that in all the misery I imagined and dreaded, I did not conceive the hundredth part of the anguish I was destined to endure. It was completely dark when I arrived in the environs of Geneva; the gates of the town were already shut; and I was obliged to pass the night at Secheron, a village at the distance of half a league from the city. The sky was serene; and, as I was unable to rest, I resolved to visit the spot where my poor William had been murdered. As I could not pass through the town, I was obliged to cross the lake in a boat to arrive at Plainpalais. During this short voyage I saw the lightning playing on the summit of Mont Blanc in the most beautiful figures. The storm appeared to approach rapidly, and, on landing, I ascended a low hill, that I

CONTINUE

might observe its progress. It advanced; the heavens were clouded, and I soon felt the rain coming slowly in large drops, but its violence quickly increased.

While I watched the tempest, so beautiful yet terrific, I wandered on with a hasty step. This noble war in the sky elevated my spirits; I clasped my hands, and exclaimed aloud, "William, dear angel! This is thy funeral, this thy dirge!" As I said these words, I perceived in the gloom a figure which stole from behind a clump of trees near me; I stood fixed, gazing intently: I could not be mistaken. A flash of lightning illuminated the object, and discovered its shape plainly to me; its gigantic stature, and the deformity of its aspect more hideous than belongs to humanity, instantly informed me that it was the wretch, the filthy daemon, to whom I had given life. What did he there? Could he be (I shuddered at the conception) the murderer of my brother? No sooner did that idea cross my imagination, than I became convinced of its truth; my teeth chattered, and I was forced to lean against a tree for support. The figure passed me quickly, and I lost it in the gloom.

1

Which choice best describes the developmental pattern of the passage?

A) A lighthearted description of an adventure

B) A dramatic response to a request for help

C) A profound analysis of an ancient curse

D) A melancholy recounting of a doomed homecoming

2

Which choice best describes what happens in the passage?

A) One character returns home to avenge the death of his brother.

B) One character fears his future in the hometown he left.

C) One character is afraid to return to a city haunted by an unknown monster.

D) One character worries that he won't be welcome at home.

3

As used in line 11 and line 19, "degrees" most nearly means

A) levels.

B) measures.

C) small increments.

D) careful developments.

4

Which emotion does the narrator most feel?

A) He feels joy at returning home.

B) He feels antagonism for the daemon.

C) He feels dread concerning his fate.

D) He feels sorrow over William's death.

5

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

A) Lines 34–36 ("Who but . . . lake")

B) Lines 42–46 ("I prophesied . . . endure")

C) Lines 58–60 ("It advanced . . . increased")

D) Lines 74–75 ("Could . . . brother")

6

In the passage, the narrator addresses the tempest with

A) awe, but not fear.

B) ebullience, but not rage.

C) disconsolation, but not anger.

D) insanity, but not regret.

CONTINUE

7

The main purpose of the first paragraph is to

A) represent a journey.

B) embellish an emotion.

C) provide a context.

D) establish a mood.

8

Why does the narrator mention "a thousand little circumstances" (line 10)?

A) He fears a natural disaster and its aftermath.

B) He dreads the effects of a devastating incident.

C) He knows he could have stopped a tragedy.

D) He has incited a revolution to take down the government.

9

Which of the following provides the best evidence for the answer to the previous question?

A) Line 8 ("How altered . . . time")

B) Lines 9–13 ("One sudden . . . decisive")

C) Lines 50–52 ("The sky . . . murdered")

D) Lines 64–65 ("William . . . dirge")

10

As used in line 66, "stole" most nearly means

A) crept.

B) pinched.

C) thieved.

D) displaced.

CONTINUE

Questions 11–20 are based on the following passage.

This passage is an excerpt from Howard Gardner, *Art, Mind, and Brain.* ©1982 by Basic Books.

Twenty years ago psychology seemed a rather remote and sterile area to individuals interested in the full and creative use of the mind. The field harbored a trio of uninviting specializations. There was academic psychology, featuring the use of contrived laboratory apparatus to study the perception of visual illusions or the memorization of long lists of nonsense syllables. Such lines of study bore little evident relationship to human beings engaged in thought. There was behaviorism, the approach that emerged from work with rats and pigeons. Behaviorists claimed that we act in the way we do because we are reinforced for doing so and, given their focus on overt activity, these scholars denied inner life—no thought, no fantasies, no aspirations. Finally, there was psychoanalysis, which offered not only a controversial method of treatment but also an overarching theory of human nature. While psychoanalysis had a grandeur and depth that eluded both academic psychology and behaviorism, it strongly accentuated human personality and unconscious problem-solving.

The cognitive revolution came in two parts. First, there was the frank recognition that one could—one must—take seriously human mental processes, including thinking, problem-solving, and creating. Study of the mind once again became a proper scientific undertaking. Second, there was the demonstration by several researchers that human thought processes were characterized by considerable regularity and structure. Not all of this cogitation took place in full view, nor could such cognitive processes always be either related to external stimuli or confirmed by introspection. But there was structure to thought processes, a structure the careful analyst could help lay bare.

Many of us who were studying the behavioral sciences in the 1960s were swept up—and have remained inspired—by this revolution. For some, the appeal lay in computer programming and artificial intelligence—the design of machines that display intelligence. For others, the thrill came in conducting careful laboratory experiments in which one could trace, on a millisecond-by-millisecond basis, an individual's mental process as he carried out a multiplication problem, reasoned through a logical syllogism, or rotated an image of geometrical form in his head. Still others took roads that went through pedagogy, through anthropology, or through the neurosciences. In my own case, I found especially appealing the approach to the mind put forth by structuralists working in the cognitive regions of several social sciences.

In the opening set of essays I lay out the principal assumption of this structuralist approach as it is exemplified by the developmental psychologist Jean Piaget, the linguist Noam Chomsky, and the anthropologist Claude Levi-Strauss. These thinkers share a belief that the mind operates according to the specifiable rules—often unconscious ones—and that these can be ferreted out and made explicit by the systematic examination of human language, action, and problem-solving. There are many intriguing differences among their approaches as well, and I review several of these: still, one finds throughout a surprisingly (and reassuringly) common vision of what the human mind is like and how it can best be described for scientific purposes.

The structuralist approach to the mind has limitations. Those that are more germane, given my own concern with artistic knowledge, derive from the essentially closed nature of structuralist systems. Though creative thought has not escaped their attention, each of the major cognitive structuralists views the options of human thought as in some way preordained, limited in advance. This makes their work especially problematic for a study of mind where the major focus falls on innovation and creation, as in the fashioning of original works of art.

To my mind the limitation implicit in the standard structuralist stance can be circumscribed by the recognition of one special feature of human thought —its ability to create and sponsor commerce through the use of various kinds of symbol systems. These symbol systems—these codes of meaning—are the vehicles through which thought takes place: by their very nature they are creative, open systems. Through the use of symbols the human mind, operating according to the structuralist principles, can create, revise, transform, and re-create wholly fresh products, systems and even worlds of meaning.

CONTINUE

11

The main purpose of the passage is to

A) review a set of essays on structuralism and creativity.

B) convince scientists to abandon behaviorist thought.

C) emphasize the limitations present in psychology.

D) present the author's view that structuralism allows for creativity.

12

The central claim of the passage is that

A) psychology has evolved since the 1960s before which it was too sedate and impractical for modern scientists.

B) traditional structuralist principles can allow for the possibility of human creativity.

C) behaviorists are limited in their scientific processes and have preordained views that humans act largely on their operant conditioning.

D) the author's opinions on creativity are revolutionary and supported by research in traditional psychology.

13

The author describes the different branches of psychology throughout the passage mainly to

A) guide the reader through a complete historic progression of a science.

B) establish his prominent and novel role within the psychological community.

C) highlight a difference that makes structuralism inferior to behaviorism.

D) show how the revolution of the 1960s affected psychology.

14

Gardner indicates that the cognitive revolution he describes in the passage was

A) a motivation for the author's exploration of creativity and structuralism.

B) a pertinent factor in revitalizing a dying field of science.

C) beneficial for interjecting thoughtful scientists back into the field of psychology.

D) more effective than previous changes to the perspective of psychologists.

15

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

A) Lines 8–9 ("Such . . . thought")

B) Lines 27–30 ("Second . . . structure")

C) Lines 36–38 ("Many . . . revolution")

D) Lines 38–41 ("For some . . . intelligence")

16

The author characterizes the branch of psychology that became popular after the cognitive revolution mentioned in line 22 as using both

A) problem-solving and creating.

B) meticulousness and mathematics.

C) regularity and structure.

D) fantasy and aspiration.

17

Which lines best support the previous answer?

A) Lines 11–15 ("Behaviorists . . . aspirations")

B) Lines 23–26 ("First . . . creating")

C) Lines 41–47 ("For others . . . head")

D) Lines 64–67 ("still . . . purposes")

CONTINUE

18

According to the passage, the author references Jean Piaget, Noam Chomsky, and Claude Levi-Strauss because they

A) represent different approaches to a unified belief about the mind.

B) present work that is inherently problematic when used in psychological discussions.

C) are psychologists who support his assumptions about structuralism.

D) published works that do not support the author's opinion on creativity.

19

The "original works of art" mentioned in line 78 mainly serve to emphasize how

A) admiring of artistic knowledge and endeavors the author is.

B) distorted the views of the structural psychologists are.

C) restricted the traditional structuralists' views on creativity are.

D) closed-minded and limited psychology is regarding artistic ability.

20

Which choice most closely captures the meaning of the "symbol systems" referred to in line 84?

A) Thought processes

B) Problematic methods

C) Structured principles

D) Representative expressions

CONTINUE

Questions 21–31 are based on the following passages.

Passage 1 is adapted from Lee Billings, "At Pluto, the End of a Beginning." ©July 2015 by *Scientific American*. Passage 2 is adapted from Caleb A. Scharf, "A New Billion-Mile Journey for New Horizons." ©August 2015 by *Scientific American*. Lee Billings is a science journalist. Caleb Scharf is the Director of Astrobiology at Columbia University.

Passage 1

Early this morning, if all has gone well, the first golden age of interplanetary exploration will have come to a close. At 7:49 Eastern time, NASA's New Horizons spacecraft was slated to reach its primary target, Pluto and its moons, concluding what some call the preliminary reconnaissance of the known solar system.

Though it was conceived in the late 1980s, New Horizons wasn't launched until 2006, after long years of delays, redesigns, and even near-death cancellations. Its unlikely five-billion-kilometer voyage to Pluto has been the work of decades. And yet today, at the climax of its mission, the spacecraft was expected to traverse the expanse of Pluto in less than three minutes, whizzing 12,500 kilometers above the surface at nearly 50,000 kilometers per hour. From the start, the spacecraft was custom-built for speed. Carrying enough fuel to crash into orbit at Pluto would have made New Horizons too bulky, expensive, and slow to even launch in the first place, so instead it will flyby and continue outward, on an endless journey into interstellar night.

During its brief close encounter, New Horizons will be too busy gathering data to immediately phone home, instead using those precious moments to scrutinize the planet with a suite of seven instruments all running on a nightlight's share of electricity. Mission planners will only learn of the flyby's success later tonight, via a radio signal. Or, they could learn of its failure by hearing nothing—the spacecraft has an estimated 1 in 10,000 chance of suffering a destructive high-speed collision with debris while passing through the Plutonian system.

Presuming New Horizons' flyby is successful, its confirmatory signal traveling sunward at the speed of light will reach Earth some 4.5 hours after being transmitted, and is expected to arrive at 8:53 PM. Though the primary encounter is best measured in minutes and hours, the slow data-transmission rate imposed by such vast distances ensures that New Horizons will be beaming its archived images home well into 2017.

Passage 2

What do you do when you've flown 3 billion miles through interplanetary space?

You keep going.

Although NASA's New Horizons mission has only just begun to transmit the bulk of the detailed scientific data from its history-making encounter with the Pluto-Charon system (at an excruciatingly slow 2 kilobits per second) the spacecraft team has been hard at work on a critical, and time-sensitive, decision.

It had long been hoped that New Horizons would be able to deploy its instruments to study further objects in the Kuiper belt. But back in early 2014 it wasn't clear that astronomers and planetary scientists were going to be able to find any suitable candidates within the range of trajectories that the mission—with its limited on-board fuel resources—could reasonably adjust to. Despite searching with Earth-bound telescopes it was clear that our understanding of the number of objects smaller than Pluto (but still large enough to study) was incomplete, as candidates were in short supply.

Using the Hubble Space Telescope in the summer of 2014, in what was a bit of a last-ditch attempt, there was huge relief as just five plausible targets finally revealed themselves, with two later confirmed to be good for an intercept.

The first of these, called PT1 (potential target one) or more officially 2014 MU69, has now been chosen as the next goal for New Horizons.

This object is thought to be at most 30 miles across —akin to a cometary nucleus on steroids—and barely 1% the size of Pluto. In other words, it's an entirely different beast than Pluto, but it may be the kind of body that helped form Pluto itself some 4.5 billion years ago, and it's within reach for New Horizons at a mere billion miles further along the interplanetary road.

CONTINUE

21

In line 10, the author of Passage 1 mentions "delays, redesigns, and even near-death cancellations" primarily to

A) indicate why the ship was built for speed.

B) predict that not all may go well with the mission.

C) express concern that the ship may crash.

D) explain the period of time between the plan and its execution.

22

The author of Passage 1 indicates that the flyby over Pluto could have which outcome?

A) Scientists could receive data beginning at 7:49 Eastern time.

B) Scientists could receive no data from the ship.

C) Scientists could learn of the mission's failure through a radio signal.

D) Scientists could receive data after a delay of 3 minutes.

23

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

A) Lines 3–7 ("At 7:49 . . . system")

B) Lines 28–29 ("Mission . . . signal")

C) Lines 29–33 ("Or, they . . . system")

D) Lines 34–37 ("Presuming . . . 8:53 PM")

24

As used in line 26, "suite" most nearly means

A) jacket.

B) room.

C) array.

D) candy.

25

What function does the discussion of the measurement of the primary encounter in lines 38–39 serve in Passage 1?

A) It supports a claim made earlier in the text.

B) It undermines an assumption made in the previous paragraph.

C) It emphasizes the relativity of time in measuring space.

D) It highlights the brevity of the encounter versus the slow pace of the documentation.

26

The central claim of Passage 2 is that New Horizons has started to transmit information about Pluto but

A) it will then continue on an endless journey into night.

B) it is also on the way to its next observation.

C) plans for its next task need to be decided upon soon.

D) the preliminary reconnaissance of our solar system is complete.

27

As used in line 53, "deploy" most nearly means

A) mimic.

B) utilize.

C) release.

D) negate.

CONTINUE

28

Which statement best describes the relationship between the passages?

A) Passage 2 expresses concern about the dangers mentioned in Passage 1.

B) Passage 2 revises the interpretation of events described in Passage 1.

C) Passage 2 describes the next chapter in the story depicted in Passage 1.

D) Passage 2 provides qualified support for the successes celebrated in Passage 1.

29

The author of Passage 2 would most likely respond to the discussion of New Horizons' continued journey in lines 21–22, Passage 1, by claiming that the journey

A) will involve at least one further stop.

B) will not take place on a literal road.

C) will be endless.

D) will take a long time before return is possible.

30

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

A) Lines 46–51 ("Although . . . decision")

B) Lines 52–54 ("It had . . . belt")

C) Lines 69–71 ("The first . . . Horizons")

D) Lines 74–79 ("In other . . . road")

31

Which point about data transmitted from the New Horizons spacecraft is explicit in Passage 1 and implicit in Passage 2?

A) It will take some time for the data to reach Earth.

B) It would be more useful if scientists were able to interpret it more quickly.

C) It will be valuable only if it offsets the cost of the mission.

D) It is likely to consist primarily of images of objects smaller than Pluto.

CONTINUE

Questions 32–42 are based on the following passage and supplementary material.

This passage is adapted from Grant E. Donnelly, Anne V. Wilson, Ashley V. Whillans, and Michael I. Norton, "Communicating Resource Scarcity and Interpersonal Connection." ©2021 by Grant E. Donnelly, Anne V. Wilson, Ashley V. Whillans, and Michael I. Norton.

People often have the feeling that they lack enough time and enough money, and this problem is compounded by the frequency with which other people make demands on both resources. Imagine receiving an invitation to your friend's wedding, a destination event in Hawaii. You want to celebrate with your friend, but traveling to Hawaii requires a great deal of time and money: You have limited remaining vacation days and money is tight. Given these constraints, you decide that you are not going to attend the wedding. You know that declining the invitation will hurt your friend's feelings and may signal that you do not value the friendship, so your goal is to say "no" but to limit the negative impact on your friendship. While you could offer no explanation when declining an invitation people feel compelled to offer a rationale – for example, by disclosing that they do not have enough vacation time or enough money.

While receiving a wedding invitation may not be an everyday occurrence, people are regularly invited to social engagements by friends, family, and co-workers. In fact, over 25,000 invitations are sent each hour on Evite, an online invitation service (Evite, 2018). Such social invitations often necessitate the investment of one's time or money – or both. We propose that people often turn down social invitations by citing insufficient time (e.g., "I don't have time to go out to dinner") or money (e.g., "I don't have money to go out to dinner"). Despite the commonness of such situations, little is known about the consequences of disclosing financial or temporal scarcity, particularly with regard to the downstream consequences of doing so for the relationship between the inviter and invitee.

Research suggests that consumers might react more favorably to communications about time (vs. money) scarcity. For example, Liu and Aaker (2008) show that people respond more generously to charitable requests for time versus money, because money activates a value-maximization mindset that is more closely linked to economic utility whereas time engenders an emotional mindset that is geared toward helping (Liu & Aaker, 2008).

Similarly, while consumers regularly assess the value of their money regarding services that they receive in transactional relationships (e.g., a consumer's relationship with a business; e.g., Fiske, 1992), such comparisons are less common and are often perceived as inappropriate in communal relationships (e.g., a consumer's relationship with family and friends; e.g., Fiske, 1992). Thus, citing insufficient money could make relationships feel transactional, undermining the communal nature of the relationship (Kim, Zhang, & Norton, 2019). As a result, when provided with a rejection to a social invitation, consumers might respond more favorably to excuses citing a scarcity of time (vs. money).

In contrast, we suggest that communicating temporal scarcity could lead to more negative reactions. We propose that time is perceived as more discretionary and under consumers' personal control than money, which often must be dedicated to non-discretionary expenses (Bureau of Labor Statistics, 2016a, 2016b). Moreover, consumers tend to see time, but not money, as more likely to be readily available in the future, regardless of current demands on either resource (Zauberman & Lynch, 2005). Building on the literature on "time slack," we suggest that consumers apply these assumptions when receiving social excuses such that declining an invitation using a time (vs. money) scarcity excuse will be viewed more negatively because time is seen as more accessible and the use of which is more discretionary. In other words, we propose that excuses citing insufficient time will be received as a more intentional social slight than citing insufficient money because time is viewed as a more personally controllable resource. Recipients of time excuses versus money excuses may therefore perceive their relationship partner as less invested in the relationship, resulting in lower feelings of interpersonal closeness and less positive interpersonal behaviors.

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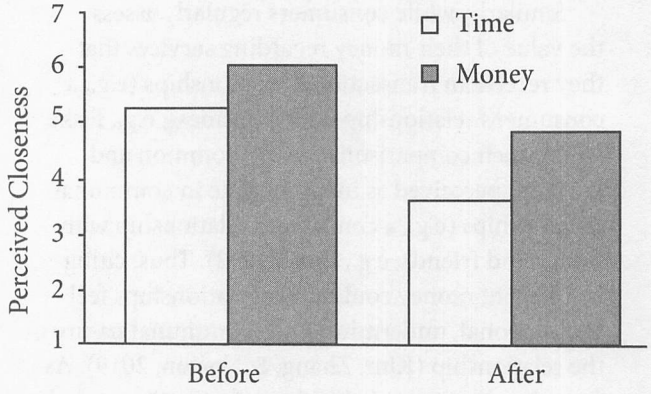
Effects of Time and Money Excuses on Perceived Closeness in Personal Relationships



32

The authors most likely use the example in lines 4-9 of the passage ("Imagine . . . tight") to highlight the

A) frequency with which people are invited to weddings.

B) demands put on one's resources by others.

C) damage done to friendships by declined invitations.

D) current shortage of vacation time available for social obligations.

33

The authors indicate that people feel compelled to explain declining an invitation primarily because they

A) want to avoid harming their friendships.

B) will lose time and money if they don't.

C) would expect the same from their friends.

D) believe they should follow societal customs.

34

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

A) Lines 11-14 ("You know . . . friendship")

B) Lines 23-25 ("Such . . . both")

C) Lines 25-29 ("We propose . . . dinner")

D) Lines 34-36 ("Research . . . scarcity")

35

In line 31, the word "temporal" most nearly means

A) worldly.

B) material.

C) time-related.

D) spiritual.

36

The authors would likely describe the "downstream consequences" mentioned in paragraph 2 (lines 19-33) as

A) unrealistic.

B) undetermined.

C) overstated.

D) temporary.

CONTINUE

37

The passage indicates that the assertion made by Kim, Zhang, and Norton in lines 50-53 may be

A) falsified.

B) illogical.

C) unnecessary.

D) inaccurate.

38

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

A) Lines 19-21 ("While . . . co-workers")

B) Lines 22-23 ("In fact . . . service")

C) Lines 53-56 ("As a . . . money")

D) Lines 57-59 ("In contrast . . . reactions")

39

As it is used in lines 59, "reactions" most nearly means

A) motivations.

B) responses.

C) transactions.

D) transformations.

40

The authors refer to work by Zauberman and Lynch (line 66) in order to

A) propose a solution.

B) support a theory.

C) discredit an opinion.

D) qualify an assumption.

41

The graph following the passage offers evidence that the perceived closeness in a personal relationship following an excuse is affected by

A) the prior perceived closeness in the friendship.

B) how frequently invitations are rejected.

C) the type of excuse offered.

D) the number of excuses offered in a rejection.

42

The authors would likely attribute the differing effects of time and money excuses on perceived closeness as represented in the graph to

A) decreasing levels of empathy.

B) beliefs about control over resources.

C) resistance to receiving any excuse.

D) the burden of social obligations.

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Questions 43–52 are based on the following passage and supplementary material.

This passage is adapted from Kaitlyn Kunce, "The Second X Chromosome." Originally published in 2016.

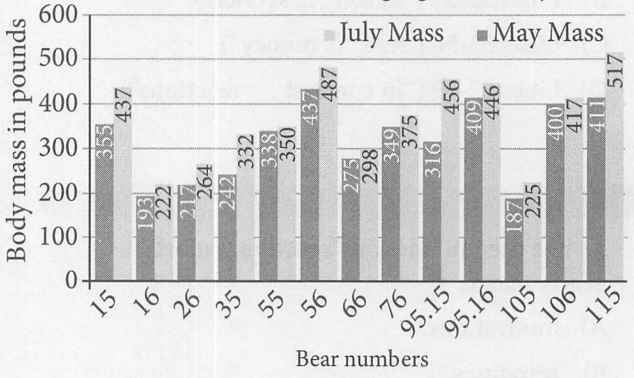
The researchers for The Changing Tides project have been collecting hair and blood samples from female bears along Katmai's coast. Researchers studied the bears during 2015 and 2016, and each bear was assigned a number. The bear's number ended in a "5" if the bear was studied in 2015 (for example, 15, 35, or 115) and ended in a "6" if the bear was studied in 2016 (for example, 16, 66, or 106). Ten collars were dispersed in May of this year on sows and seven of them were recaptured in July. Out of the three that weren't recaptured, one of the sows was in a spot that was inaccessible to the researchers. Another sow's collar was unable to be heard properly to be located. The researchers are careful not to capture sows with spring cubs, also known as cubs of the year. However, sows with older cubs are used in this study. Why this selection of females over males?

Females are often watched in wildlife populations to determine health. Initial cub nourishment, protection, and teaching are the mother bear's responsibility. Although fall food resources have been shown to influence bear populations, the quality of the early foraging season may have an effect on development of cubs. During the first year, cubs double their weight every two months. They depend exclusively on mom for nourishment for up to six months. This puts a lot of stress on the sow that must re-nourish herself and her cubs after hibernation.

The coastal areas in Katmai provide an important high quality early-season habitat for bears. The coast is one of the first places that becomes snow-free after winter. Looking at the data from early summer, both this year and last, we can see how important these resources can be for bears along the coast. The sows that were studied gained between 12-140 pounds over two months. Together they averaged about 1.2 pounds a day and only 0.08 pounds of fat a day. During this early summer period the bears are working to gain more muscle than fat. The late summer season is when researchers begin to see more fat gain per day. The salmon season, which runs from July through October, provides a fat-rich food source for the bears. And the salmon season is well-timed for the bears, because the bigger you get, the more weight and energy you spend to carry that weight around.

While sows are watched for health of the bear populations, the reason researchers pick females may be a little simpler than that. Throughout the summer as the bears continue to grow, the GPS collars are carefully placed so they won't infringe on the bears movement or growth. Quite often when a bear wakes up and doesn't like the collar, they slide it off within the first two hours. Usually the bears that do that are the males. Temperament may be a key reason researchers pick females over males.

Figure 1
Spring-Summer Weight Gain
2015 and 2016 Changing Tides Project



Adapted from The Second X Chromosome by Kaitlyn Kunce. National Parks Service.

Figure 2
Assimilated Body Composition–Bear 035, Bear 105

Bear 035	Pre-Salmon Foraging Season			
		May 2015	July 2015	Gain/Day
	Mass total	242 lbs	332 lbs	2.1 lbs
	Body Fat %	13%	20%	
	Salmon Foraging Season			
		July 2015	Oct 2015	Gain/Day
	Mass total	332 lbs	471 lbs	1.4 lbs
	Body Fat %	20%	39%	
Bear 105	Pre-Salmon Foraging Season			
		May 2015	July 2015	Gain/Day
	Mass total	187 lbs	225 lbs	0.9 lbs
	Body Fat %	2%	7%	
	Salmon Foraging Season			
		July 2015	Oct 2015	Gain/Day
	Mass total	225 lbs	357 lbs	1.4 lbs
	Body Fat %	7%	38%	

Adapted from "Changing Tides – More Questions Than Answers" by Kaitlyn Kunce. National Parks Service

CONTINUE

43

In the first paragraph (lines 1–17), what do the authors claim to be an important concern when selecting bears for the study?

A) The age of a bear's cubs

B) The year of the study

C) The number of bear cubs

D) The accessibility of the area

44

The author's use of the words "double" and "exclusively" in lines 25–26 in the second paragraph functions mainly to

A) underscore the need for sows to find high-quality sources of food during the summer months.

B) provide evidence against the claim that bear cubs double their weight every two months.

C) suggest an explanation for the timing of bears' hibernation during winter months.

D) reinforce the importance of monitoring female bears in order to determine the health of wild bear populations.

45

The author's main purpose of including the information about the Katmai coastal areas is to

A) present the reasoning that led the researchers to choose to study bears in this area.

B) provide an additional argument in favor of studying female rather than male bears.

C) establish that female bears gain more weight in muscle than fat in the summer months.

D) suggest an alternative location more productive for studying bears.

46

A student claims that sows gain weight only during the late summer and fall in preparation for hibernation. Which of the following statements in the passage contradicts the student's claim?

A) Lines 21–24 ("Although . . . cubs")

B) Lines 34–36 ("The sows . . . months")

C) Lines 37–39 ("During . . . fat")

D) Lines 40–42 ("The salmon . . . bears")

47

Based on the passage, the author's statement "the bigger you get, the more weight and energy you spend to carry that weight around" (lines 43-45) implies that a bear

A) requires more energy to catch salmon than to forage for food.

B) mostly gains muscle rather than fat when putting on weight in the early summer months.

C) gains an advantage by putting on more weight during late summer than during early summer.

D) should prioritize eating fatty foods during the months when it is also nourishing cubs.

48

The authors use the word "temperament" in line 54 to indicate that

A) the behavior of male bears accounts in part for researchers' selection of study subjects.

B) researchers study only female bears to avoid the need for locks on the bears' tracking collars.

C) female bears do not often engage in aggressive behavior toward researchers.

D) tracking collars restrict the movements of male bears more significantly than those of females.

CONTINUE

49

Based on figure 2, is the percentage of body fat gained between July and October greater or less than the percentage gained between May and July, and which statement made by the authors is most consistent with that data?

A) Less; "During . . . months" (lines 24–25)

B) Less; "Looking . . . coast" (lines 32–34)

C) Greater; "Together . . . day" (lines 36–37)

D) Greater; "The late . . . day" (lines 39–40)

50

Based on figure 1 and the passage, which choice gives the lowest body mass of a bear measured in July of 2015?

A) 187 pounds

B) 193 pounds

C) 222 pounds

D) 225 pounds

51

Do the data in figure 1 support the author's claim about weight gain among bears in the early summer months?

A) Yes, because for the bears included in the chart, the smallest weight gain was less than 12 pounds, and the largest weight gain was greater than 140 pounds.

B) Yes, because for the bears included in the chart, the smallest weight gain between May and July was 12 pounds, and the largest weight gain was 140 pounds.

C) No, because for the bears included in the chart, the smallest weight gain was less than 12 pounds, and the largest weight gain was greater than 140 pounds.

D) No, because for the bears included in the chart, the smallest weight gain between May and July was 12 pounds, and the largest weight gain was 140 pounds.

52

According to the graph, which of the following pieces of data provide evidence in support of the previous question?

A) Bears 15 and 55

B) Bears 15 and 95.15

C) Bears 55 and 95.15

D) Bears 95.15 and 115

STOP

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

No Test Material On This Page

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.

"Made-Up" Science

When we hear about the opinions of "ten scientists" or "ten dentists," or we hear that things are "clinically proven" or "lab-tested," for 1 example, and we might expect to be reading scientific journals. However, these phrases and statistics are well-known outside of scientific circles because they are so commonly used in a less likely place: advertising. It's not enough for, say, a shampoo to promise clean hair: it seems the only way to sell shampoo is 2 by lowering the price and offering special deals and coupons.

1

A) NO CHANGE
B) example, consequently we
C) example: we
D) example, we

2

Which provides the most relevant detail?

A) NO CHANGE
B) to merge into larger corporations and reduce the number of shampoo brands.
C) by comparing the product to other products customers buy more regularly.
D) to promise 40% more volume and bounce or 60% fewer split ends than other brands.

CONTINUE

These claims are part of what has been called, since 1961, "cosmeutical" science. The word itself combines "cosmetics" and "pharmaceutical." Since the term was coined in 1961, cosmetics companies have been under more pressure to innovate, as competition grows and markets expand outside the United States. This pressure has led to an increased reliance on scientific data as a way to back up the advertisers' claims.

[1] But where exactly do these claims come from? [2] However, if these claims seem absurd at times, it's because they may come from nowhere at all. [3] A recent study of these scientific claims appears in the *Journal of Global Fashion Marketing*. [4] In this study, the researchers looked at over 300 advertisements from fashion magazines like *Elle*, 3 *Vogue*, and *Vanity Fair*. [5] The obvious answer would seem to be "the lab." 4

To anyone who has ever 5 believed the truth-value of these advertisements (or of advertisements in general), the researchers' findings are probably not surprising. The researchers found that a mere 18% of the claims made in these advertisements were true. 23% of the claims were classified as "outright lies." 6 42% were considered too vague to classify.

3

A) NO CHANGE

B) *Vogue* and,

C) *Vogue*; and

D) *Vogue*: and

4

To make this paragraph most logical, sentence 5 should be placed

A) where it is now.

B) before sentence 2.

C) before sentence 3.

D) before sentence 4.

5

A) NO CHANGE

B) pondered

C) questioned

D) skepticized

6

The writer is considering deleting the underlined portion. Should the writer do this?

A) No, because it demonstrates the most surprising of the researchers' findings.

B) No, because it completes the discussion of the data and is mentioned again in the passage.

C) Yes, because it is a reminder of how subjective the researchers' study truly was.

D) Yes, because the reader could deduce this information through simple mathematics.

CONTINUE

These findings are good for a laugh, but 7 they may have more serious implications as well. Although everyone knows that the Food and Drug Administration can 8 reign what goes *into* food and drugs, what is less known is that the FDA can also punish false advertising claims. That sizable 23% that is telling "outright lies" may have a federal agency investigating its claims, and these investigations 9 might have resulted in significant fines and lawsuits.

While this has obvious ramifications for the "outright lies," what can the FDA do 10 from that much larger share of "too vague" claims? These may be safe for the simple reason that they are too vague to be disproven. Whatever the FDA may decide to do, this research should still remind consumers about the potential perils of trusting the word of advertisers. 11 Thus, the claims are often harmless, but consumers want to believe that they are giving their hard-earned money to trustworthy organizations.

7

A) NO CHANGE
B) will have
C) may have
D) might be having

8

A) NO CHANGE
B) regulate
C) name
D) administrate

9

A) NO CHANGE
B) have resulted in significant fine's
C) may result in significant fines
D) may result in significant fine's

10

A) NO CHANGE
B) to
C) by
D) with

11

A) NO CHANGE
B) On the other hand,
C) True,
D) Nevertheless,

CONTINUE

Questions 12–22 are based on the following passage and supplementary material.

Gerry's Salamander

The United States is often lauded for its contributions to democracy in the world. When the process is allowed to work, democracy in the United States is truly admirable, and all of those who vote can feel that they are participating in the process in a significant way. 12 This being the case, there are some abnormalities in the history of U.S. elections that fall short of these expectations.

[1] One notable instance came in a state senate election in Massachusetts in 1812. [2] Unfortunately, it was not the last. [3] Shortly before this election, Elbridge 13 Gerry, then governor of the state, called for a redistricting that was supposed to reflect demographic shifts within the city. [4] To anyone paying attention, however, it 14 will become clear that this redistricting would benefit Gerry's own party, the Democratic-Republicans. [5] It was one of the first and most infamous works of political trickery in the history of the country. 15

12

A) NO CHANGE
B) Happily,
C) Politically,
D) Unfortunately,

13

A) NO CHANGE
B) Gerry then governor of the state,
C) Gerry, then governor of the state
D) Gerry, then governor, of the state

14

A) NO CHANGE
B) would have become
C) became
D) becomes

15

To make this paragraph most logical, sentence 2 should be placed

A) where it is now.
B) after sentence 3.
C) after sentence 4.
D) after sentence 5.

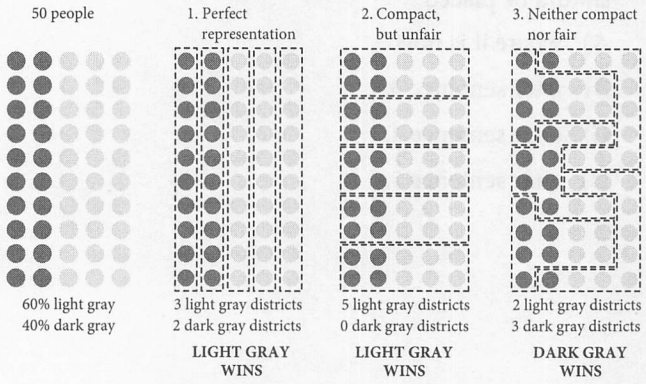
CONTINUE

Gerry's tactics gave birth to a new term. The *Boston Gazette* poked fun at Gerry's redistricting **16** plan. This newspaper said that the newly created South Essex electoral district resembled a salamander on the map. This image, combined with the governor's name, came to be known by a very specific **17** name: gerrymandering. The practice unfortunately continues to be a tool of political manipulation to this day.

Particularly on the state and local levels, gerrymandering can have a tremendous influence on the outcome of an election. As the below graphic shows, gerrymandering can turn **18** voters against some of the legislative bodies in their state. In a population of 50 people, in which voting blocs lived in contained areas, different districting can result in vastly different outcomes, even where there is a clear advantage for one party. In the redistricting shown below, **19** 40% light gray voters can become 60% dark gray districts through the careful manipulation of the districts.

Gerrymandering, explained

Three different ways to divide 50 people into five districts



16

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

A) plan, when the paper said

B) plan, at which time the paper said

C) plan, saying

D) plan and they said

17

A) NO CHANGE

B) name: which was

C) name;

D) name. And it was

18

Which choice best completes the description of the purpose of gerrymandering?

A) NO CHANGE

B) a series of political factions against one another.

C) elections into long processes with delayed results.

D) electoral disadvantages into electoral advantages.

19

Which choice most accurately and effectively represents information in the figure?

A) NO CHANGE

B) 60% dark gray voters can become 60% light gray districts.

C) 40% light gray voters can become 100% dark gray districts.

D) 60% light gray voters can become 60% dark gray districts.

CONTINUE

Gerrymandering almost always benefits the parties in 20 power, not those out of power, because those are the parties that have the influence necessary to redistrict. Many perfectly viable candidates have been shut out by cruel and unfair districting practices. In this and in other political arenas, it is much easier to stay in power than to gain power.

The real victims of gerrymandering, however, are the voters. The process is used quite often to disenfranchise certain voters by making 21 they're votes less valuable. In "majority-minority" districts in particular, districts with large non-white populations, gerrymandering can discount the importance of particular races or classes of voters, many 22 of whose voting interests may go against those in power. The American voting system works, but only when all voters are given an equal say in the outcome of an election.

20

A) NO CHANGE
B) power usually,
C) power
D) power for the good

21

A) NO CHANGE
B) their
C) there
D) they are

22

A) NO CHANGE
B) voters'
C) of their
D) DELETE the underlined portion.

CONTINUE

Questions 23–33 are based on the following passage and supplementary material.

The Original Condition

If you've ever been to an art museum, you know the basic layout: long hallways and large rooms with paintings hung a few feet apart. You know how the paintings are 23 by certain means marked, and you know that the paintings have been arranged chronologically or thematically.

There's one thing, however, which you've definitely noticed even if you can't quite articulate it. Particularly when looking at old paintings, 24 paintings all have that vividly *new* look, whether they were painted in 1950 or 1450. Even where the subject matter is older, the colors are vibrant, and you're never forced to wonder exactly what the painting must have looked like in its original state. 25 The history of painting is nearly as long as the history of mankind.

23

A) NO CHANGE
B) marked,
C) being marked in a way,
D) by so means of marking,

24

A) NO CHANGE
B) you've surely noticed how *new* all the paintings look,
C) noticing the *new* look of all the paintings is something you can do,
D) the paintings always strike you as very *new* looking,

25

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

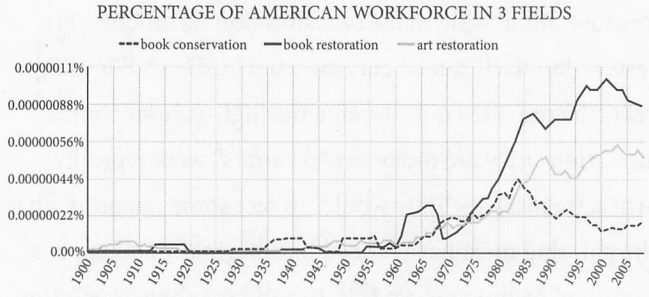
A) Deleted, because it strays from the paragraph's major focus by introducing an irrelevant fact.
B) Deleted, because it restates a historical detail that is provided in a later paragraph.
C) Kept, because it is a useful introduction to the topic of this paragraph.
D) Kept, because it provides a humorous anecdote regarding the work of art restorers.

CONTINUE

This incredible feat is the work of a highly specialized group: art restorers. Despite this specialization, the profession has exploded in recent years. 26 Art restoration has been growing steadily since 1930. While the job of an art restorer may seem fairly straightforward 27 when looking, the job is in fact quite complicated. Sometimes, as in the case of Michelangelo's famous sculpture *David*, the cleaning and restoration of artworks is a simple 28 matter, applying chemicals, washing away grime, and scrubbing off the dirt.

26

At this point, the writer wants to add specific information that is consistent with the focus of the paragraph.



Which choice most effectively provides a sentence with relevant and accurate information from the graph above?

A) NO CHANGE

B) The number of book restorers who became art restorers tripled in 2000.

C) By the year 2030, it is predicted that art restoration will even eclipse art conservation.

D) From 1970 to 2005, the percentage of people working in art restoration has roughly tripled.

27

A) NO CHANGE

B) beholden,

C) at first glance,

D) under your gaze,

28

A) NO CHANGE

B) matter

C) matter:

D) matter;

CONTINUE

29 With most paintings, however, the process is a good deal more involved because it is not necessarily just a matter of "cleaning" the older paintings. One cannot merely take a scrub brush to a centuries-old great work. Because of the wide range of restoration techniques, art restoration itself can be controversial business. For many years, before museums became the high-volume tourist attractions they are today, art "restorers" were typically artists themselves. They would project some image of what the painting must have looked like originally and apply a variety of techniques, up 30 to and including: repainting, to preserve this "original."

[1] Now, however, more attention is paid to the historical quality of the artworks. [2] Some art historians 31 who is writing today even go so far as to say that dirt and grime themselves are parts of the historical fabric of a painting and thus should be left in. [3] Others argue that the purity of the painting is all that matters. [4] They will restore the original look of a painting, even if that means "fixing" the painting by some non-paint means. 32

Whatever methods they use, art restorers are more needed 33 for ever, but their work is also less permanent. In order to retain the integrity of the artwork in case the restorers make a mistake, all restoration must now be reversible, a reminder that art "history" is very much a thing of the present and the future.

29

A) NO CHANGE
B) Anyway,
C) In this sense,
D) Alongside cleaning,

30

A) NO CHANGE
B) to, and including,
C) to and including
D) to, and including:

31

A) NO CHANGE
B) who are
C) whom is
D) whom are

32

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

> For example, a recent restoration at Harvard's Art Museums involved precisely calibrated lights that would correct the color damage to a series of murals done by Mark Rothko in the 1960s.

The best placement for the sentence is immediately

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

33

A) NO CHANGE
B) by
C) what
D) than

CONTINUE

Questions 34–44 are based on the following passage.

The Rise of *Hyperion*

Literary critics have always paid the most attention to "serious" authors. The great authors of recent memory, especially in American literature, have been distinctly "literary" authors: Toni Morrison, Philip Roth, Thomas Pynchon, and Jonathan Franzen. Often overlooked in this pantheon of great authors are the contributions of authors in non-traditional 34 modes. Specifically overlooked is the genre of science fiction. In some ways, the novel that has hearkened back to the great authors of the Victorian nineteenth century is not Morrison's *Beloved* or Roth's *American Pastoral* but *Hyperion* by Dan Simmons.

Simmons's novel was published in 1989, and it won the Hugo Award for best science-fiction novel that year. 35 All things considered, it is regularly listed among the greatest science-fiction novels of all time. The novel 36 that spawned a series of novels dealing with the same fantastic universe, the first of which was *The Fall of Hyperion*, published in 1990. *Hyperion* tells the story of seven pilgrims who travel to the distant world of Hyperion in an attempt to avert a galaxy-wide war between hostile factions. Because the pilgrims are 37 not sure in a complete way why they've been recruited for this

34

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

A) modes, which notably include
B) modes, and overlooked in particular is
C) modes, specifically
D) modes, and one genre suffering neglect is

35

A) NO CHANGE
B) For all that,
C) To this day,
D) Check this out,

36

A) NO CHANGE
B) which,
C) is that which
D) DELETE the underlined portion.

37

A) NO CHANGE
B) not sure in their entirety
C) not entirely sure
D) lacking a complete sureness

CONTINUE

"pilgrimage," they spend the long journey to Hyperion sharing 38 your stories, each of which illuminates the journey 39 while explaining this new fantasy world to the reader.

If this structure 40 of sound familiar, that's because it draws on some of the great classics of literature, most notably *The Canterbury Tales*, which itself is a kind of travel narrative, as it follows 41 pilgrims travel together to the Canterbury Cathedral.

38

A) NO CHANGE
B) their
C) our
D) everyone's

39

A) NO CHANGE
B) when
C) though
D) as if

40

A) NO CHANGE
B) and sounding
C) sounding
D) sounds

41

A) NO CHANGE
B) pilgrim's travels
C) pilgrim's traveling
D) pilgrims traveling

CONTINUE

The name of the novel draws on a long literary history as well: poems by John Keats and novels by Friedrich Hölderlin and Henry Wadsworth Longfellow. 42 With all of these literary tributes, if great works of literature are expressions of, as T.S. Eliot says, "tradition and the individual talent," then *Hyperion* is certainly a great work. 43

In addition to its incredible achievements in terms of literary history, *Hyperion* is also a truly incredible work of science fiction. The future world it imagines is vivid, and its continuities with the contemporary world 44 is clearly defined. *Hyperion* is awash in literary laurels, but it is also an entertaining novel—quite a combination!

The fact that *Hyperion* is not as well known as some of the more accepted "classics" should make us wonder what we mean by this term "classics." We should also wonder what else we've been missing because it hasn't met our traditional criteria for greatness.

42

Which choice most effectively sets up the information that follows?

A) Dan Simmons must have studied the poems and essays of T.S. Eliot at some point in his life.

B) Even beyond these nominal debts, *Hyperion* pays homage to countless genres, including the war story and the detective novel.

C) But don't worry, there are still plenty of lasers and spaceships in the book, too.

D) Although the critics of the early twentieth century probably would've loved it, many of them died before *Hyperion* was published.

43

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

> Some of T.S. Eliot's most famous poems are *The Waste Land* and "The Love Song of J. Alfred Prufrock."

Should the writer make this addition here?

A) Yes, because it helps to put the literary quality of *Hyperion* into its appropriate context.

B) Yes, because it names another series of works that are overlooked for being non-traditional.

C) No, because it introduces a new set of information that does not have a clear link to the rest of the passage.

D) No, because it disagrees with the passage's central claim that *Hyperion* is the greatest work of science fiction.

44

A) NO CHANGE

B) has been

C) being

D) are

STOP

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

Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

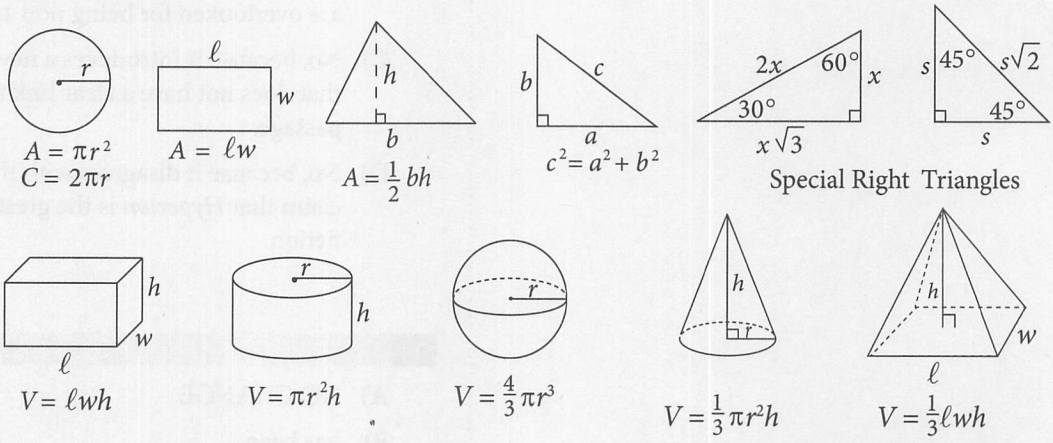
DIRECTIONS

For questions 1–15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle 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



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

3

1

During a certain week, Jan worked j hours each day for 3 days, and Noah worked n hours each day for 5 days. Which of the following represents the total combined number of hours worked that week by Jan and Noah?

A) $3j + 5n$

B) $5j + 3n$

C) $8jn$

D) $15jn$

2

If $\frac{y + 2}{5} = c$ and $c = 4$, what is the value of y ?

A) 16

B) 18

C) 20

D) 22

3

For $i = \sqrt{-1}$, what is the sum $(10 - 4i) + (3 + 6i)$?

A) $13 - 10i$

B) $13 + 2i$

C) $7 - 10i$

D) $7 + 2i$

4

$$(ab^2 + 4a^2 + 6a^2b^2) - (-ab^2 + 2a^2b^2 + 4a^2)$$

Which of the following is equivalent to the expression above?

A) $-2a^2b^2$

B) $-2a^2b^2 + 8a^2$

C) $2ab^2 - 2a^2b^2 + 8a^2$

D) $2ab^2 + 4a^2b^2$

CONTINUE

5

$$w = 3{,}150 + 450l$$

A marine biologist uses the equation above to estimate the weight, w, of a mature great white shark, in pounds, in terms of the shark's fork length, l, in feet. Based on the equation, what is the estimated weight increase, in pounds, for each foot of growth in fork length in a great white shark?

A) 3,150

B) 2,700

C) 1,350

D) 450

6

Juan is a book editor who is given a book to edit. The number of pages that he has left to edit at the end of each hour is estimated by the equation $P = 326 - 12h$, where h represents the number of hours spent editing the book. What is the meaning of the value 326 in this equation?

A) Juan edits pages at a rate of 326 per day.

B) Juan edits pages at a rate of 326 per hour.

C) Juan is given a total of 326 pages to edit.

D) Juan will finish editing the book in 326 hours.

7

If $\frac{x}{y} = 3$, what is the value of $\frac{12y}{x}$?

A) 4

B) 6

C) 8

D) 12

8

$$2y + x = -17$$

$$5x - 4y = -15$$

What is the solution (x, y) to the system of equations shown above?

A) $(-7, -5)$

B) $(-4, -1)$

C) $(-3, 0)$

D) $(5, -11)$

CONTINUE

9

$$c = \frac{\frac{r}{1,200}}{1-\left(1+\frac{r}{1,200}\right)^{-N}} M$$

In order to buy a house, a couple takes on a mortgage of M dollars at an annual rate of r percent to be paid off over N months. If the equation above is used to determine the monthly payment, c, that the couple needs to make to pay off the loan, which of the following expressions gives the value of M, in terms of c, r, and N?

A) $M = \left(\frac{r}{1,200}\right)c$

B) $M = \left(\frac{1,200}{r}\right)c$

C) $M = \frac{1-\left(1+\frac{r}{1,200}\right)^{-N}}{\frac{r}{1,200}}c$

D) $M = \frac{\frac{r}{1,200}}{1-\left(1+\frac{r}{1,200}\right)^{-N}}c$

10

A line in the xy-plane has a slope of $\frac{2}{3}$ and passes through the origin. Which of the following points lies on the line?

A) $\left(0, \frac{2}{3}\right)$

B) (2, 3)

C) (6, 4)

D) (9, 4)

11

$$f(x) = cx^2 + 30$$

For the function f defined above, c is a constant and $f(3) = 12$. What is the value of $f(-3)$?

A) −12

B) −2

C) 0

D) 12

CONTINUE

12

$$A = 240 - 20w$$
$$B = 320 - 30w$$

In the equations above, A and B represent the price per night for a room in Hotel A and Hotel B, respectively, w weeks after September 1 last autumn. What was the price per night in Hotel A when it was equal to the price per night in Hotel B?

A) \$80

B) \$160

C) \$180

D) \$220

13

If $a - 4b = 18$, what is the value of $\frac{3^a}{81^b}$?

A) 81^2

B) 9^6

C) 3^{18}

D) The value cannot be determined from the information given.

14

If $(ax + 3)(bx + 5) = 35x^2 + kx + 15$ for all values of x, and $a + b = 12$, what are the two possible values for k?

A) 46 and 50

B) 15 and 35

C) 21 and 25

D) 5 and 7

15

If $y > 5$, which of the following is equivalent to

$$\frac{1}{\frac{1}{y-4} + \frac{1}{y-3}}$$?

A) $2y - 7$

B) $y^2 - 7y + 12$

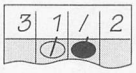
C) $\frac{y^2 - 7y + 12}{2y - 7}$

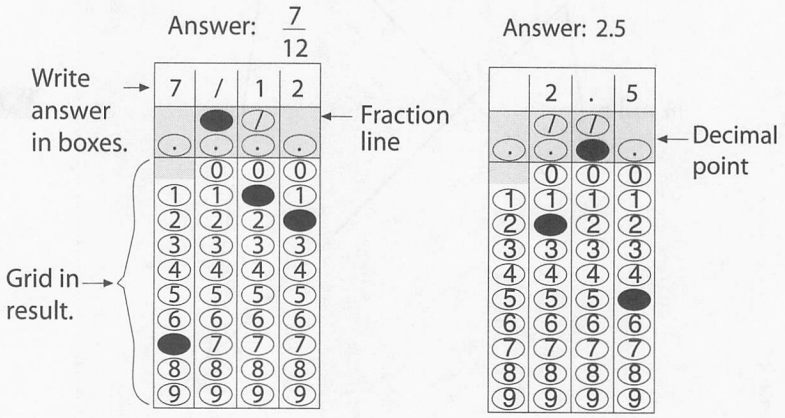
D) $\frac{2y - 7}{y^2 - 7y + 12}$

CONTINUE

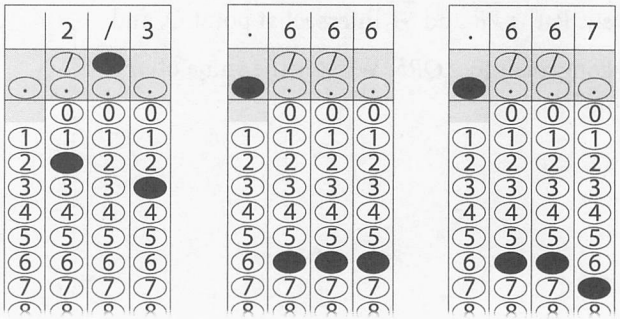
DIRECTIONS

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

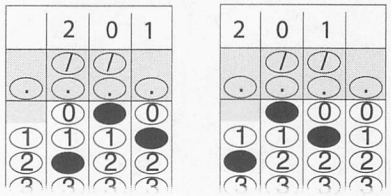
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
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 as $3\frac{1}{2}$.)
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.



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



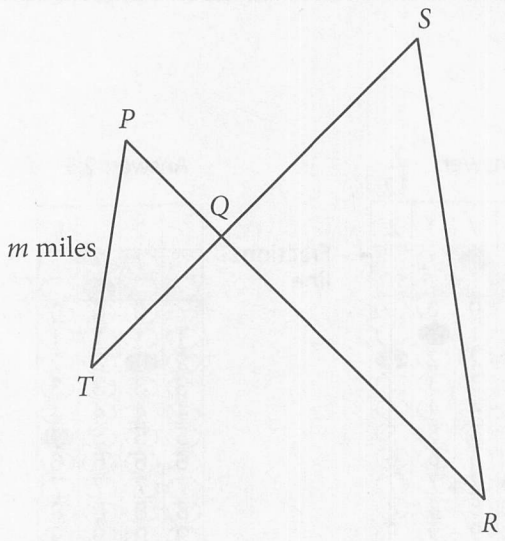
Answer: 201 – either position is correct



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 a certain park, the layout of the six bicycle paths is shown in the figure above. The lengths of $\overline{PQ}$, $\overline{QT}$, $\overline{QS}$, and $\overline{SR}$ are 3 miles, 4 miles, 8 miles, and 10 miles, respectively. Paths $\overline{PR}$ and $\overline{ST}$ intersect at point Q, and $\angle TPQ$ is congruent to $\angle QRS$. What is the value of m ?

17

If $y > 0$ and $y^2 - 36 = 0$, what is the value of y ?

18

In a right triangle, one angle measures $d°$, where $\cos d° = \frac{5}{13}$. What is $\sin (90° - d°)$?

CONTINUE

19

If $c = 3\sqrt{5}$ and $5c = \sqrt{5z}$, what is the value of z?

20

$$a + b = -10$$

$$2a + b = -33$$

What is the value of b in the system of equations shown above?

STOP

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

Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

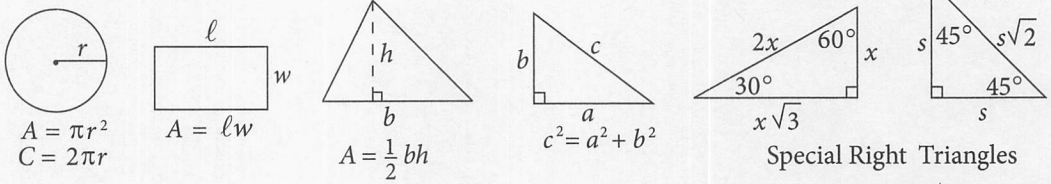
DIRECTIONS

For questions 1–30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle 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 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



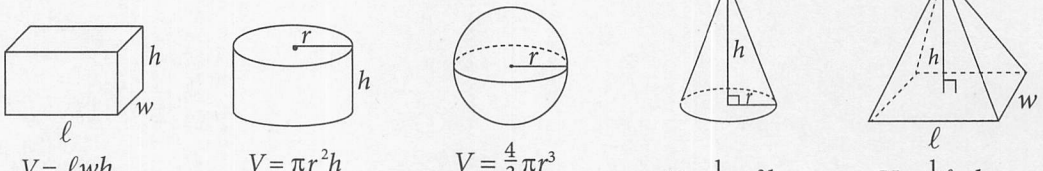
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

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

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

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

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

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

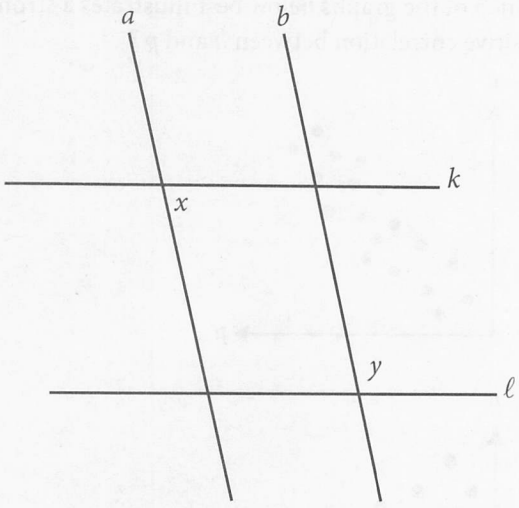
$V = \frac{1}{3}\ell wh$

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

4

1



In the figure shown above, lines a and b are parallel and lines k and ℓ are parallel. If the measure of $\angle x$ is 75°, what is the measure of $\angle y$?

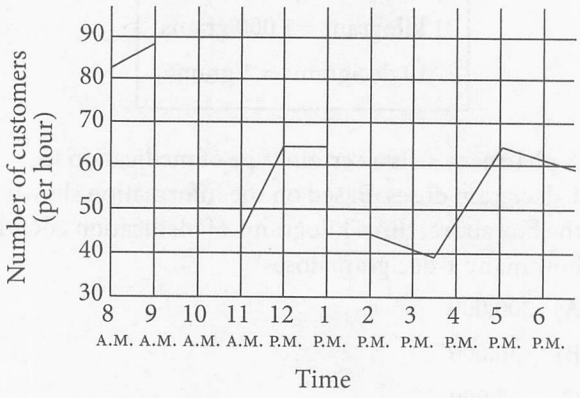
A) 15°

B) 75°

C) 105°

D) 165°

2



The graph above shows the number of customers per hour at a coffee shop. Over which of the following intervals is the number of customers strictly decreasing then strictly increasing?

A) From 9 A.M. to 12 P.M.

B) From 12 P.M. to 2 P.M.

C) From 2 P.M. to 5 P.M.

D) From 3:30 P.M. to 6:30 P.M.

3

If $y = \frac{x}{k}$, where k is a constant, and $y = 5$ when $x = 30$, what is the value of y when $x = 42$?

A) 6

B) 7

C) 10

D) 17

CONTINUE

4

1 kilogram = 1,000 grams
10 decigrams = 1 gram

A pharmacy sells a certain type of medication in 1-decigram doses. Based on the information shown in the box above, three kilograms of medication contain how many 1-decigram doses?

A) 300,000

B) 30,000

C) 3,000

D) 300

5

If $6x - 4$ is 11 less than 25, what is the value of $9x$?

A) 3

B) 8

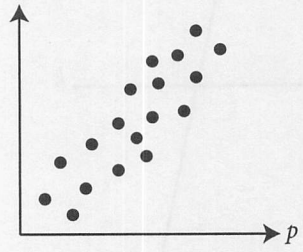
C) 18

D) 27

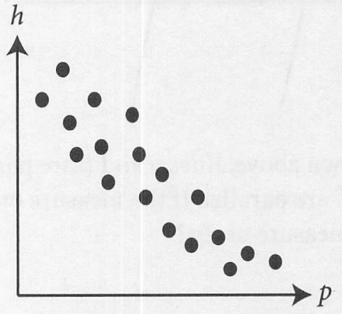
6

Which of the graphs below best illustrates a strong positive correlation between h and p ?

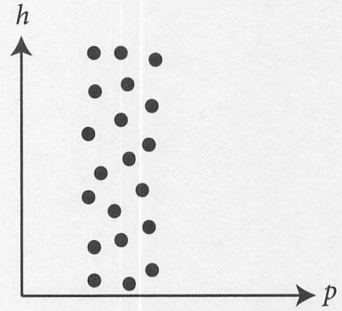
A)



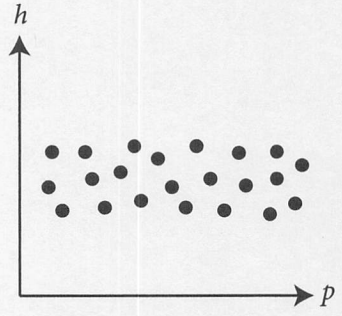
B)



C)



D)



CONTINUE

Questions 7 and 8 refer to the following information.

$$p = 101 + 10.094d$$

The total pressure on an object submerged in the ocean depends on the depth of the object beneath the surface. The formula above shows the relationship between p, pressure, in kilopascals, and d, depth, in meters.

7

At which of the following depths will the total pressure be closest to 200 kilopascals?

A) 8 meters

B) 9 meters

C) 10 meters

D) 11 meters

8

Which of the following formulas expresses depth in terms of pressure?

A) $d = \frac{p}{10.094} - 101$

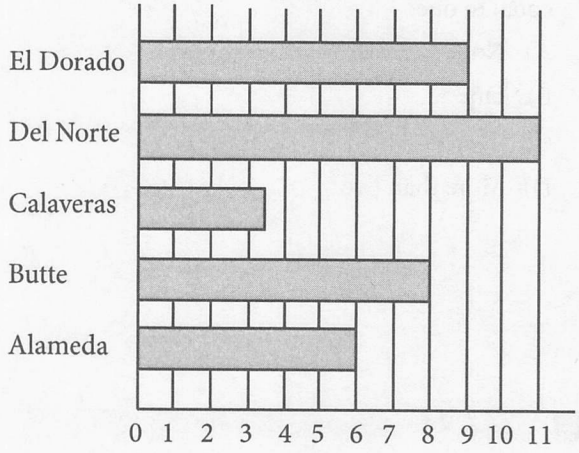
B) $d = \frac{10.094}{101 - p}$

C) $d = \frac{p + 101}{10.094}$

D) $d = \frac{p - 101}{10.094}$

9

Wind Turbine Operation in Five Counties



The number of wind turbines in use in five counties is shown in the graph above. If there are a total of 3,750 wind turbines operating in these five counties, which of the following is an appropriate label for the horizontal axis of the graph?

A) Number of wind turbines (in tens)

B) Number of wind turbines (in hundreds)

C) Number of wind turbines (in thousands)

D) Number of wind turbines (in tens of thousands)

CONTINUE

10

For how many values of k is it true that $|k - 3| + 2$ is equal to one?

A) None

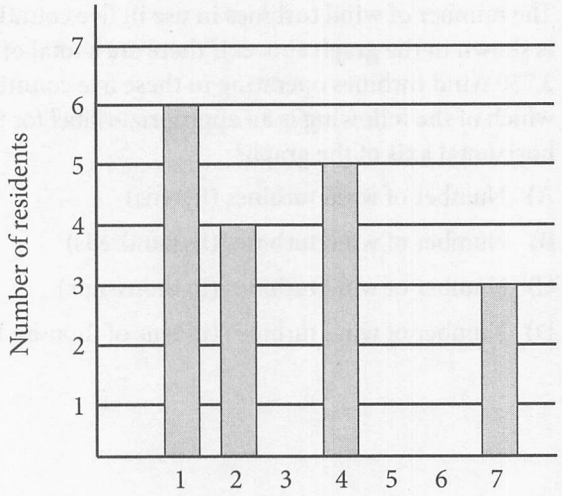
B) One

C) Two

D) More than two

11

Number of Residents in Each of 14 Apartments



According to the histogram shown above, which of the following is closest to the average (arithmetic mean) number of residents per apartment?

A) 3

B) 3.25

C) 3.5

D) 4

12

Which of the following integers CANNOT be a solution to the inequality $6x - 4 \leq 7x - 3$?

A) 1

B) 0

C) −1

D) −2

13

Weights of potatoes (in ounces)								
2	3	3	4	4	4	5	5	6
6	7	7	7	7	8	8	9	9

An agriculture class harvested 18 potatoes from the school garden and compiled the weights of the potatoes in the table above. If the 2-ounce measurement is removed from the data, which of the following statistical measures of the values listed will change the least?

A) The mean

B) The median

C) The range

D) The total

CONTINUE

14

$$p + x > y$$

$$r - x < -y$$

In the xy-plane, (2, 2) is a solution to the system of inequalities shown above. Which of the following must be true about p and r?

A) $p < r$

B) $r < p$

C) $p + r = 0$

D) $|p| = |r|$

15

	Political Party			
	Liberal	Conservative	Independent	Total
Men	59	74	62	195
Women	82	63	55	200
Total	141	137	117	395

A group of voters in country X responded to a poll that asked which political party they planned to vote for. The table above shows the results of the polling data. Which of the categories below accounts for approximately 15 percent of all poll respondents?

A) Men voting Liberal

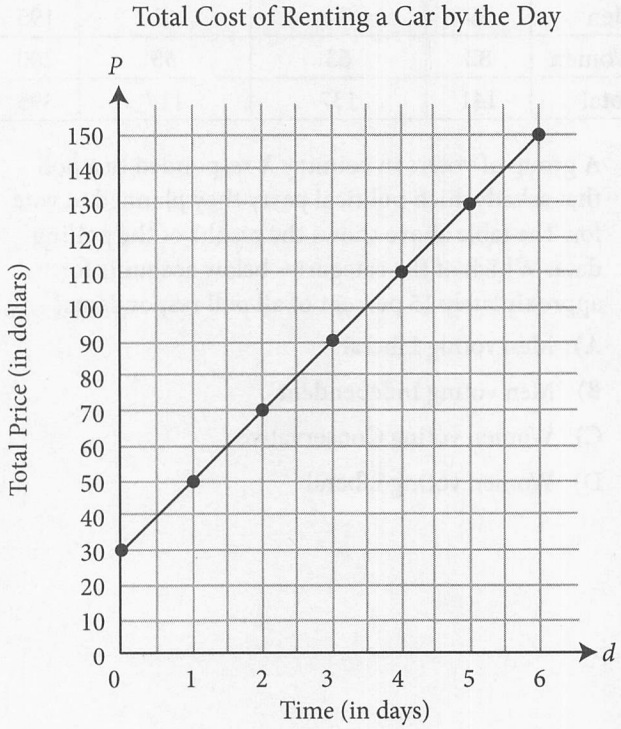
B) Men voting Independent

C) Women voting Conservative

D) Women voting Liberal

CONTINUE

Questions 16 and 17 refer to the following information.



The graph above shows the total price P, in dollars, to rent a car for d days.

16

What does the slope of the graph represent?

A) The total number of cars rented

B) The initial cost of renting a car

C) The average increase in price to rent a car for each additional day

D) The total number of days for which a car is rented

17

Which of the equations below shows the relationship between d and P?

A) $P = 25d$

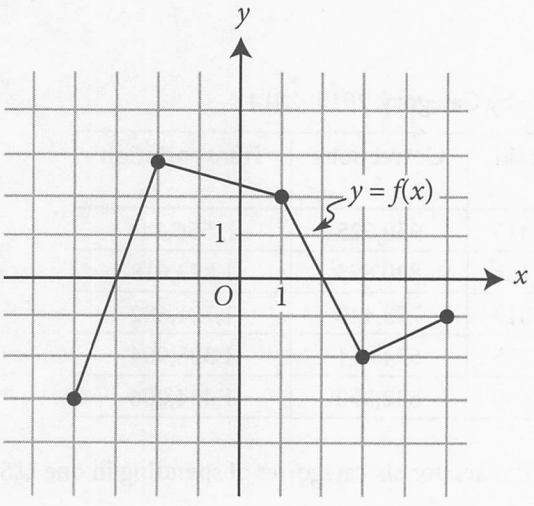
B) $P = d + 30$

C) $P = 10d + 30$

D) $P = 20d + 30$

CONTINUE

18



The figure above shows the complete graph of the function f in the xy-plane. For which of the following values of x is $f(x)$ at its maximum?

A) -4

B) -3

C) -2

D) 3

19

The price of a train ticket purchased in the train station or from a conductor is 15 percent less during off-peak hours than it is during peak hours. If a ticket is purchased from the conductor, an 11 percent surcharge is added to the price. Alec purchased a ticket from the conductor during off-peak hours and paid a total of t dollars. Which of the following, in terms of t, represents the price he would have paid if he had purchased the ticket in the train station during peak hours?

A) $\frac{t}{0.96}$

B) $0.96t$

C) $\frac{t}{(0.85)(1.11)}$

D) $(0.85)(1.11)t$

20

Number of Exercise Sessions per Week

	0–2	3–5	More than 5	Total
Group 1	13	22	15	50
Group 2	11	18	21	50
Total	24	40	36	100

The table above was compiled by a nutrition researcher studying how often people exercise when asked to keep a log of their exercise sessions. Group 1 was comprised of people who regularly eat snacks, and Group 2 was comprised of people who rarely eat snacks. If one person is randomly chosen from among those who exercise fewer than six times per week, what is the probability that this person belonged to Group 1 ?

A) $\frac{35}{64}$

B) $\frac{50}{64}$

C) $\frac{29}{100}$

D) $\frac{35}{100}$

21

A service station sells gasoline for \$3.25 per gallon and diesel fuel for \$3.00 per gallon. On Monday, the service station's revenue from selling a total of 131 gallons of gasoline and diesel fuel was \$404.25. How many gallons of diesel fuel did the service station sell on Monday?

A) 35

B) 55

C) 76

D) 86

CONTINUE

Questions 22 and 23 refer to the following information.

Total Budget Spending in One U.S. State by Category, 2010–2014

Year	K-12 education	Higher education	Public assistance	Medicaid	Corrections	Transportation
2014	3,635,265	3,099,112	29,450	2,990,415	930,525	1, 556,244
2013	3,677,428	2,734,615	45,873	3,005,188	820,855	1,873,618
2012	3,715,853	2,550,665	55,645	3,020,012	773,420	1,721,682
2011	3,747,921	2,309,789	54,321	2,984,375	694,011	1,388,904
2010	3,785,200	2,104,214	55,787	3,001,650	632,350	1,434,006

The table above summarizes annual spending, in thousands of dollars, for six categories of spending in one U.S. state, 2010–2014.

22

Of the following, which category's ratio of its 2010 spending to its 2014 spending is nearest to the higher-education category's ratio of its 2010 spending to its 2014 spending?

A) K-12 education

B) Medicaid

C) Corrections

D) Transportation

23

Which of the following is the best approximation of the average rate of change in spending on public assistance from 2012 to 2014 ?

A) $6,000,000

B) $10,000,000

C) $13,000,000

D) $26,000,000

CONTINUE

24

A fish leaps vertically upward from the surface of a lake at an initial speed of 9 meters per second. The height h, in meters, of the fish above the surface of the water s seconds after it leaps is given by the equation $h = 9s - 4.9s^2$. Approximately how many seconds after the fish leaps will it hit the surface of the lake?

A) 2.0

B) 2.5

C) 3.0

D) 3.5

25

A circle in the xy-plane is centered at (3, 0) and has a radius with endpoint $\left(1, \frac{8}{3}\right)$. Which of the following is an equation of the circle?

A) $(x-3)^2 + y^2 = \frac{10}{3}$

B) $(x+3)^2 + y^2 = \frac{10}{3}$

C) $(x-3)^2 + y^2 = \frac{100}{9}$

D) $(x+3)^2 + y^2 = \frac{100}{9}$

26

A square lawn has a length of 8 feet and a width of 8 feet. Eight researchers each examine a randomly chosen region of the field; all regions are square with length and width of one foot. The researchers count the number of seedlings in each region that have reached a height of at least 2 inches. The table below shows the resulting data.

Region	1	2	3	4
Number of seedlings	82	87	95	99
Region	5	6	7	8
Number of seedlings	102	106	111	115

Which of the following best approximates the number of seedlings that are at least 2 inches high on the entire lawn?

A) 80

B) 640

C) 800

D) 6,400

27

A zoologist is studying the reproduction rates of two different breeds of chinchillas in country Y. He discovered that the Eastern chinchillas in his study produced 30 percent more offspring than the Western chinchillas did. Based on the zoologist's observation, if the Eastern chinchillas in his study produced 143 offspring, how many offspring did the Western chinchillas produce?

A) 100

B) 103

C) 110

D) 186

CONTINUE

28

When polynomial $g(x)$ is divided by $x - 4$, the remainder is 3. Which of the following statements about $g(x)$ must be true?

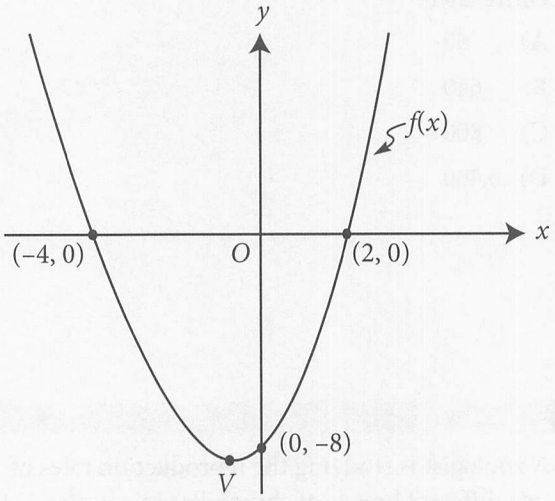
A) $g(-4) = 3$

B) $g(4) = 3$

C) $x - 4$ is a factor of $g(x)$.

D) $x + 3$ is a factor of $g(x)$.

29



The figure above shows the graph in the xy-plane of the function $f(x) = x^2 + 2x - 8$. Which of the following is an equivalent form of the function f that includes the coordinates of vertex V as constants in the function?

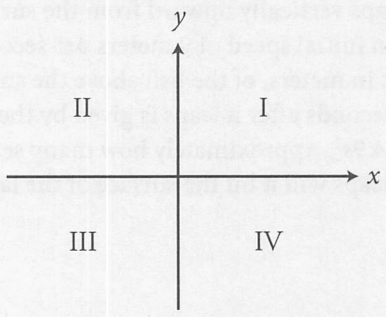
A) $f(x) = (x + 1)^2 - 9$

B) $f(x) = x(x + 2) - 8$

C) $f(x) = (x - 2)(x + 4)$

D) $f(x) = (x + 2)(x - 4)$

30



If the system of inequalities $y \geq x + 2$ and $y \geq \frac{1}{3}x - 1$ is graphed in the xy-plane shown above, how many quadrants will contain solutions to the system?

A) 4

B) 3

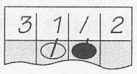
C) 2

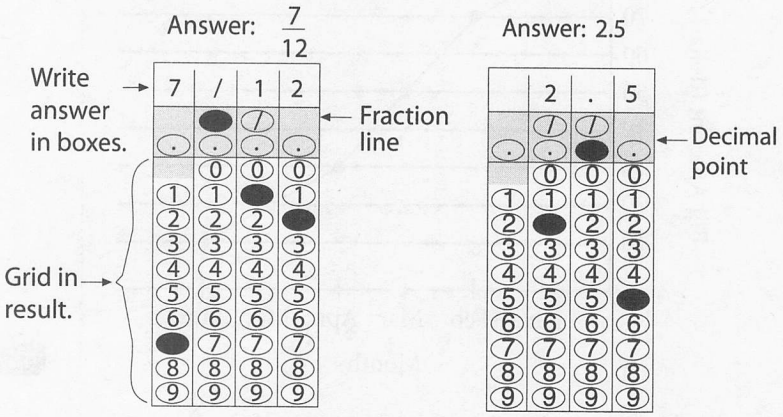
D) 1

CONTINUE

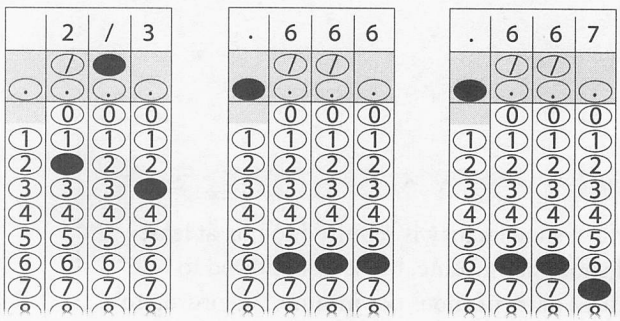
DIRECTIONS

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

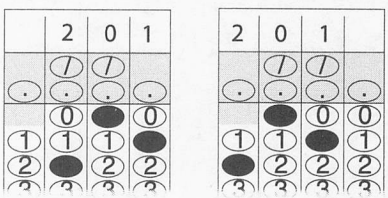
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
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 as $3\frac{1}{2}$.)
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.



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



Answer: 201 – either position is correct

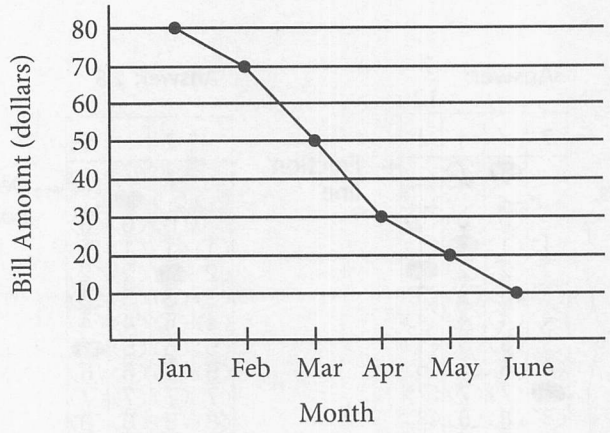


NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

CONTINUE

31

Amount of Greg's Heating Bill Each Month from January to June



The line chart above shows the amount of Greg's monthly heating bill from January to June. The amount of his bill in April was what fraction of the amount of his bill in February?

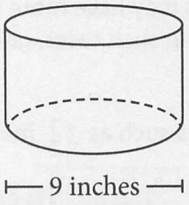
32

A worker at a shoe factory is required to box at least 8 pairs of shoes per minute, but is not allowed to box more than 12 pairs of shoes per minute. According to this information, what is a possible amount of time, in minutes, that it could take the worker to box 168 pairs of shoes?

33

Safety regulations in a certain building require that the elevator not carry more than 1,600 pounds. A delivery driver will enter the elevator with a pallet containing a certain number of identical cartons that weigh 45 pounds each. If the combined weight of the delivery driver and the empty pallet is 250 pounds, what is the maximum number of cartons that will be allowed by the building's safety regulations?

34



An aluminum can in the shape of a right circular cylinder has a diameter of 9 inches and a volume of 81π cubic inches. What is the height of the can, in inches?

CONTINUE

35

For what value of x is the expression

$$\frac{2}{(x-6)^2 + 4(x-7) + 8}$$ undefined?

36

A train passes through the Appleton train station every 20 minutes. The first train each day passes through at 6:00 A.M., and the last train passes through at 10:40 P.M. How many trains pass through the Appleton station in one day?

Questions 37 and 38 refer to the following information.

Helene purchased a $50 savings bond, issued by city *A*, which earns interest that is compounded annually. She uses the expression $\$50(1.03)^t$ to find the value of the savings bond after t years.

37

What is the annual interest rate, expressed as a percentage, earned by the savings bond? (Disregard the percent sign when gridding in your answer.)

38

Helene's sister Carolyn purchased a $50 savings bond issued by city *B*. Carolyn's bond has an interest rate, compounded annually, that is 1 percent greater than the interest rate earned by Helene's bond. After 12 years, the value of Carolyn's bond will be how much greater than the value of Helene's bond? (Round your answer to the nearest cent and disregard the dollar sign when gridding in your answer.)

END OF TEST

DO NOT RETURN TO A PREVIOUS SECTION.