

# Practice Test 1



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# 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.**

The passage that follows is adapted from an 1859 novel that follows the lives of both English and French characters during the French Revolution.

“You were very sound, Sydney, in the matter of those crown witnesses today. Every question told.”

“I always am sound; am I not?”

Line “I don’t gainsay it. What has roughened your 5 temper? Put some punch to it and smooth it again.”

With a deprecatory grunt, Carton complied.

“The old Sydney Carton of old Shrewsbury School,” said Stryver, nodding his head over him as he reviewed him in the present and the past, “the old seesaw

10 Sydney. Up one minute and down the next; now in spirits and now in despondency!”

“Ah!” returned the other, sighing: “Yes! The same Sydney, with the same luck. Even then, I did exercises for other boys, and seldom did my own.”

15 “And why not?”

“God knows. It was my way, I suppose.”

“Carton,” said his friend, squaring himself at him with a bullying air, as if the fire-grate had been the furnace in which sustained endeavour was forged, and 20 the one delicate thing to be done for the old Sydney Carton of old Shrewsbury School was to shoulder him into it, “your way is, and always was, a lame way. You summon no energy and purpose. Look at me!”

“Oh, botheration!” returned Sydney, with a lighter 25 and more good-humoured laugh, “don’t you be moral!”

“How have I done what I have done?” said Stryver; “how do I do what I do?”

“Partly through paying me to help you, I suppose. But it’s not worth your while to apostrophise me, or 30 the air, about it; what you want to do, you do. You were always in the front rank, and I was always behind.”

“I had to get into the front rank; I was not born there, was I?”

“I was not present at the ceremony; but my opinion 35 is you were,” said Carton. At this, he laughed again, and they both laughed.

“Before Shrewsbury, and at Shrewsbury, and ever since Shrewsbury,” pursued Carton, “you have fallen into your rank, and I have fallen into mine. You were 40 always somewhere, and I was always nowhere.”

“And whose fault was that?”

“Upon my soul, I am not sure that it was not yours. You were always driving and shouldering and passing, to that restless degree that I had no chance for my life 45 but in rust and repose. It’s a gloomy thing, however, to talk about one’s own past, with the day breaking. Turn me in some other direction before I go.”

“Well then! Pledge me to the pretty witness,” said Stryver, holding up his glass. “Are you turned in a 50 pleasant direction?”

“Pretty witness,” he muttered, looking down into his glass. “I have had enough of witnesses today and tonight; who’s your pretty witness?”

“The picturesque doctor’s daughter, Miss Manette.”

55 “She pretty?”

“Is she not?”

“No.”

“Why, man alive, she was the admiration of the whole Court!”

60 “Rot the admiration of the whole Court! Who made the Old Bailey a judge of beauty? She was a golden-haired doll!”

“Do you know, Sydney,” said Mr. Stryver, looking at him with sharp eyes, and slowly drawing a hand across his florid face: “do you know, I rather thought, at the time, that you sympathized with the golden-haired doll, and were quick to see what happened to the golden-haired doll?”

“Quick to see what happened! If a girl, doll or no doll, swoons within a yard or two of a man’s nose, he can see it without a perspective-glass. I pledge you, but I deny the beauty. And now I’ll have no more drink; I’ll get to bed.”

When his host followed him out on the staircase with a candle, to light him down the stairs, the day was coldly looking in through its grimy windows. When he got out of the house, the air was cold and sad, the dull sky overcast, the river dark and dim, the whole scene like a lifeless desert. And wreaths of dust were spinning round and round before the morning blast, as if the desert-sand had risen far away, and the first spray of it in its advance had begun to overwhelm the city.

Climbing to a high chamber in a well of houses, he threw himself down in his clothes on a neglected bed, and its pillow was wet with wasted tears. Sadly, sadly, the sun rose; it rose upon no sadder sight than the man of good abilities and good emotions, incapable of their directed exercise, incapable of his own help and his own happiness, sensible of the blight on him, and resigning himself to let it eat him away.

1

The primary purpose of the passage as a whole is to

- describe the history between Carton and Stryver.
- characterize life at the Shrewsbury School.
- reveal Carton’s character.
- show that Stryver has been exploiting Carton.

2

Based on the information in the passage, Carton is best characterized as

- unsound.
- mercurial.
- unlucky.
- imperceptive.

3

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

- Lines 10-11 (“Up . . . despondency”)
- Lines 13-14 (“Even . . . own”)
- Lines 35-36 (“At this . . . laughed”)
- Lines 45-46 (“It’s a . . . breaking”)

4

As used in line 11, “spirits” most nearly means

- soul.
- liquor.
- essence.
- jubilation.

5

Based on lines 17-22 (“squaring himself....shoulder him into it”), it can be reasonably inferred that

- Stryver is frustrated with Carton’s behavior.
- Stryver is planning to push Carton into the fireplace.
- Stryver believes Carton to be comparatively older.
- Stryver wishes to bully Carton as he did at Shrewsbury.

6

The use of italics in line 55 primarily serves to emphasize Carton’s

- incredulity.
- confusion.
- annoyance.
- affection.

CONTINUE ➔

7

The passage suggests which of the following about Stryver?

- A) He is in love with Miss Manette.
- B) He believes that Carton lacks the intelligence required to be successful.
- C) He does not believe that Carton finds Miss Manette unattractive.
- D) He was born into a wealthy family.

8

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

- A) Lines 32-33 (“I had . . . was I”)
- B) Line 41 (“And whose . . . that”)
- C) Lines 58-59 (“Why . . . Court”)
- D) Lines 63-68 (“Do you . . . doll”)

9

In context, “desert” in line 79 refers to

- A) Stryver’s cold demeanor.
- B) London’s landscape.
- C) Carton’s windows.
- D) sunlit dunes.

10

The “tears” referred to in line 85 are “wasted” because

- A) Miss Manette will never love Carton.
- B) Carton is unlikely to change his ways.
- C) Carton’s home is one of squalor.
- D) Stryver will continue to exploit Carton’s labor.

**Questions 11-21 are based on the following passage.**

This passage is adapted from Priit Vesilind, *The Singing Revolution*. © 2008 by Sky Films Incorporated.

By the end of 1939 Soviet troops had forced their way into garrisons in the Baltic states of Estonia, Latvia, and Lithuania. In 1940 the Soviets forcibly annexed the three Baltic states into the USSR. But in 5 1941 Hitler double-crossed Stalin: he launched an attack on the Soviet Union. The Baltic nations were caught in the middle of the treachery. In 1945, when the war ended, Estonia remained occupied by the Soviets.

10 After nearly 50 years of Soviet occupation, when agitations for independence came in the late 1980s, the protestors pointed back to the Molotov-Ribbentrop Pact, a secret non-aggression treaty between the Soviet Union and Nazi Germany. If the Kremlin were 15 to acknowledge the existence of this protocol, they reasoned, it would be admitting that the Baltic States had no legal “marriage” with Moscow, but that these nations were forcibly abducted with the collusion of the world’s most heinous fascist regime. So the 20 occupied nations had every right to ask for their freedom, and with no need for a legal “divorce.”

The Baltic states had been morally supported with the firm stand taken in 1940 by the United States not to recognize the legality of the forceful annexation 25 of Estonia, Latvia, and Lithuania. But politics were effective only if the Estonians had some other leverage. A nation of barely one million, burdened with half a million foreign settlers and 100,000 Soviet troops, could not threaten the Soviet Union militarily or 30 economically, so it had to do it with the force of its culture. Estonia had always been a nation of singers. Its wealth of folk songs gave rhythm to village life and work, and its earnest anthems often invoked the longing for self-determination. Estonians had lived for 35 centuries in servitude, and the themes of their music were often grim: sorrow, slavery, soil, blood, birch forests, and sacrifice. But there was always hope in their hearts.

Early in their national awakening, about 140 years 40 ago, Estonians established a history of mass song festivals, held when money and politics allowed—celebrations that would kindle and fortify the courage to express their love of language and nation, and their reluctance to be absorbed by anyone. The festivals were

45 a nationwide phenomenon, as were similar festivals held in Latvia and Lithuania.

In Tallinn the massive modern song stage held some 30,000 singers and the outdoor amphitheater could accommodate as many as 300,000. Often, 30 50 percent of all Estonians would be there—at a single concert. During the Soviet years the festivals were forced to pay tribute to Communist icons and the solidarity of the Soviet peoples. Choirs from other parts of the vast empire would come and all would 55 whip up a rousing tribute to Stalin or Lenin. To these mandatory performances Estonians would introduce patriotic songs disguised as love songs or folk music. An unofficial national anthem, by the popular choir director Gustav Ernesaks, established itself in 1947, 60 and survived the entire Soviet occupation despite a serious attempt by officials to eliminate it in 1969.

By the late 1980s the nation was simmering. A movement of young historians was already defying Soviet authority in speeches that laid history bare under 65 the cover of Gorbachev’s policy of glasnost, or “free speech.” And the burden of protest songs had passed to rock-and-rollers, young men whose energized patriotic tunes blared from every radio.

Momentum built to a crescendo in the summer 70 of 1988 when a rock concert in Tallinn’s Old Town spilled into the Song Festival grounds and massive crowds gathered for six straight nights to lift arms, sway in unison, and sing patriotic songs. Emboldened, Estonians brought out forbidden blue-and-black-and-75 white national flags, some from attics and basements where they had been hidden since 1940. Shockingly, no one stopped them. For the finale of these “Night Song Festivals” more than 200,000 Estonians gathered.

This was the heart of “The Singing Revolution,” 80 a spontaneous, non-violent, but powerful political movement that united Estonians with poetry and music. After that there was no backing up. Sedition hung in the wind, waiting to be denied.

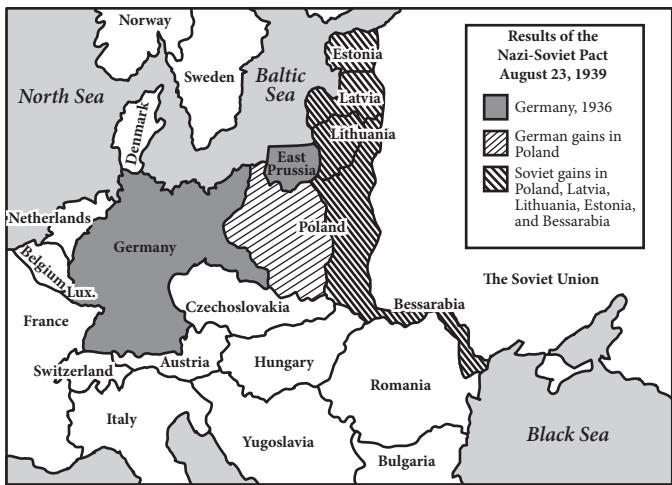


Diagram of Europe following the Nazi-Soviet Pact of 1939, also known as the Molotov-Ribbentrop Pact. Image adapted from CQ Researcher.

11

The point of view from which the passage is written is best described as

- A) condemnatory of the Soviet Union's treacherous actions.
- B) sympathetic to the Baltic states' struggle for freedom.
- C) dismissive of the idea of non-violent revolution.
- D) conflicted about the underlying cause of the revolution.

12

As used in line 18, "collusion" most nearly means

- A) conspiracy.
- B) impact.
- C) separation.
- D) danger.

13

In lines 33-36, the author draws a distinction between

- A) the tone of Estonian songs and the people's true feelings.
- B) the themes of Estonian folk songs and anthems.
- C) the military strength of Estonia and that of the Soviet Union.
- D) song festivals in Estonia and those in Latvia and Lithuania.

14

In the context of the passage, the phrase "their reluctance to be absorbed" suggests that Estonians

- A) refused to speak Russian with the many foreigners settlers in Estonia.
- B) wanted to have an independent nation.
- C) worked to ensure their culture stayed distinct from those of the other Baltic states.
- D) were unwilling to devote the amount of concentration to song festivals that the Soviets demanded.

15

The author includes statistics about the size of the song stage in Tallinn (lines 47-49) primarily to

- A) provide a sense of how large the amphitheater is.
- B) indicate the popularity of the tributes to Stalin and Lenin.
- C) compare the size to that of similar stages in Latvia and Lithuania.
- D) illustrate the wide appeal of the mass song festivals in Estonia.

16

As used in line 66, “burden” most nearly means

- A) weight.
- B) travail.
- C) responsibility.
- D) need.

17

The primary rhetorical effect of the last sentence of the passage is to

- A) convey the sense of dread that hung over Estonia at the height of the Singing Revolution.
- B) indicate the depth of disagreement between violent and non-violent revolutionaries.
- C) show how crucial music and poetry were to Estonia’s fight for independence.
- D) communicate the sense of optimistic tension that Estonians felt after the Night Song Festivals.

18

Which of the following does the passage suggest about Estonia’s relation to the Soviet Union?

- A) Estonia had a richer cultural tradition of singing than the Soviet Union had.
- B) Estonia had the political leverage necessary to free itself from the Soviet Union.
- C) Estonia was smaller and weaker than the Soviet Union, making violent revolution impractical.
- D) Estonia held song festivals during the Soviet occupation primarily to pay tribute to Communist icons.

19

The author implies which of the following about Estonian song festivals?

- A) They afforded Estonians a medium through which national and cultural pride could be expressed.
- B) They were started during the Soviet occupation to preserve Estonian culture and language.
- C) They were unique in size and format to the country where they were founded.
- D) They provided an opportunity to sing songs that were more uplifting than those sung while working.

20

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

- A) Lines 19-21 (“So . . . ‘divorce’”)
- B) Lines 44-46 (“The festivals . . . Lithuania”)
- C) Line 62 (“By the late . . . simmering”)
- D) Lines 79-82 (“This . . . music”)

21

Which of the following claims is supported by the diagram?

- A) In the 1939 pact, Germany gained the entirety of Poland.
- B) The Soviet Union doubled in size after the pact.
- C) Lithuania and Estonia are contiguous countries.
- D) The Soviet Union’s gains stretched from the Baltic Sea to the Black Sea.

**Questions 22-31 are based on the following passage.**

This passage is an excerpt adapted from a speech given in 1917 by American Senator Robert LaFollette. In the speech, LaFollette explains the special importance of free speech during times of war and the relation between free speech and democratic governance.

Since the declaration of war the triumphant war press has pursued those Senators and Representatives who voted against war with malicious falsehood and Line recklessly libelous attacks, going to the extreme limit of 5 charging them with treason against their country.

I have in my possession numerous affidavits establishing the fact that people are being unlawfully arrested, thrown into jail, held incommunicado for days, only to be eventually discharged without ever 10 having been taken into court, because they have committed no crime. Private residences are being invaded, loyal citizens of undoubted integrity and probity arrested, cross-examined, and the most sacred constitutional rights guaranteed to every American 15 citizen are being violated.

It appears to be the purpose of those conducting this campaign to throw the country into a state of terror, to coerce public opinion, to stifle criticism, and suppress discussion of the great issues involved in this 20 war.

I think all men recognize that in time of war the citizen must surrender some rights for the common good which he is entitled to enjoy in time of peace. But sir, the right to control their own Government 25 according to constitutional forms is not one of the rights that the citizens of this country are called upon to surrender in time of war.

Rather in time of war the citizen must be more alert to the preservation of his right to control his 30 Government. He must be most watchful of the encroachment of the military upon the civil power. He must beware of those precedents in support of arbitrary action by administrative officials, which excused on the plea of necessity in war time, become 35 the fixed rule when the necessity has passed and normal conditions have been restored.

More than all, the citizen and his representative in Congress in time of war must maintain his right of free speech. More than in times of peace it is necessary that 40 the channels for free public discussion of governmental policies shall be open and unclogged. I believe, Mr. President, that I am now touching upon the most

important question in this country today—and that is the right of the citizens of this country and their 45 representatives in Congress to discuss in an orderly way frankly and publicly and without fear, from the platform and through the press, every important phase of this war; its causes, the manner in which it should be conducted, and the terms upon which peace should 50 be made. I am contending, Mr. President, for the great fundamental right of the sovereign people of this country to make their voice heard and have that voice heeded upon the great questions arising out of this war, including not only how the war shall be prosecuted but 55 the conditions upon which it may be terminated with a due regard for the rights and the honor of this Nation and the interests of humanity.

I am contending for this right because the exercise of it is necessary to the welfare, to the existence, of this 60 Government to the successful conduct of this war, and to a peace which shall be enduring and for the best interest of this country.

Suppose success attends the attempt to stifle all discussion of the issues of this war, all discussion 65 of the terms upon which it should be concluded, all discussion of the objects and purposes to be accomplished by it, and concede the demand of the war-mad press and war extremists that they monopolize the right of public utterance upon these 70 questions unchallenged, what think you would be the consequences to this country not only during the war but after the war?

It is no answer to say that when the war is over the citizen may once more resume his rights and feel some 75 security in his liberty and his person. As I have already tried to point out, now is precisely the time when the country needs the counsel of all its citizens. In time of war even more than in time of peace, whether citizens happen to agree with the ruling administration or 80 not, these precious fundamental personal rights—free speech, free press, and right of assembly so explicitly and emphatically guaranteed by the Constitution should be maintained inviolable.

22

The position that LaFollette takes is best described as

- a law-maker suggesting a new piece of legislation.
- an impartial observer arbitrating a legal issue.
- a dissenter arguing for a cause.
- a pacifist arguing against international conflicts.

23

- In the passage, LaFollette draws a distinction between
- rights that are appropriately and inappropriately sacrificed during war.
  - moments when free speech is and is not necessary.
  - just wars and wars sought for economic interest.
  - the interests of the Nation and the interests of humanity.

24

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

- Lines 6-11 (“I have . . . crime”)
- Lines 21-27 (“I think . . . war”)
- Lines 30-31 (“He must . . . power”)
- Lines 50-57 (“I am . . . humanity”)

25

As used in line 8, “incommunicado” most nearly means

- justified.
- sequestered.
- luxuriously.
- available.

26

Lines 32-36 suggest that

- some rights are necessarily given up during war time.
- restrictions on civil powers are always arbitrary.
- the Government must be watchful of the military.
- temporary restrictions may become permanent.

27

Based on the information in the passage, citizen governance is necessary in all of the following situations EXCEPT

- electing legislators and executives.
- negotiating a peace treaty.
- declarations of war.
- decisions about military strategy.

28

The principal rhetorical effect of the phrase in lines 48-50, (“its causes...peace should be made”) is to

- argue against granting free speech during war by emphasizing the difficulties faced by the military and the President.
- suggest the numerous points at which citizens should exercise their free speech during times of war.
- discuss three reasons why members of the press are currently unable to speak frankly without fear.
- show that LaFollette believes that the citizens understand the dynamics of war far better than the President.

29

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

- Lines 11-15 (“Private . . . violated”)
- Lines 16-20 (“It appears . . . war”)
- Lines 30-36 (“He must . . . restored”)
- Lines 37-41 (“More than . . . unclogged”)

30

The author’s attitude toward “the attempt to stifle” (line 63) can be described as

- sympathetic.
- apathetic.
- frustrated.
- morose.

31

As used in line 83, “inviolable” most nearly means

- secretly.
- freely.
- unbreakable.
- personally.

CONTINUE 

**Questions 32–41 are based on the following passage.**

The following is from a passage about continental drift and plate tectonics from *Science World*.

By 1965, investigations led to the proposal that Earth's surface was broken into seven large plates and several smaller plates. It was further suggested that *Line* these plates are rigid, and that their boundaries are 5 marked by earthquakes and volcanic activity. In recent years, satellite pictures have documented the existence of plate boundaries. An especially visible example is the San Andreas Fault in California.

Plates interact with one another at their boundaries 10 by moving toward, away, or alongside each other. Faults are examples of boundaries where two plates slide horizontally past each other. Mid-ocean ridges mark boundaries where plates are forced apart as new ocean floor is being created between them. Mountains, 15 volcanic-island arcs, and ocean trenches occur at the boundaries where plates are colliding, causing one plate to slide beneath the other. The network of crustal plates and the geologic activity caused by their movement is referred to as *plate tectonics*.

20 The original continental-drift theory suggested that continents plowed through the ocean floor like ships. Plate tectonics, on the other hand, holds that continents are carried along together with the surrounding seabed in huge plates—much like rafts 25 frozen into the ice on a flowing stream.

There are several major plates. The North American plate comprises North America and the western half of the North Atlantic seafloor. The South American plate includes South America east to the Mid-Atlantic Ridge. 30 The African plate contains Africa and its surrounding seafloor. The Antarctic plate has Antarctica and surrounding seafloor. The Eurasian plate includes Europe, Asia, and nearby seafloor. The Pacific plate underlies the Pacific Ocean. Recently, an international 35 team of geologists and other researchers analyzing seafloor measurements discovered that what was classified as the Indo-Australian plate may actually be two separate plates—one with the Indian subcontinent and the adjacent seabed, and the other with Australia 40 and surrounding waters.

Scientists believe that, in addition to the great, slow convection currents that carry plates about Earth, there are also smaller, rapidly rising *mantle plumes*, columns of hot material rising from deep within Earth. (Earth 45 is believed to be composed of an inner solid core, a

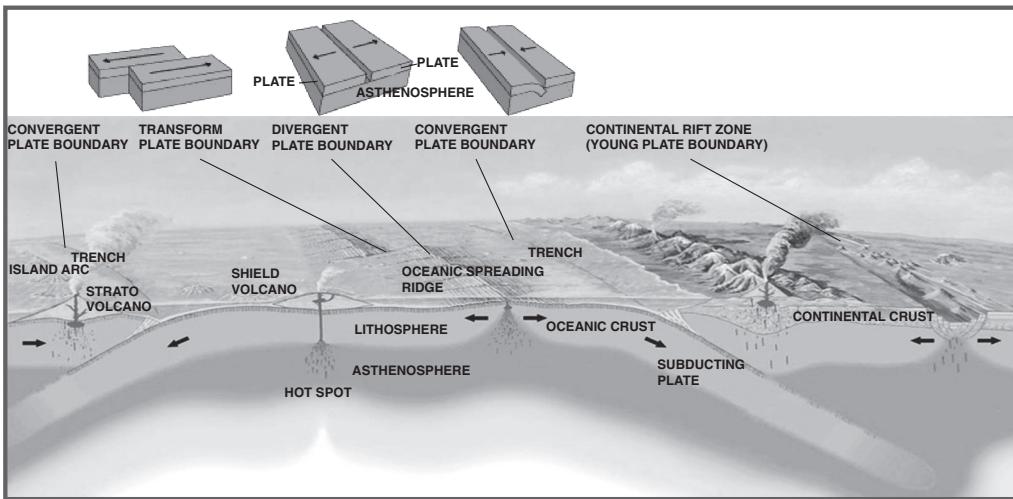
middle mantle, and an outer crust.) These plumes of molten rock, often called *hot spots*, rise and erupt through the crust of a moving plate.

Most of the isolated mid-plate volcanoes, such as 50 those of Hawaii and Yellowstone, lie at one end of a line of extinct volcanoes that grow steadily older with distance from the active center. Hawaii's Mauna Loa is at the extreme southeastern end of the rest of the Hawaiian island chain. The volcanoes in this chain 55 become steadily older and less active to the northeast. Likewise, Yellowstone's hot springs and geysers are at the eastern end of a line of extinct volcanoes that extend into Idaho. Such a line of volcanoes suggests that the crust of Earth is passing over a hot spot, or hot 60 spots, in the deeper mantle. As the crustal plate moves, the hot spot “punches” up a line of volcanic and hot-spring activity.

Indeed, the motions of the Pacific plate are compatible with the direction of the Hawaiian chain 65 and the ages of its volcanic islands. Plate motion has slowly moved the volcanic islands away from the hot spot that created them. In other words, the Hawaiian island chain traces the motion of the Pacific plate.

As molten rock flows up along the mid-ocean 70 ridges to create new seafloor, the lava flows more abundantly in certain spots, producing volcanic islands. Scientists believe that these places of abundant lava flow may be hot spots that occur between two separating plates. Two such plates underlie the large, 75 highly volcanic island of Iceland, which straddles the Mid-Atlantic Ridge. On one side is the North American plate; on the other, the Eurasian plate. Similarly, ridges extend from the active volcanic island of Tristan da Cunha westward to South America and 80 eastward to Africa. Some geologists propose that, although such hot spots do not actually move plates, they may mark weak points in the mantle, which in turn help determine the lines along which plates fracture and separate.

Hot spots of volcanic activity often occur at 85 the junction where plates collide. Examples are the volcanic Azores, which arise where the North American, Eurasian, and African plates meet. Another—Macquarie Island, south of New Zealand—90 marks the meeting point for the Pacific, Antarctic, and Indo-Australian plates. These hot spots may be fueled in part by plate collision.



This image shows the three main types of plate boundaries: divergent, convergent, and transform. Image adapted from the U.S. Geological Survey.

32

Based on the information in the passage it can be reasonably inferred that

- A) geological theories are only proven with the help of technological advances.
- B) improvements in satellite technology advanced plate tectonics theory.
- C) the plate tectonics theory was created in 1965.
- D) the San Andreas Fault proved the veracity of plate tectonics theory.

34

As used in line 42, “convection” most nearly means

- A) liquefying.
- B) melting.
- C) mobilizing.
- D) transferring.

35

In line 56, what is the most likely reason the author introduces Yellowstone’s hot springs?

- A) As an example of a mid-plate volcano
- B) As proof that plates slide past each other
- C) As support for an opposing theory
- D) As an example of a mid-ocean ridge

36

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

- A) Lines 3-5 (“It was . . . activity”)
- B) Lines 54-55 (“The volcanoes . . . northeast”)
- C) Lines 60-62 (“As the . . . activity”)
- D) Lines 65-67 (“Plate . . . them”)

37

As used in line 64, “compatible” most nearly means

- A) consistent.
- B) adaptable.
- C) opposed.
- D) skewed.

38

What is the most likely reason the author mentions Iceland?

- A) To offer an example of an island created at a mid-ocean ridge
- B) To show a contrast between an island and a continent
- C) To prove that an island can also be a volcano
- D) To assert that the Mid-Atlantic Ridge connects two plates

39

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

- A) Lines 9-12 (“Plates . . . other”)
- B) Lines 41-44 (“Scientists . . . Earth”)
- C) Lines 49-52 (“Most . . . center”)
- D) Lines 69-72 (“As . . . islands”)

40

The principal rhetorical purpose of the phrase “Some geologists . . . separate” (lines 80-84) is to

- A) suggest that scientists are still investigating plate tectonic theory.
- B) emphasize the lack of data supporting how fractures separate.
- C) reveal that some scientists disagree with the major tenets of plate tectonics.
- D) expose a weakness in the continental-drift theory.

41

It can be reasonably inferred from information in the passage and the diagram that

- A) continental rift zones always occur beside the ocean.
- B) hot spots are molten plumes that travel through the lithosphere to the surface.
- C) mid-ocean ridges are caused by the presence of subducting plates.
- D) oceanic crust is more rigid than continental crust.

**Questions 42–52 are based on the following passage.**

Passage 1 is adapted from Theodore S. Melis, Ed., “Effects of Three High-Flow Experiments on the Colorado River Ecosystem Downstream from Glen Canyon Dam, Arizona,” published in 2011 by the U.S. Geological Survey. Passage 2 is adapted from Paul E. Grams, “A Sand Budget for Marble Canyon, Arizona—Implications for Long-Term Monitoring of Sand Storage Change,” published in 2013 by the U.S. Geological Survey.

**Passage 1**

At the time Glen Canyon Dam was constructed (1956–63), little consideration was given to how dam operations might affect downstream resources in Grand Canyon National Park. In fact, the dam 5 was completed before enactment of the National Environmental Policy Act of 1969 and the Endangered Species Act of 1973. By the late 1950s, public values began to shift, and throughout the 1960s and 1970s recognition of the environmental consequences of 10 Glen Canyon Dam and its operation grew. National Park Service and U.S. Geological Survey scientists and river recreationists observed the physical transformation of the river in Grand Canyon, including the loss of large beaches used for camping, 15 narrowing of rapids so as to reduce navigability, and changes in the distribution and composition of riparian vegetation. The humpback chub and Colorado pikeminnow, species found only in the Colorado River Basin, were listed as endangered in 1967 by 20 the U.S. Fish and Wildlife Service, which concluded in 1978 that the dam and its operation jeopardized the continued existence of humpback chub in Grand Canyon.

Annual spring snowmelt floods were the defining 25 attribute of the pre-dam flow regime. Before the Colorado River was regulated by dams, streamflow gradually increased from mid-December to March, precipitously increased in April and May, and reached its peak in early June.

Pre-dam floods disturbed the aquatic ecosystem, and native fish species developed strategies to survive periods when the velocity in the main part of the channel was high and large amounts of suspended sediment were being transported. For example, several 35 of the native fish species share unusual body shapes, including a large adult body size, small depressed skulls, large humps on their backs, and small eyes, which presumably developed as adaptations to life in a

turbid and seasonably variable riverine environment.

- 40 Sandbars, riverbanks, and their accompanying aquatic habitats were reshaped during floods. Additionally, the increased elevation of the river surface during floods provided water to native riparian vegetation otherwise principally dependent on precipitation.

**Passage 2**

Decline in the size and abundance of sandbars since the pre-Glen Canyon Dam era has been documented by analysis of old aerial and ground-level photographs and by topographic surveys that began in the mid-1970s. Scientists have estimated that sandbar 50 area in the upstream 100 miles of Glen, Marble, and Grand Canyons was 25 percent less in 2000 than in average pre-dam years. This decline occurred because releases of water from Lake Powell are virtually free of sediment. The tributaries that enter the Colorado River 55 downstream from the dam supply only a fraction of the pre-dam sand supply, and the capacity of the post-dam river to transport that sand greatly exceeds this limited supply. Normal dam operations, therefore, tend to erode, rather than build, sandbars.

By experimentation, scientists have learned that controlled floods, if released from the reservoir immediately following large inputs of sand from tributaries, can build sandbars. These sandbars are built during controlled floods when sand is carried 65 from the riverbed and temporarily suspended at high concentration in the flow. The suspended sand is transported into eddies where it is then deposited in areas of low stream-flow velocity. Sandbars enlarged by this process provide larger camping beaches for 70 river-rafting trips and create backwater habitats used by native fish. Newly deposited sandbars also provide areas for riparian vegetation to grow and are a source of windblown sand. Windblown sand carried upslope from sandbars helps to cover and potentially preserve 75 some of the culturally significant archeological sites in Grand Canyon.

Scientists have also learned that controlled floods may erode sandbars if the concentration of suspended sand during a controlled flood is too low.

The concentration of sand during a flood is directly 80 proportional to the amount of the riverbed covered by sand and the size of that sand. Higher concentrations of suspended sand occur when the sand is relatively fine and large amounts of the riverbed are covered by 85 sand. These findings are incorporated in the current

reservoir-release management strategy for Glen Canyon Dam, which involves releasing controlled floods—administratively referred to as High Flow Experiments (HFFs)—whenever the Paria River 90 has recently delivered large amounts of sand to the Colorado River. The magnitude and duration of the controlled floods is adjusted to transport just the amount of sand that has recently been delivered from the Paria River.

42

The author of Passage 1 most likely believes that the Glen Canyon Dam

- A) is a useful tool for managing scarce water resources.
- B) was built with a lack of foresight.
- C) has decimated native fish populations.
- D) has had a calming effect on the aquatic ecosystem.

43

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

- A) Lines 1-4 (“At the time . . . Park”)
- B) Lines 17-23 (“The humpback . . . Canyon”)
- C) Lines 24-25 (“Annual . . . regime”)
- D) Lines 30-34 (“Pre-dam floods . . . transported”)

44

The author of Passage 1 mentions scientists and river recreationists primarily to

- A) provide support for the idea that post-dam river looks drastically different.
- B) draw a contrast between scientific observations and casual observations of river conditions.
- C) emphasize the spirit of collaboration between the science community and the public in conservation efforts.
- D) prove that the Glen Canyon Dam has had a ruinous effect on the river.

45

Passage 1 suggests that the humpback chub

- A) is now extinct in the Grand Canyon.
- B) has a small, depressed skull.
- C) can survive in changing environments.
- D) thrives in high velocity river channels.

46

As used in line 25, “regime” most nearly means

- A) government.
- B) tenure.
- C) system.
- D) management.

47

As used in line 65, “suspended” most nearly means

- A) stopped.
- B) mixed.
- C) withheld.
- D) hanging.

48

It is reasonable to conclude that controlled floods

- A) successfully simulate pre-dam snowmelt floods.
- B) contain large amounts of suspended sediment.
- C) may be detrimental to the health of the Colorado River.
- D) should be done during the months that snowmelt floods typically occur.

49

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

- A) Lines 58-59 (“Normal . . . sandbars”)
- B) Lines 66-68 (“The suspended . . . velocity”)
- C) Lines 71-73 (“Newly . . . sand”)
- D) Lines 77-79 (“Scientists . . . low”)

CONTINUE

50

The author of Passage 1 would most likely respond to the High Flow Experiments described in Passage 2 by

- A) appreciating the efforts of scientists to maintain the sand supply below the dam.
- B) warning of the calamity of interfering with the river ecosystem.
- C) questioning the ability of controlled floods to build up sandbars.
- D) worrying that reshaped habitats will harm native fish.

52

Which of the following statements is true of Passage 1, but not of Passage 2?

- A) The passage gives details of scientific studies conducted on the river.
- B) The passage offers documented evidence of topographic change in the river.
- C) The passage indicates the importance of floods to the river ecosystem.
- D) The passage gives specific examples of species affected by the dam.

51

Which of the following best describes the structure of the two passages?

- A) Passage 1 introduces a problem, and Passage 2 proposes a solution to the problem.
- B) Passage 1 offers a historical discussion, and Passage 2 describes the implications of a scientific practice.
- C) Passage 1 gives background information, and Passage 2 details recent changes.
- D) Passage 1 describes an experiment, and Passage 2 offers suggestions for future action.

**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.

# 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.

### And Justice for All

Her father got her the job. Amanda was between semesters at college, and her **1** work at the mall wouldn't do much for her when she got out of school. It was time to do something more serious, something that meant more to her. Many of her friends were getting internships in the city, working for this or that publishing house or TV studio. Amanda, however, wanted something different. She would start applying to law schools **2** soon and she wanted to know what the law looked like in action.

1

- A) NO CHANGE
- B) work, at the mall, wouldn't do much for her when
- C) work at the mall wouldn't do much for her, when
- D) work, at the mall, wouldn't do much for her, when

2

- A) NO CHANGE
- B) soon and,
- C) soon, and
- D) soon,

Fortunately, her dad knew someone from high school, a friend **3** named Ellen, who had then gone on to study at Duke University. It was a thankless job, and although the Department building itself covered almost one hundred acres (in New York City, there was an entire island devoted to it), no one paid the Department of Corrections much mind. Most people never come near a jail cell, so **4** it's easy for them to dismiss inmates as totally removed from society.

[1] At the Department, however, Amanda learned about prisoners' rights. [2] Or, by the same token, when was the use of force appropriate from the officers? [3] There is a clear provision in the Constitution that prohibits "cruel and unusual punishment." [4] The meaning of these four words **5** were nowhere more ambiguous than in prisons. [5] Everyone within these walls had been convicted of a crime and was now paying **6** they're debt to society, but how could a government ensure that the place would deliver the "reform" in a reformatory or the "penitence" in a penitentiary? [6] Should inmates with, for example, mental illnesses be treated differently from others? **7**

3

Which of the following true statements contains information most in keeping with the main idea of this passage?

- A) NO CHANGE
- B) who had gone on to law school and now worked at the County Department of Corrections.
- C) with whom he had not spoken in twenty-five years, though with whom he still felt very close.
- D) DELETE the underlined portion.

4

Which of the following best concludes this paragraph by reinforcing ideas presented in this sentence and the preceding one?

- A) NO CHANGE
- B) people often know literally nothing about prison life, though they are endlessly fascinated.
- C) movie studios are famous for their sordid but often wrong depictions of prison life.
- D) incarceration rates in the United States are some of the highest in the world.

5

- A) NO CHANGE
- B) have been
- C) are
- D) is

6

- A) NO CHANGE
- B) their
- C) there
- D) his or her

7

In the sequence of the paragraph, the best placement for sentence 2 would be

- A) where it is now.
- B) before sentence 1.
- C) after sentence 3.
- D) after sentence 6.

CONTINUE ➔

While Amanda did not gain any answers from her summer at the Department of Corrections, she **8** gathered together a whole new set of questions. She had uncovered questions and conundrums about the prison system itself, but she had begun to see prisoners' rights as central to the question of free rights as well. She began to wonder exactly what it was that a government owed its people and how much freedom was too much. Her internship that summer made her realize that politics and the law **9** was a living thing. As she applied to law schools the following fall, Amanda wrote passionately about what she had uncovered. "Although law has long been considered a profession of privilege and prestige," she concluded her essay, "I have seen firsthand how it affects the lives of all of us. We may believe that we never come into contact with the **10** law; however, it is written into everything around us, including how we see ourselves."

8

- A) NO CHANGE
- B) gathered up
- C) collected up
- D) gathered

9

- A) NO CHANGE
- B) were living things.
- C) was a thing that was alive.
- D) were things that were living.

10

- A) NO CHANGE
- B) law, however
- C) law, however;
- D) law, however,

11

Suppose the writer's goal had been to write an essay that criticizes the American justice system. Would this essay fulfill that goal?

- A) Yes, because it refers to much of what Amanda learns as "conundrums."
- B) Yes, because it shows that the U.S. justice system has some problems.
- C) No, because it tells the story of one person becoming interested in the justice system.
- D) No, because it suggests that working in the justice system inspired one person's entire career.

Questions 12–22 are based on the following passage.

### Alexander's Empire of Culture

Alexander the Great is a name known to all, but not all know the extent of Alexander's accomplishments. Now that the study of the "classics" (mainly Roman and Greek civilizations) has **12** disappeared both from high-school and college curricula, Alexander the Great's legend is not on the tongue of every schoolboy, though his accomplishments have not **13** diminished for all that.

Alexander was born in Pella, Macedonia, in 356 BCE. His father, King Philip II, a strong military king **14** in his own write, believed that his son was born part man and part god. Alexander came to cultivate the image himself, bolstered by his keen intellect and learning, quickened in part by his tutor, the great Greek philosopher Aristotle. Pella was at that time a backwater of Greek culture, and **15** his arrival announced a new era of what historians would later call "enlightened monarchy," **16** even though that term is used much more to describe monarchies in the eighteenth century.

12

- A) NO CHANGE
- B) disappeared from both
- C) disappeared both
- D) from both disappeared

13

- A) NO CHANGE
- B) ameliorated
- C) gone down
- D) subsided

14

- A) NO CHANGE
- B) in his own right,
- C) in his own rite,
- D) by his own rite,

15

- A) NO CHANGE
- B) Aristotle's
- C) their
- D) the

16

Which of the following true statements would best conclude the paragraph by emphasizing the change that Alexander's rule brought to Macedonia?

- A) NO CHANGE
- B) although those who suffered defeat at Alexander's hands might not have seen it that way.
- C) suggesting a style for the reigns of both Julius Caesar and Napoleon Bonaparte.
- D) underlining further that Philip's former militaristic state was entering a new age.

Still, the age was not entirely new. Alexander spent nearly all his time abroad, first uniting the Greek kingdom that threatened to fall apart at Philip's death, then moving on to broader military conquests. **17** Alexander had conquered an incredible amount of land by the time of his death in 323 BCE, **18** as his empire stretched from Greece to modern-day India, some two million square miles. When his armies conquered Persia (now Iran and Iraq) once and for all, he took on the title by which he is still known today: King of Babylon, King of Asia, King of the Four Quarters of the World.

17

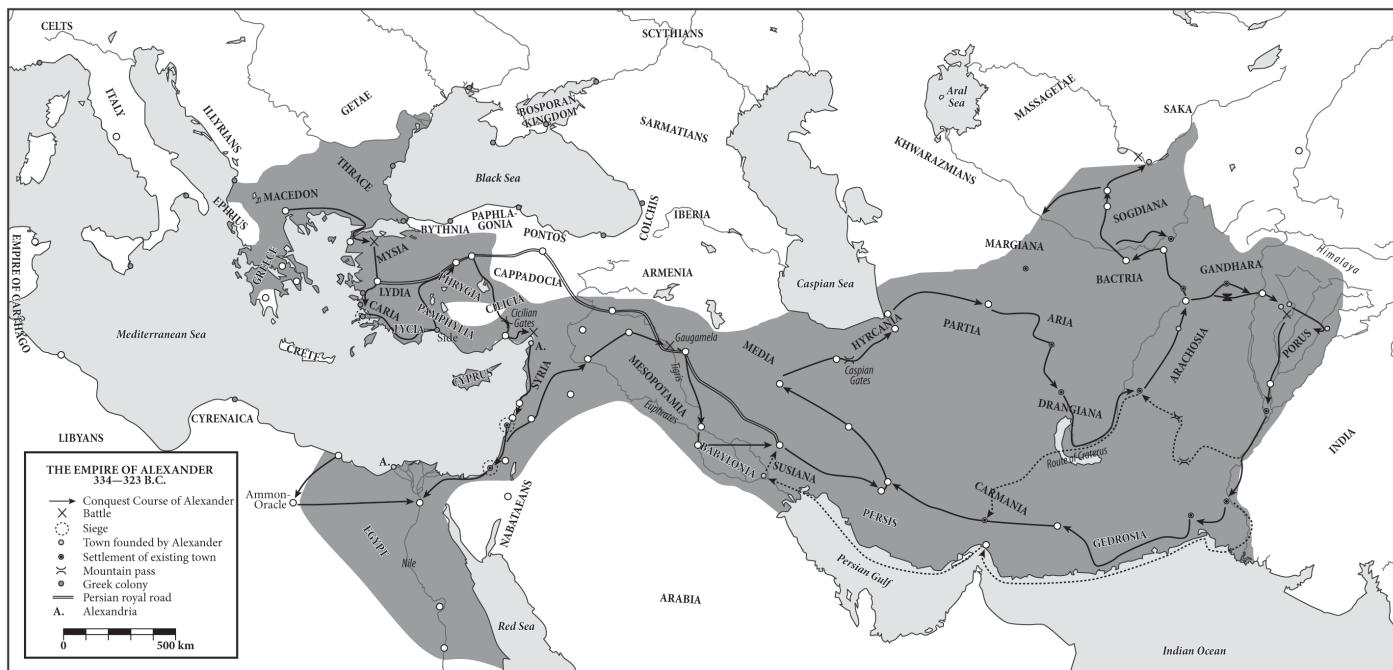
The author wants to insert an introductory phrase or clause at the beginning of this sentence that will emphasize the continuity Alexander's reign had with the previous one. Which of the following choices would most effectively give this emphasis?

- A) In what must have been truly exhausting,
- B) With great ambition,
- C) As his father had before him,
- D) Just as historians have noted,

18

Which of the following choices gives information consistent with the map shown below?

- A) NO CHANGE
- B) while he traveled on foot throughout most of modern-day Europe,
- C) because he circled the entire Mediterranean Sea and much of the Indian Ocean,
- D) as he conquered all of Italy hundreds of years before Caesar had done so,



Extent of the empire of Alexander the Great

Alexander's historical importance is not merely one of military might, however. **19** He moved to these different parts of the world, he brought Greek culture with him, and his reign marks **20** an unprecedented instance of contact between the ancient East and West. Over twenty cities throughout the empire bear his name. Alexandria, Egypt, perhaps the most famous of these cities, continues to **21** thrive. It is the second-largest city in the modern nation of Egypt.

Perhaps history is the wrong place to understand the accomplishments of Alexander the Great. Epic poetry seems more suitable. After all, Alexander's great teacher Aristotle showed him Homer's *Iliad* and *Odyssey*, and it seems that Alexander himself understood his life as a shuttling back and forth between man and god, the individual and the world, and the natural **22** and the unnatural.

19

- A) NO CHANGE
- B) As he
- C) Although he
- D) Moreover, he

20

Which of the following alternatives to the underlined portion would NOT be acceptable?

- A) an unparalleled
- B) a pioneering
- C) an ahistorical
- D) a never before seen

21

Which of the following is the most effective way to combine these two sentences?

- A) thrive; it is
- B) thrive, is
- C) thrive. It's
- D) thrive and is

22

- A) NO CHANGE
- B) versus
- C) from
- D) but

Questions 23–33 are based on the following passage.

**Brother, Can You Spare a Dime?**

Although printed cheaply and for quick consumption,  
23 today's experience of culture is largely shaped by dime  
novels. For much of the nineteenth century, Americans  
consumed fiction, poetry, and non-fiction by way of  
literary periodicals. Some of our best-known authors from  
this period, 24 though there were also some notable  
exceptions, published something close to their complete  
works between the pages of countless periodicals.

23

- A) NO CHANGE
- B) we experience culture the way we do because of  
dime novels.
- C) dime novels have shaped the way we experience  
culture today.
- D) the shape of dime novels influences of cultural  
experiences.

24

Which of the following true phrases gives the most specific information in the context?

- A) NO CHANGE
- B) some of the best-known authors of all time,
- C) and some who were not so well-known,
- D) especially Edgar Allan Poe and Nathaniel  
Hawthorne,

Things started to change around the Civil War. Harriet Beecher Stowe's great **25** novel, *Uncle Tom's Cabin* had been an enormously popular serial novel in the abolitionist periodical *The National Era*. By the time the novel's forty-week run had concluded, however, publishers were clamoring for an actual book. **26** That book went on to become the first American bestseller. And it showed that Americans were willing to pay for books, which had, to that point, been too expensive to print and subsequently to buy.

**27**

**25**

- A) NO CHANGE
- B) novel, *Uncle Tom's Cabin*,
- C) novel *Uncle Tom's Cabin*,
- D) novel *Uncle Tom's Cabin*

**26**

If the author were to remove the phrase “for an actual book” (ending the sentence at the word *clamoring*), the sentence would lose

- A) specific information that clarifies the subject of the next sentence.
- B) a description of the greed of publishers in the nineteenth century.
- C) details that show how Stowe's work came to be so popular.
- D) nothing, because this information is implied in the word “clamoring.”

**27**

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

The average annual income for men in New England from 1820-1850 was a mere \$323.25.

Should the writer make this addition here?

- A) Yes, because it makes clear how expensive books must have been in the period.
- B) Yes, because it shows that even those in New England could not afford books printed there.
- C) No, because it strays from the paragraph's focus on the changes in book publishing.
- D) No, because it suggests that people in New England were not wealthy enough to read.

In 1860, Irwin and Erastus Beadle published the first in a long series of what **28** would become known as Beadle's Dime Novels. The first was called *Malaeska, The Indian Wife of the White Hunter*. By the turn of the nineteenth century, dime novels were everywhere.

The **29** affects are difficult to chart, but we can actually see the influence of these dime novels everywhere. Much of the mythology of the Old West, for example, was concretized in these dime novels, and William Bonney and James Butler Hickok became the folk heroes Billy the Kid and Wild Bill Hickok as the dime novels charted their (largely imagined) adventures. **30**

28

- A) NO CHANGE
- B) becomes
- C) is
- D) would have become

29

- A) NO CHANGE
- B) effects
- C) effect's
- D) affect's

30

The author is considering deleting the names “Billy the Kid and Wild Bill Hickok” from the preceding sentence. Should the names be kept or deleted?

- A) Kept, because they are specific names in a sentence that speaks in generalities.
- B) Kept, because they demonstrate the transformation described in the sentence.
- C) Deleted, because they are nicknames of people whose true names are already listed in the sentence.
- D) Deleted, because they encourage the frontier behavior that made the Wild West such a violent place.

The new media of the twentieth-century—film, radio, and comic books—may have replaced the dime novel, but they did so with much they had 31 been taught from the dime novel's popularity. All three media, for instance, borrowed characters that had become popular in dime novels—characters such as Frank Reade and Nick Carter, Master Detective. Then, in comic books and radio, a new generation of superheroes—The Shadow, Superman, and Popeye—was created in the mold of the old swashbuckling romancers of the dime-novel era.

So today, as we enjoy superhero action films or boy-wizard series of novels, we should be aware that there is nothing new under the sun. Indeed, 32 for our hopelessly mass-media universe, this now forgotten form laid the foundation, pushing the same books onto countless readers. Such a feat may be commonplace as films gross many billions of dollars at the box office, but in the nineteenth century, the dime novel brought a new 33 frame of reference and a belief that the small world was getting larger bit by bit.

31

- A) NO CHANGE
- B) got
- C) learned
- D) brought

32

- If the punctuation is adjusted accordingly, the best placement for the underlined portion would be
- A) where it is now.
  - B) after the word *form*.
  - C) after the word *foundation*.
  - D) at the end of the sentence.

33

- Which of the following alternatives to the underlined portion would NOT be acceptable?
- A) paradigm
  - B) integration
  - C) framework
  - D) context

Questions 34–44 are based on the following passage.

### The Tiger Moth's Phantom Target

[1]

Bats have always seemed mysterious predators. While many other animal predators use methods 34 similar to human hunters, bats have evolved a series of unique methods of capturing prey. 35 The main curiosity among the bat's weaponry is its use of echolocation, or sonar.

[2]

Because bats hunt in the dark, they are not often able to see their prey. Instead, they use a process wherein they emit sounds and listen for the echoes. If 36 they are, say, standing atop a mountain and shout, you can figure out the distance across the canyon using the speed of sound waves and a series of precise calculations. Using its innate senses, a bat does these same 37 calculations instinctively. With extreme precision, a bat can identify its prey's location and size in the dark and capture its prey. While a bat does have relatively acute vision, 38 though not nearly as acute as some species of shrimp, its echolocation is what makes it such an effective predator.

34

- A) NO CHANGE
- B) similar to that of human hunters
- C) similar to those of human hunters
- D) like human hunters

35

- A) NO CHANGE
- B) The echolocation, sonar, of the bat's weaponry is its main curiosity.
- C) The bat has a curious weaponry, main among which is its echolocation and sonar.
- D) The bat's weaponry is mainly curious in its use of echolocation of sonar.

36

- A) NO CHANGE
- B) they're,
- C) one is,
- D) you are,

37

- A) NO CHANGE
- B) calculations by instinct.
- C) calculations with its instincts.
- D) calculations.

38

The writer intends to insert a phrase or clause that emphasizes a common misunderstanding about bats' vision. Which of the following would best suit that intention?

- A) NO CHANGE
- B) undermining the cliché “blind as a bat,”
- C) despite the pitch darkness in which it hunts,
- D) in addition to its incredible hearing,

[3]

However, scientists have recently discovered a species that can disrupt the bat's usually failsafe echolocation. The tiger moth, a victim of bat predation for over 50 million years, has figured out a way to "jam" **39** its system of echolocation. Most tiger moths can emit clicks that warn bats away from the moths, suggesting that the moths might be inedible toxic compounds. **40**

[4]

In the long history of bat research, scientists have never seen the like of these tiger moths. Although human methods of warfare have used sonic deception for as long as such warfare has existed, the tiger moth and **41** their sonar jamming provide one of the first instances of aural camouflage in the animal kingdom that scientists have discovered. It seems that no matter how ancient the conflict, bats and tiger moths continue to attack, **42** counterattack, and adapt in a war as old as time.

39

- A) NO CHANGE
- B) the bats'
- C) the bat's
- D) the bats

40

- If the writer were to delete the words *inedible* and *toxic* from the preceding sentence, the sentence would primarily lose
- A) an indication that the tiger moth is not consumed by any predators.
  - B) a specific description of the compound that prevents the bat from eating the tiger moth.
  - C) a detailed analysis of the mechanism of the clicks that produce this particular compound.
  - D) nothing, because the information is stated elsewhere in the passage.

41

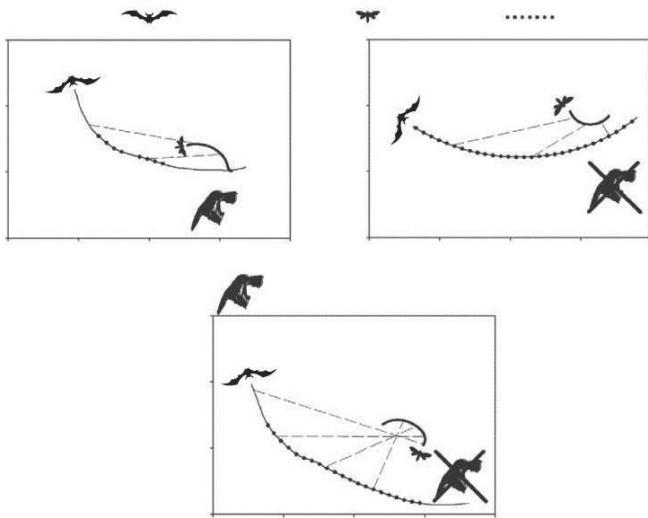
- A) NO CHANGE
- B) it's
- C) its
- D) its'

42

- A) NO CHANGE
- B) counterattack, and, adapt
- C) counterattack and adapt
- D) counterattack and adapt,

[5]

One species, the tiger moth *Bertholdia trigona*, has done even better. This species emits a high-frequency clicking noise that throws off the bat's sonar altogether. While no one is certain exactly how these clicks camouflage the *B. trigona*, the clicks have been remarkably successful in defending the moths from bat attacks. Some suggest that the clicks force bats to misinterpret their sensory data, taking the moth clicks for their own echoes. As a result, bats **43** miss their prey at the moment of attempted capture, and the tiger moths flit away unharmed. **44**



This image adapted from the *Journal of Experimental Biology* © 2011.

43

Which of the following provides accurate information based on the diagrams?

- A) NO CHANGE
- B) attack other animals they find easier to detect,
- C) fly after one another, bonking their heads together,
- D) hear no sounds at all,

44

In the context of the passage as a whole, the best placement for paragraph 5 would be

- A) where it is now.
- B) after paragraph 1.
- C) after paragraph 2.
- D) after paragraph 3.

**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.

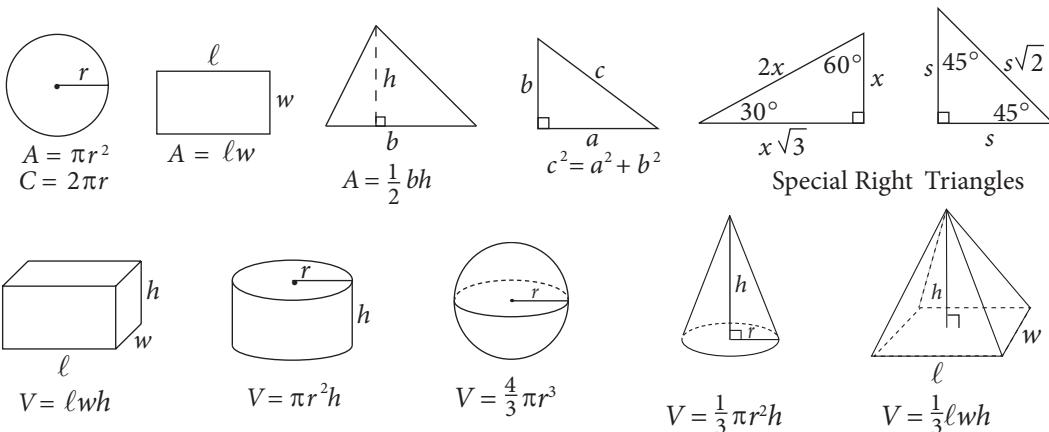
## DIRECTIONS

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  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

Which of the following equations has a vertex of  $(3, -3)$ ?

- A)  $y = 5(x - 3)^2 - 3$
- B)  $y = 5(x + 3)^2 - 3$
- C)  $y = 5(x - 3)^2 + 3$
- D)  $y = 5(x + 3)^2 + 3$

3

Syed took out a cash advance of  $d$  dollars from a financing company. The company deducts a fee of  $\frac{1}{3}$  of the original advanced amount along with a wire transfer fee of \$30.00. Which of the following represents the final advanced amount that Syed receives after all applied fees, in dollars?

- A)  $\frac{1}{3}d - 30$
- B)  $\frac{1}{3}(d - 30)$
- C)  $\frac{2}{3}(d - 30)$
- D)  $\frac{2}{3}d - 30$

2

A beverage store charges a base price of  $x$  dollars for one keg of root beer. A sales tax of a certain percentage is applied to the base price, and an untaxed deposit for the keg is added. If the total amount, in dollars, paid at the time of purchase for one keg is given by the expression  $1.07x + 17$ , then what is the sales tax, expressed as a percentage of the base price?

- A) 0.07%
- B) 1.07%
- C) 7%
- D) 17%

4

What is the equation of a line that contains the point  $(1, 6)$  and has a  $y$ -intercept of 4?

- A)  $y = \frac{1}{2}x + 4$
- B)  $y = x + 4$
- C)  $y = 2x + 4$
- D)  $y = 4x + 2$



5

The number of bonus points,  $B(p)$ , that a credit card holder receives is given by the function  $B(p) = 4p + 7$ , where  $p$  represents the number of purchases made. If the number of purchases is increased by 3, by how much does the number of bonus points increase?

- A) 3
- B) 4
- C) 12
- D) 19

6

Jeff tests how the total volume occupied by a fluid contained in a graduated cylinder changes when round marbles of various sizes are added. He found that the total volume occupied by the fluid,  $V$ , in cubic centimeters, can be found using the equation below, where  $x$  equals the number of identical marbles Jeff added, one at a time, to the cylinder, and  $r$  is the radius of one of the marbles.

$$V = 24\pi + x \left( \frac{4}{3}\pi r^3 \right)$$

If the volume of the graduated cylinder is  $96\pi$  cubic centimeters, then, what is the maximum number of marbles with a radius of 3 centimeters that Jeff can add without the volume of the fluid exceeding that of the graduated cylinder?

- A) 1
- B) 2
- C) 3
- D) 4

7

If  $b$  is two more than one-third of  $c$ , which of the following expresses the value of  $c$  in terms of  $b$ ?

- A)  $c = \frac{b - 2}{3}$
- B)  $c = \frac{b + 2}{3}$
- C)  $c = 3(b - 2)$
- D)  $c = 3(b - 6)$

8

The rotation rate of a mixing blade, in rotations per second, slows as a liquid is being added to the mixer. The blade rotates at 1,000 rotations per second when the mixer is empty. The rate at which the blade slows is four rotations per second less than three times the square of the height of the liquid. If  $h$  is the height of liquid in the mixer, which of the following represents  $R(h)$ , the rate of rotation?

- A)  $4 - 9h^2$
- B)  $1,000 - (4 - 3h)$
- C)  $1,000 - (9h - 4)$
- D)  $1,000 - (3h^2 - 4)$



9

A dental hygiene company is creating a new 24-ounce tube of toothpaste by combining its most popular toothpastes, Cavity Crusher and Bad Breath Obliterator. Cavity Crusher contains 0.25% of sodium fluoride as its active ingredient, and Bad Breath Obliterator contains 0.30% of triclosan as its active ingredient for a total of 0.069 ounces of active ingredients in both toothpastes. Solving which of the following systems of equations yields the number of ounces of Cavity Crusher,  $c$ , and the number of ounces of Bad Breath Obliterator,  $b$ , that are in the new toothpaste?

A)  $c + b = 0.069$   
 $0.25c + 0.3b = 24$

B)  $c + b = 24$   
 $0.0025c + 0.003b = 0.069$

C)  $c + b = 24$   
 $0.025c + 0.03b = 0.069$

D)  $c + b = 24$   
 $0.25c + 0.3b = 0.069$

11

Which of the following is a possible equation for a circle that is tangent to both the  $x$ -axis and the line  $x = 4$ ?

- A)  $(x + 2)^2 + (y + 2)^2 = 4$   
B)  $(x + 2)^2 + (y - 2)^2 = 4$   
C)  $(x - 2)^2 + (y + 4)^2 = 4$   
D)  $(x - 6)^2 + (y - 2)^2 = 4$

10

$$\frac{2d^2 - d - 10}{d^2 + 7d + 10} = \frac{d^2 - 4d + 3}{d^2 + 2d - 15}$$

In the equation above, what is the value of  $d$ ?

- A) -4  
B) 2  
C) 4  
D) 6

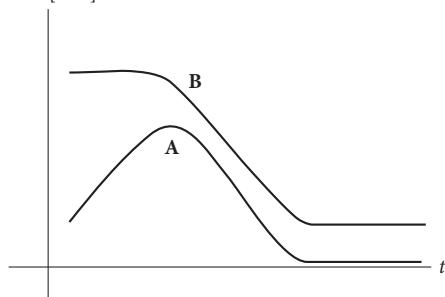
CONTINUE



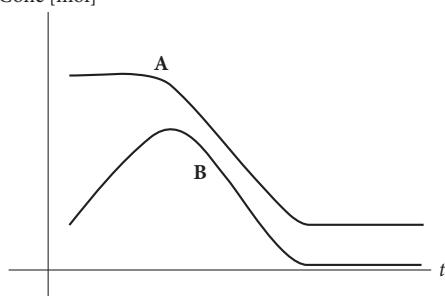
12

Reactant A is placed in a beaker, to which Reactant B will be added. Reactants A and B will not react unless B gets to a certain concentration. Once the reaction starts, both concentrations decrease until B has been consumed. Which of the following graphs, showing concentration in moles as a function of time in seconds, represents the reaction?

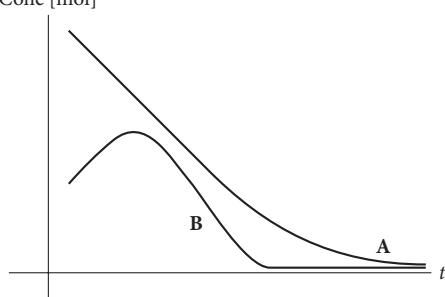
A) Conc [mol]



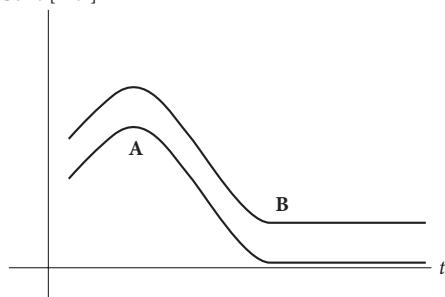
B) Conc [mol]



C) Conc [mol]



D) Conc [mol]

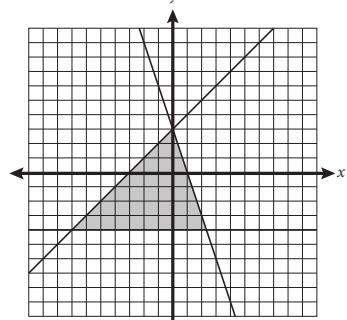


13

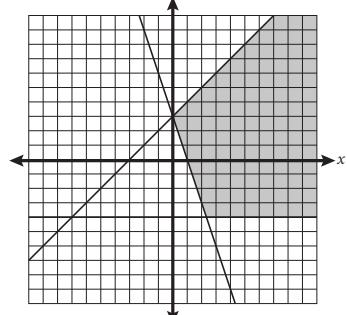
$$\begin{aligned} -2y &\leq 8 \\ y - 3 &\leq x \\ -\frac{1}{3}y + 1 &\geq x \end{aligned}$$

Which of the following graphs shows the solution to the system of inequalities above?

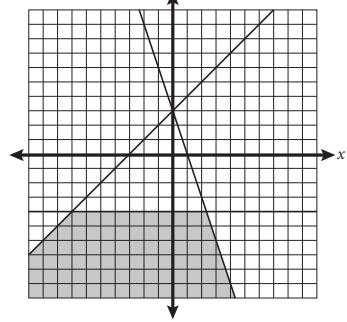
A)



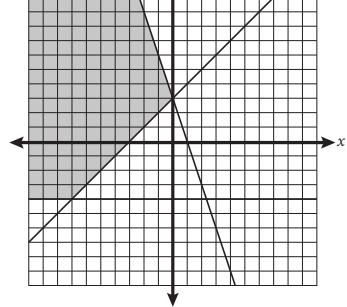
B)



C)

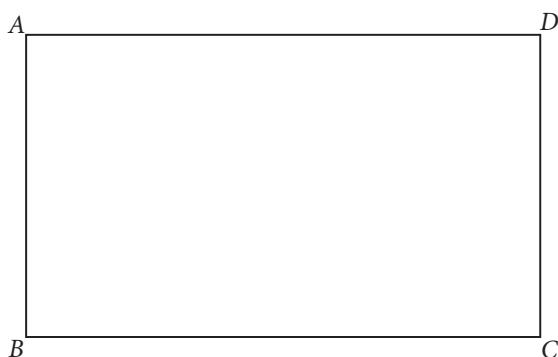


D)





14



- If rectangle  $ABCD$  has an area of 324 and the tangent of  $\angle BCA$  (not shown) is  $\frac{4}{9}$ , then which of the following is closest to the length of  $\overline{BD}$  (not shown)?
- A) 9.8
  - B) 27
  - C) 29.5
  - D) It cannot be determined from the given information.

15

Which of the following is equivalent to

$$\frac{2m+6}{4} \times \frac{6m-36}{3m+9} ?$$

A)  $\frac{12m^2 - 216}{12m + 36}$

B)  $\frac{8m - 30}{3m + 13}$

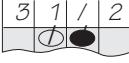
C)  $\frac{m - 6}{4}$

D)  $m - 6$

CONTINUE

**DIRECTIONS**

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

- 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.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $\frac{7}{2}$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not as  $3\frac{1}{2}$ .)
- 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:  $\frac{7}{12}$

Write answer in boxes. →

7	/	1	2
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Grid in result. →

Answer: 2.5

2	.	5
.	.	.
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

← Decimal point

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

2	/	3
.	.	.
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9

.	6	6	6
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

	2	0	1
.	.	.	.
0	1	1	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

2	0	1	
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

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



16

A rectangular box has sides 3, 4, and  $x$  and a volume of 18. What is the value of  $x$ ?

18

The parabola  $y = -x^2 + 5x + 6$  is intersected by the line  $y = -\frac{1}{2}x + 12$ . What is the  $y$ -coordinate of the intersection closest to the  $x$ -axis?

17

Jeanne babysits Chuy one day each week. Jeanne charges a \$20 fee for the day, plus \$5.50 for every 30 minutes of babysitting. How much has Jeanne earned after three hours of babysitting? (Disregard the \$ sign when gridding your answer.)

CONTINUE



19

$$13r + 8v = 47$$

$$22v = 63 - 17r$$

Based on the system of equations above, what is the sum of  $r$  and  $v$ ?

20

A gardener has a cultivated plot that measures 4 feet by 6 feet. Next year, she wants to double the area of her plot by increasing the length and width by  $x$  feet. What is the value of  $x$ ?

**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.

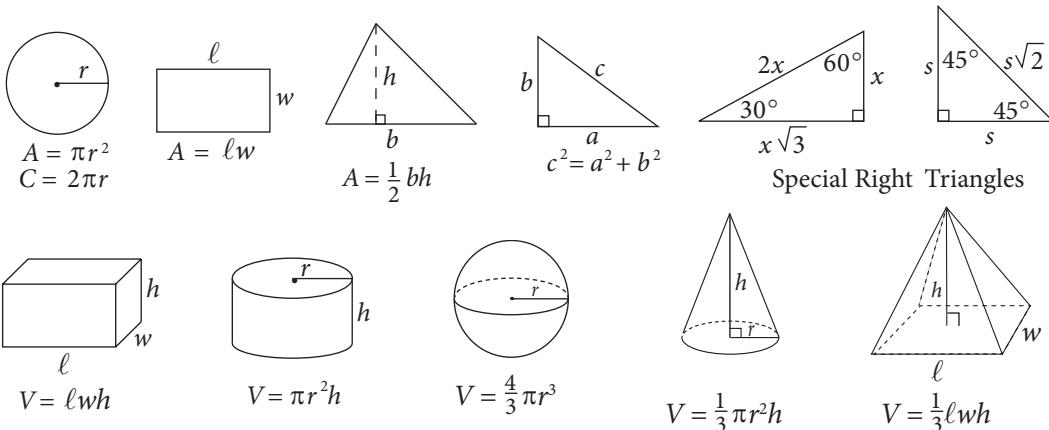
## DIRECTIONS

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



The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.



1

The population,  $P$ , of Town  $Y$  since 1995 can be estimated by the equation  $P = 1.0635x + 3,250$ , where  $x$  is the number of years since 1995 and  $0 \leq x \leq 20$ . In the context of this equation, what does the number 1.0635 most likely represent?

- A) The estimated population of town  $Y$  in 1995
- B) The estimated population of town  $Y$  in 2015
- C) The factor by which the population of town  $Y$  increased yearly
- D) The factor by which the population of town  $Y$  decreased yearly

3

Sai is ordering new shelving units for his store. Each unit is 7 feet in length and extends from floor to ceiling. Sai's store has 119 feet of wall space that includes 21 feet of windows along the walls. If the shelving units cannot be placed in front of the windows, which of the following inequalities includes all possible values of  $r$ , the number of shelving units that Sai could use?

- A)  $r \leq \frac{119 - 21}{7}$
- B)  $r \geq \frac{119 + 21}{7}$
- C)  $r \leq 119 - 21 + 7r$
- D)  $r \geq 119 + 21 - 7r$

2

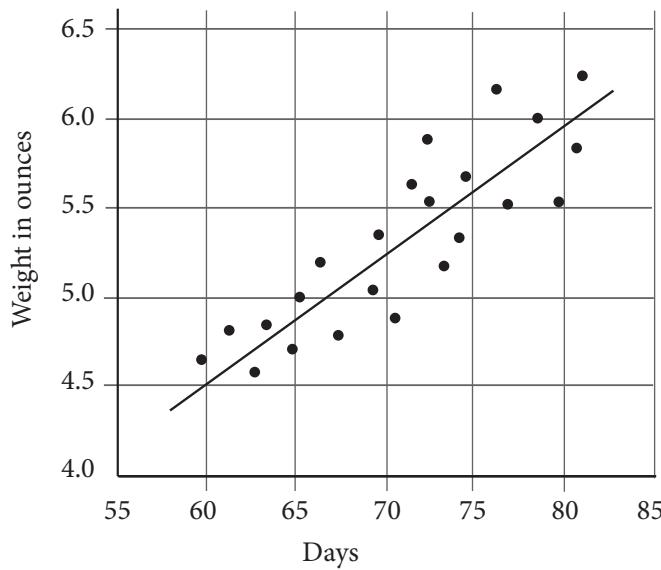
If  $x^2 + 12x = 64$  and  $x > 0$ , what is the value of  $x$ ?

- A) 2
- B) 4
- C) 8
- D) 16



4

Truffula Tree Fruit Weight



The scatterplot above shows the weight, in ounces, of the fruits on a certain truffula tree from days 55 to 85 after flowering. According to the line of best fit in the scatterplot above, which of the following is the closest approximation of the number of days after flowering of a truffula fruit that weighs 5.75 ounces?

- A) 63
- B) 65
- C) 77
- D) 81

5

Hannah placed an online order for shirts that cost \$24.50 per shirt. A tax of 7% is added to the cost of the shirts, before a flat, untaxed shipping rate of \$6 is charged. Which of the following represents Hannah's total cost for  $s$  shirts, in dollars?

- A)  $0.07(24.50s + 6)$
- B)  $1.07(24.50 + 6)s$
- C)  $1.07(24.50s) + 6$
- D)  $1.07(24.50 + s) + 6$

6

Once a certain plant begins to grow, its height increases at a linear rate. After six weeks, the plant is 54 centimeters tall. Which of the following functions best models the relationship between  $h(w)$ , the height, in centimeters, of the plant, and  $w$ , the number of weeks that the plant has been growing?

- A)  $h(w) = 6w$
- B)  $h(w) = 9w$
- C)  $h(w) = 54w$
- D)  $h(w) = 54 + w$



7

Which of the following is equivalent to  $(12x^2 + 4x + 5y) + (3x^2 - 2x + 3y)$ ?

- A)  $2x^2 - 2x + 8y$
- B)  $2x^2 + 15x + 8y$
- C)  $15x^2 - 2x + 8y$
- D)  $15x^2 + 2x + 8y$

9

$$\frac{1}{2}t + 4 = \frac{3}{4}t - 5$$

In the equation above, what is the value of  $t$ ?

- A) 4
- B) 9
- C) 18
- D) 36

8

An advertisement for Royal Rat Rations states: “7 out of 8 veterinarians recommend Royal Rat Rations for your fancy rat.” No other information about the data is provided by the company.

Based on this data, which of the following inferences is most valid?

- A) Royal Rat Rations provides the best nutrition for fancy rats.
- B) If you do not feed your rat Royal Rat Rations, your rat will be unhealthy.
- C) Only one veterinarian does not recommend Royal Rat Rations for your fancy rat.
- D) Of the veterinarians surveyed by Royal Rat Rations, the majority recommend Royal Rat Rations for your fancy rat.

10

Dogs need 8.5 to 17 ounces of water each day for every 10 pounds of their weight. Everett has two dogs—Ringo is a 35-pound black lab mix, and Elvis is a 55-pound beagle. Which of the following ranges represents the approximate total number of ounces of water,  $w$ , that Elvis and Ringo need in a week?

- A)  $77 \leq w \leq 153$
- B)  $109 \leq w \leq 218$
- C)  $536 \leq w \leq 1,071$
- D)  $765 \leq w \leq 1,530$



11

Priya is planning to send her favorite dry rub recipe to a friend who lives in France. Before sending the recipe, Priya wants to convert the American customary units in the instructions into metric units so that her friend will easily be able to understand the measurements. If the recipe calls for a ratio of four ounces of paprika to every seven ounces of chili powder, and if Priya's friend is planning to make a large batch of dry rub with 91 total ounces of chili powder, approximately how many total grams of paprika and chili powder will the recipe require?

(1 ounce = 28.3 grams)

- A) 4,047 grams
- B) 4,521 grams
- C) 4,925 grams
- D) 5,149 grams

12

Luciano measured the amount of water that evaporated over a period of time from a container holding  $w$  ounces of water, where  $w$  is greater than 12. By the end of the first day, the cup had lost 2 ounces of water. By the end of the 7th day, the cup had lost an additional 8 ounces of water. By the end of the 11th day, the cup had lost half of the water that remained after the 7th day. Which of the following represents the remaining amount of water, in ounces, in Luciano's container at the end of the 11th day?

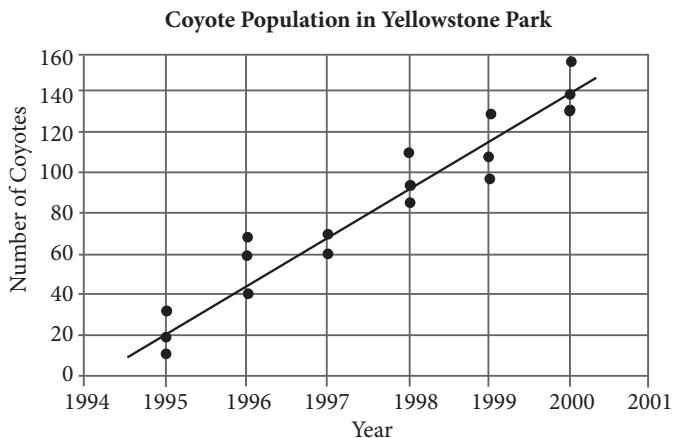
- A)  $\frac{w-2}{8}$
- B)  $\frac{w-2}{2} - 10$
- C)  $\frac{1}{2}w - 10$
- D)  $\frac{w-10}{2}$



14

**Questions 13 and 14 refer to the following information.**

In the 1990s, the park rangers at Yellowstone National Park implemented a program aimed at increasing the dwindling coyote population in Montana. Results of studies of the coyote population in the park are shown in the scatterplot below.



13

Based on the line of best fit in the scatterplot above, which of the following is the closest to the average annual increase in coyotes in Yellowstone Park between 1995 and 2000?

- A) 22
- B) 24
- C) 26
- D) 28

According to the data in the scatterplot, which of the following best represents the percent increase between the median of the results of the studies from 1995 and the median of the results of the studies from 1996?

- A) 50%
- B) 100%
- C) 150%
- D) 200%

**CONTINUE**



15

Bailey's Boutique Clothing is having a 20% off sale during which shirts cost \$30.00 and pants cost \$60.00. On the day of the sale, Bailey's sells a total of 60 shirts and pants and earned a total of \$2,250. On a regular day, Bailey's sells  $\frac{2}{3}$  the number of shirts and pants sold during the sale and earns a total of \$1,875. Solving which of the following systems of equations yields the number of shirts,  $s$ , and the number of pants,  $p$ , sold during a regular day?

- A)  $s + p = 40$   
 $37.5s + 75p = 1,875$
- B)  $s + p = 40$   
 $30s + 60p = 2,250$
- C)  $s + p = 60$   
 $30s + 60p = 2,250$
- D)  $s + p = 2,250$   
 $30s + 60p = 60$

16

Bryan, who works in a high-end jewelry store, earns a base pay of \$10.00 per hour plus a certain percent commission on the sales that he helps to broker in the store. Bryan worked an average of 35 hours per week over the past two weeks and helped to broker sales of \$5,000.00 worth of jewelry during that same two-week period. If Bryan's earnings for the two-week period were \$850.00, what percent commission on sales does Bryan earn?

- A) 1%  
B) 2%  
C) 3%  
D) 4%

17

If  $\frac{(C+x)}{x-3} = \frac{x+8}{3}$ , which of the following could be an expression of  $C$  in terms of  $x$ ?

- A)  $3(1+x)$   
B)  $x^2 + 2x - 24$   
C)  $\frac{1}{3}(x+6)(x-4)$   
D)  $\frac{1}{3}(x-3)(x+8)$

18

Lennon has 6 hours to spend in Ha Ha Tonka State Park. He plans to drive around the park at an average speed of 20 miles per hour, looking for a good trail to hike. Once he finds a trail he likes, he will spend the remainder of his time hiking it. He hopes to travel more than 60 miles total while in the park. If he hikes at an average speed of 1.5 miles per hour, which of the following systems of inequalities can be solved for the number of hours Lennon spends driving,  $d$ , and the number of hours he spends hiking,  $h$ , while he is at the park?

- A)  $1.5h + 20d > 60$   
 $h + d \leq 6$
- B)  $1.5h + 20d > 60$   
 $h + d \geq 6$
- C)  $1.5h + 20d < 60$   
 $h + d \geq 360$
- D)  $20h + 1.5d > 6$   
 $h + d \leq 60$



19

In a certain sporting goods manufacturing company, a quality control expert tests a randomly selected group of 1,000 tennis balls in order to determine how many contain defects. If this quality control expert discovered that 13 of the randomly selected tennis balls were defective, which of the following inferences would be most supported?

- A) 98.7% of the company's tennis balls are defective
- B) 98.7% of the company's tennis balls are not defective
- C) 9.87% of the company's tennis balls are defective
- D) 9.87% of the company's tennis balls are not defective

20

If  $-\frac{20}{7} < -3z + 6 < -\frac{11}{5}$ , what is the greatest possible integer value of  $9z - 18$ ?

- A) 6
- B) 7
- C) 8
- D) 9

21

$$\begin{aligned}-24 - 8j &= 12k \\ 3 + \frac{5}{3}k &= -\frac{7}{6}j\end{aligned}$$

Which of the following ordered pairs  $(j, k)$  is the solution to the system of equations above?

- A)  $(6, -6)$
- B)  $(3, 0)$
- C)  $(0, 2)$
- D)  $(-4, 1)$



22

United States Investment in  
Alternative Energy Sources

	Actual 2007 Investment	Projected 2017 Investment
Biofuels	0.31	0.34
Wind	0.40	0.32
Solar	0.27	0.30
Fuel Cells	0.02	0.04
Total	1.00	1.00

The table above shows the relative investment in alternative energy sources in the United States by type. One column shows the relative investment in 2007 of \$75 million total invested in alternative energy. The other column shows the projected relative investment in 2017 given current trends. The total projected investment in alternative energy in 2017 is \$254 million. Suppose that a new source of alternative energy, Cold Fusion, is perfected. It is projected that by 2017 that \$57 million will be invested in Cold Fusion in the United States, without any corresponding reduction in investment for any other form of alternative energy. What portion of the total investment of alternative energy in the United States will be spent on biofuels?

- A) 0.18
- B) 0.22
- C) 0.28
- D) 0.34

23

$$(x - 2)^2 + y^2 = 36$$

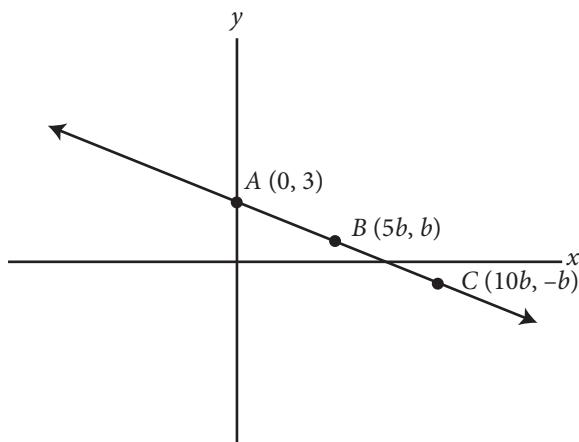
$$y = -x + 2$$

The equations above represent a circle and a line that intersects the circle across its diameter. What is the point of intersection of the two equations that lies in quadrant II?

- A)  $(-3\sqrt{2}, 3\sqrt{2})$
- B)  $(-4, 2)$
- C)  $(2 + \sqrt{3}, 2)$
- D)  $(2 - 3\sqrt{2}, 3\sqrt{2})$



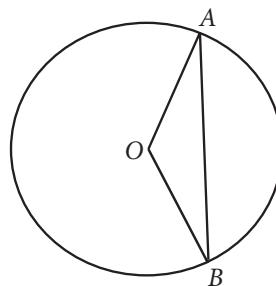
24



The graph of  $f(x)$  is shown above in the  $xy$ -plane. The points  $(0, 3)$ ,  $(5b, b)$ , and  $(10b, -b)$  are on the line described by  $f(x)$ . If  $b$  is a positive constant, what are the coordinates of point  $C$ ?

- A)  $(5, 1)$
- B)  $(10, -1)$
- C)  $(15, -0.5)$
- D)  $(20, -2)$

26



If the radius of the circle above is  $x$ ,  $\angle AOB = 120^\circ$ , and O is the center of the circle, what is the length of chord  $AB$  in terms of  $x$ ?

- A)  $\sqrt{2}x$
- B)  $\sqrt{3}x$
- C)  $\frac{x}{\sqrt{2}}$
- D)  $\frac{x}{\sqrt{3}}$

25

Melanie puts \$1,100 in an investment account that she expects will make 5% interest for each three-month period. However, after a year she realizes she was wrong about the interest rate and she has \$50 less than she expected. Assuming the interest rate the account earns is constant, which of the following equations expresses the total amount of money,  $x$ , she will have after  $t$  years using the actual rate?

- A)  $x = 1,100(1.04)^{4t}$
- B)  $x = 1,100(1.05)^{4t - 50}$
- C)  $x = 1,100(1.04)^{t/3}$
- D)  $x = 1,100(1.035)^{4t}$



27

Students in a physics class are studying how the angle at which a projectile is launched on level ground affects the projectile's hang time and horizontal range. Hang time can be calculated using the formula  $t = \frac{2v \cdot \sin(\theta)}{g}$ , where  $t$  is the hang time in seconds,  $v$  is the initial launch velocity,  $\theta$  is the projectile angle with respect to level ground, and  $g$  is the acceleration due to gravity, defined as  $9.8 \text{ m/s}^2$ . Horizontal range can be calculated using the formula  $R = \frac{v^2 \sin(2\theta)}{g}$ , where  $R$  is the distance the projectile travels from the launch site, in feet. Which of the following gives the value of  $v$ , in terms of  $R$ ,  $t$ , and  $\theta$ ?

A)  $v = \frac{t \sin(\theta)}{2R \sin(\theta)}$

B)  $v = \frac{2t \sin(\theta)}{R \sin(\theta)}$

C)  $v = \frac{2R \sin(\theta)}{t \sin(2\theta)}$

D)  $v = \frac{2R \sin(2\theta)}{t \sin(\theta)}$

28

If  $(i^{413})(i^x) = 1$ , then what is one possible value of  $x$ ?

A) 0

B) 1

C) 2

D) 3

29

The function  $g$  is defined by  $g(x) = 2x^2 - dx - 6$ , where  $d$  is a constant. If one of the zeros of  $g$  is 6, what is the value of the other zero of  $g$ ?

A) 2

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

C)  $-\frac{1}{2}$

D) -2

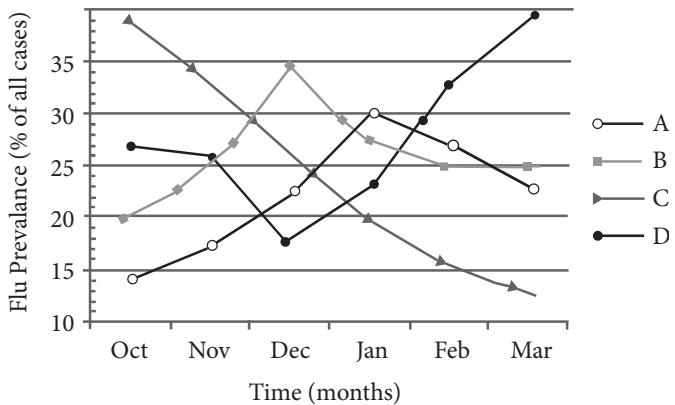


30

The flu shot for a flu season is created from four strains of the flu virus, named Strain A, B, C, and D, respectively. Medical researchers use the following data to determine the effectiveness of the vaccine over the flu season. Table 1 shows the effectiveness of the vaccine against each of these strains individually. The graph below the table shows the prevalence of each of these strains during each month of the flu season, represented as a percentage of the overall cases of flu that month.

Table 1

Strain	Effectiveness
A	35%
B	13%
C	76%
D	68%



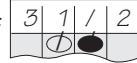
For the strain against which the flu shot was the most effective, approximately how effective was the shot overall when that strain was least prevalent?

- A) 13%
- B) 20%
- C) 27%
- D) 48%



## DIRECTIONS

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

- 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.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or  $\frac{7}{2}$ . (If  is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not as  $3\frac{1}{2}$ .)

- 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:  $\frac{7}{12}$

Write answer in boxes. →

7	/	1	2
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Grid in result. →

Answer: 2.5

	2	.	5
.	/	/	/
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Decimal point

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

.	2	/	3
.	/	2	3
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	6
.	/	6	6
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

.	6	6	7
.	/	6	7
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

.	2	0	1
.	/	/	/
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

2	0	1	
/	/	/	
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4

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



31

If  $9 > 3v - 3$ , what is the greatest possible integer value of  $v$ ?

32

$$\text{In the expression } \frac{\frac{6}{12} - \frac{5}{2y}}{y} = 1, \text{ what is the value of } y?$$

33

During a presidential election, a high school held its own mock election. Students had the option to vote for Candidate A, Candidate B, or several other candidates. They could also choose to spoil their ballot. The table below displays a summary of the election results.

	Candidate A	Candidate B	Other	Total
10 <sup>th</sup> grade	0.32	0.58	0.10	1.00
11 <sup>th</sup> grade	0.50	0.42	0.08	1.00
12 <sup>th</sup> grade	0.63	0.32	0.05	1.00
Total	0.48	0.44	0.08	1.00

614 students voted for Candidate A. Approximately how many students attend the school?

34

$$\text{If } \tan \theta = \frac{12}{5}, \text{ then } \cos \theta =$$

**CONTINUE**



35

Marcellus is traveling abroad in Ghana and using traveler's checks, which he has acquired from Easy Traveler's Savings Bank. Easy Traveler's Savings Bank charges a 7% fee on traveler's checks, which can then be used like cash at any location overseas at the same exchange rate, and any change will then be returned to Marcellus in local currency. For this trip, Marcellus bought a 651 Cedi traveler's check and paid a fee of 32.30 USD (United States dollars) for the check.

While in Ghana, Marcellus finds Leon's Pawnshop and Barter, which offers store credit for Marcellus's briefcase equal to its value in Cedis. If Marcellus's briefcase is worth 5,000 USD at the same exchange rate at which he bought his traveler's check, then how much store credit, to the closest Cedi, will Marcellus receive for the briefcase?

36

A square is inscribed in a circle. The area of the square is what percent of the area of the circle? (Disregard the percent symbol when gridding your answer.)



38

**Questions 37 and 38 refer to the following information.**

Professor Malingowski, a chemist and teacher at a community college, is organizing his graduated cylinders in the hopes of keeping his office tidy and setting a good example for his students.

He has beakers with diameters, in inches, of  $\frac{1}{2}$ ,  $\frac{3}{4}$ ,  $\frac{4}{5}$ , 1, and  $\frac{5}{4}$ .

37

Professor Malingowski notices one additional cylinder lying on the ground, and can recall certain facts about it, but not its actual diameter. If he knows that the value of the additional graduated cylinder's diameter,  $x$ , will not create any modes and will make the mean of the set equal to  $\frac{5}{6}$ , what is the value of the additional cylinder's diameter?

With his original five cylinders, Professor Malingowski realizes that he is missing a cylinder necessary for his upcoming lab demonstration for Thursday's class. He remembers that the cylinder he needs, when added to the original five, will create a median diameter value of  $\frac{9}{10}$  for the set of six total cylinders. He also knows that the measure of the sixth cylinder will exceed the value of the range of the current five cylinders by a width of anywhere from  $\frac{1}{4}$  inches to  $\frac{1}{2}$  inches, inclusive. Based on the above data, what is one possible value of  $y$ , the diameter of this missing sixth cylinder?

**S T O P**

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.

# SAT Essay

## ESSAY BOOK

### DIRECTIONS

The essay gives you an opportunity to show how effectively you can read and comprehend a passage and write an essay analyzing the passage. In your essay you should demonstrate that you have read the passage carefully, present a clear and logical analysis, and use language precisely.

Your essay must be written on the lines provided in your answer sheet booklet; except for the planning page of the answer booklet, you will receive no other paper on which to write. You will have enough space if you write on every line, avoid wide margins, and keep your handwriting to a reasonable size. Remember that people who are not familiar with your handwriting will read what you write. Try to write in print so that what you are writing is legible to those readers.

**You have 50 minutes to read the passage and write an essay in response to the prompt provided inside this booklet.**

### REMINDER

- Do not write your essay in this booklet. Only what you write on the lined pages of your answer booklet will be evaluated.
- An off-topic essay will not be evaluated.

As you read the passage below, consider how the author uses

- evidence, such as facts or examples, to support claims.
- reasoning to develop ideas and to connect claims and evidence.
- stylistic or persuasive elements, such as word choice or appeals to emotion, to add power to the ideas expressed.

**Excerpted from “Making A Brain Map That We Can Use” by Alva Noë. Originally published January 16, 2015.**

- 1 It is now conventional wisdom that the brain is the seat of the mind; it is alone through the brain’s workings that we think and feel and know.
- 2 But what *is* a brain, anyway?
- 3 My thoughts turned to this question as I was reading a recent *New York Times* piece about Sebastian Seung’s project to map the brain by tracing out each of the trillions of links between individual neurons. This undertaking to map the system of connections which make us what we are—to map what Seung called the connectome in his 2011 book—can seem, from a certain point of view, like a glorious and heroic step backward.
- 4 Trying to understand how the brain works by looking at the behavior of individual cells—so observed David Marr, one of modern cognitive science’s foundational figures writing in the late 1970s—would be like trying to understand how a bird flies by examining the behavior of individual feathers. To understand flight, you need to understand aerodynamics; only once you get a handle on that can you ask how a structure of feathers, or any other physical system—such as a manufactured airship—can harness aerodynamics in the service of flight.
- 5 And so it is with the brain: Before we can understand how it works, it would seem that we need to understand what it’s doing. But you can’t read that off the action of individual cells. Just try!
- 6 Imagine you were to stumble one day upon a computer on the beach and imagine (very unrealistically) that you have never seen or heard of a computer before. How would you go about figuring out how it works? Well, one thing you could do would be to make a map of how all the detachable parts of the machine are connected. This piece of metal is soldered to this piece, which is stapled to this piece of plastic. And so on. Suppose you finished the job. Would you know what the thing is before you? Or how it works? Would your complicated, Rube-Goldberg-esque map of the connections between the parts even count as a model of the computer? Keep in mind that there are lots of different kinds of computers, made of lots of different materials, with lots of different types of parts and networks of connections. In fact, if Alan Turing was right (and Turing *was* right), the basic and essential job of a computer—the computing of computable functions—can be specified in entirely formal terms; the physical stuff of the computing machine is irrelevant to the question of what computations are being computed and, so, really, it is also irrelevant to the question of how this—or any other computer—works...

CONTINUE 

- 7 I'm raising both a practical point and a point of principle. The practical point is that we need some conception of what the whole *is for* before we have a ghost of a chance of figuring out how it works. This is Marr's point about feathers and flight. But there is also a matter of principle: When it comes to complex functional systems—like computers, for sure, and, probably, like brains—the laws and regularities and connections that matter are themselves *higher-level*; they don't bottom out in laws framed in terms of neuronal units any more than they do in laws framed in terms of quantum mechanical processes. The point is not just that it is hard to understand the brain's holistic operation in terms of what cells are doing but, instead, that it might be impossible—like trying to understand the stock market in terms of quantum mechanics. Surely, naturalism doesn't commit us to the view that it ought to be possible to frame a theory of the stock market in the terms of physics?
- 8 Gareth Cook, who wrote the recent *New York Times Magazine* article on Seung's quest, was wise to refer to Argentinian writer Jorge Luis Borges's cautionary tale, *On Exactitude In Science*, about a map being built as an exact, to-size replica of the domain being mapped. Such a map can't serve any explanatory purpose whatsoever. It won't be a useful map. My worry is that we already know that exactly the same thing is true of Seung's connectome.

Write an essay in which you explain how Noë builds an argument against the idea of cell-by-cell brain mapping. In your essay, analyze how Noë uses one or more of the features listed above (or features of your own choice) to strengthen the logic and persuasiveness of his argument. Be sure that your analysis focuses on the most relevant aspects of the passage.

Your essay should not explain whether you agree with Redford's claims, but rather explain how the author builds an argument to persuade his audience.

**END OF TEST****DO NOT RETURN TO A PREVIOUS SECTION.**

Completely darken bubbles with a No. 2 pencil. If you make a mistake, be sure to erase mark completely. Erase all stray marks.

1. <b>YOUR NAME:</b> (Print) _____	Last _____	First _____	M.I. _____
SIGNATURE: _____	DATE: / /		
HOME ADDRESS: (Print) _____	Number and Street _____		
_____	City _____	State _____	Zip Code _____
PHONE NO.: (Print) _____			

**IMPORTANT:** Please fill in these boxes exactly as shown on the back cover of your test book.

**2. TEST FORM**

**6. DATE OF BIRTH**

Month	Day	Year
JAN	0	0
FEB	0	0
MAR	1	1
APR	2	2
MAY	3	3
JUN	4	4
JUL	5	5
AUG	6	6
SEP	7	7
OCT	8	8
NOV	9	9
DEC	9	9

<b>3. TEST CODE</b>			<b>4. REGISTRATION NUMBER</b>						
0	A	J	0	0	0	0	0	0	0
1	B	K	1	1	1	1	1	1	1
2	C	L	2	2	2	2	2	2	2
3	D	M	3	3	3	3	3	3	3
4	E	N	4	4	4	4	4	4	4
5	F	O	5	5	5	5	5	5	5
6	G	P	6	6	6	6	6	6	6
7	H	Q	7	7	7	7	7	7	7
8	I	R	8	8	8	8	8	8	8
9			9	9	9	9	9	9	9

**7. SEX**

MALE  
 FEMALE



5. YOUR NAME			
First 4 letters of last name		FIRST INIT	MID INIT
A	A	A	A
B	B	B	B
C	C	C	C
D	D	D	D
E	E	E	E
F	F	F	F
G	G	G	G
H	H	H	H
I	I	I	I
J	J	J	J
K	K	K	K
L	L	L	L
M	M	M	M
N	N	N	N
O	O	O	O
P	P	P	P
Q	Q	Q	Q
R	R	R	R
S	S	S	S
T	T	T	T
U	U	U	U
V	V	V	V
W	W	W	W
X	X	X	X
Y	Y	Y	Y
Z	Z	Z	Z

## Test 1

Start with number 1 for each new section.  
If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

### Section 1—Reading

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D
10. A B C D
11. A B C D
12. A B C D
13. A B C D
14. A B C D
15. A B C D
16. A B C D
17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D
22. A B C D
23. A B C D
24. A B C D
25. A B C D
26. A B C D
27. A B C D
28. A B C D
29. A B C D
30. A B C D
31. A B C D
32. A B C D
33. A B C D
34. A B C D
35. A B C D
36. A B C D
37. A B C D
38. A B C D
39. A B C D
40. A B C D
41. A B C D
42. A B C D
43. A B C D
44. A B C D
45. A B C D
46. A B C D
47. A B C D
48. A B C D
49. A B C D
50. A B C D
51. A B C D
52. A B C D

### Section 2—Writing and Language Skills

1. A B C D
2. A B C D
3. A B C D
4. A B C D
5. A B C D
6. A B C D
7. A B C D
8. A B C D
9. A B C D
10. A B C D
11. A B C D
12. A B C D
13. A B C D
14. A B C D
15. A B C D
16. A B C D
17. A B C D
18. A B C D
19. A B C D
20. A B C D
21. A B C D
22. A B C D
23. A B C D
24. A B C D
25. A B C D
26. A B C D
27. A B C D
28. A B C D
29. A B C D
30. A B C D
31. A B C D
32. A B C D
33. A B C D
34. A B C D
35. A B C D
36. A B C D
37. A B C D
38. A B C D
39. A B C D
40. A B C D
41. A B C D
42. A B C D
43. A B C D
44. A B C D

**Test 1**

Start with number 1 for each new section.

If a section has fewer questions than answer spaces, leave the extra answer spaces blank.

**Section 3—Mathematics: No Calculator**

1.  A  B  C  D
2.  A  B  C  D
3.  A  B  C  D
4.  A  B  C  D
5.  A  B  C  D
6.  A  B  C  D
7.  A  B  C  D
8.  A  B  C  D
9.  A  B  C  D
10.  A  B  C  D
11.  A  B  C  D
12.  A  B  C  D
13.  A  B  C  D
14.  A  B  C  D
15.  A  B  C  D

16.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

17.

0	0	0	0
1	1	1	1
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5	5	5	5
6	6	6	6
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8	8	8	8
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18.

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1	1	1	1
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3	3	3	3
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9	9	9	9

19.

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1	1	1	1
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4	4	4	4
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7	7	7	7
8	8	8	8
9	9	9	9

20.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

**Section 4—Mathematics: Calculator**

1.  A  B  C  D
2.  A  B  C  D
3.  A  B  C  D
4.  A  B  C  D
5.  A  B  C  D
6.  A  B  C  D
7.  A  B  C  D
8.  A  B  C  D
9.  A  B  C  D
10.  A  B  C  D
11.  A  B  C  D
12.  A  B  C  D
13.  A  B  C  D
14.  A  B  C  D
15.  A  B  C  D
16.  A  B  C  D
17.  A  B  C  D
18.  A  B  C  D
19.  A  B  C  D
20.  A  B  C  D
21.  A  B  C  D
22.  A  B  C  D
23.  A  B  C  D
24.  A  B  C  D
25.  A  B  C  D
26.  A  B  C  D
27.  A  B  C  D
28.  A  B  C  D
29.  A  B  C  D
30.  A  B  C  D

31.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
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8	8	8	8
9	9	9	9

32.

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1	1	1	1
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3	3	3	3
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9	9	9	9

33.

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1	1	1	1
2	2	2	2
3	3	3	3
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8	8	8	8
9	9	9	9

34.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

35.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

36.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

37.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

38.

0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
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6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

## PRACTICE TEST 1 EXPLANATIONS

### Section 1: Reading

1. C The key to this question is the phrase the passage as a whole. Choice (A) describes the purpose of a section of a passage, but is too specific to describe the purpose of the passage as a whole. Therefore, (A) is incorrect. Similarly, while the speakers briefly discuss the Shrewsbury School, the discussion occupies very little space, and is not the main point of the passage. Therefore, (B) is incorrect. Because the passage focuses on Carton, it is accurate to say that its purpose is to reveal his character. Therefore, (C) is correct. Because there is no evidence in the passage that Stryver has exploited Carton, (D) cannot be correct.
2. B Because Stryver describes Carton as sound in the first paragraph, (A) is incorrect. Mercurial means subject to sudden changes. Because Carton rapidly changes from growling to laughing to crying, (B) accurately describes him. Carton's luck is never described as bad, so (C) is incorrect. Because there is no indication that Carton does not notice the things occurring around him, (D) does not describe Carton.
3. A In the previous question, it is clear that Carton's personality and emotional state are somewhat easily changeable, so the correct answer for this question needs to reflect that theme. The quote in line 10, Up one minute and down the next, accurately illustrates the idea that Carton is mercurial; therefore, the answer must be (A). None of the other answer choices are relevant.
4. D In the paragraph in question, in spirits describes Carton, and the paragraph says that carton is up one minute and down the next. Because despondency means depression, spirits must mean the opposite of depression, like happiness. Choices (A), (B), and (C) all mean things other than happiness. Only jubilation is the opposite of despondency. Therefore, (D) is correct.
5. A In the paragraph in question, Stryver calls Carton unmotivated and lame, so it is clear that Stryver dislikes Carton's behavior. Therefore, (A) is correct. Because Carton and Stryver are friends, it is clear that the description should not be taken literally; Stryver does not want to literally push Carton into the fireplace. Therefore, (B) is wrong. Similarly, the phrase the old Sydney Carton has nothing to do with Carton's actual age but rather is a term of endearment. Therefore, (C) is incorrect. Because Stryver and Carton are presented as school friends, and there is no reason to believe Stryver ever bullied Sydney at school, (D) should be eliminated.
6. A Two lines after the paragraph in question, Carton explicitly states that he does not find Miss Manette pretty. Because incredulity means disbelief, (A) is a good description of Carton's attitude. Because Carton says that she is not attractive and Stryver says that she is attractive, Carton is not confused. He knows what he thinks and what Stryver thinks. Therefore, (B) is incorrect. Because there is no indication that Carton is annoyed by Stryver in the lines in question, (C) should be eliminated. Because Carton thinks Miss Manette is not pretty, he does not feel affection towards her. Therefore, (D) is incorrect.
7. C While Stryver says that Miss Manette is pretty, to say that he is in love with her would be extreme. Therefore, (A) is incorrect. Though Carton is not successful, Stryver says that it is a lack of motivation that holds him back, not a lack of intelligence. Therefore, (B) is incorrect. In lines 63 - 68, Stryver says that it looked like Carton sympathized with Miss Manette, which indicates that Stryver believes Carton was paying attention to her and saw what happened to her at court. He was paying attention because she's attractive. Therefore, (C) is correct. Because Stryver and Carton never discuss either man's family, (D) cannot be correct.
8. D The answer to the previous question is that Stryver does not believe that Carton finds Miss Manette unattractive. Because the paragraphs indicated by (A) and (B) make no mention of Miss Manette, these choices are incorrect. Because the lines indicated by (C) state only that the court found Miss Manette attractive and makes no reference to Carton, this choice is incorrect. The paragraph indicated by (D) says that Carton sympathized with Miss Manette, which contradicts Carton's assertion that she is not attractive. Therefore, (D) provides support for the statement that Stryver does not believe that Carton finds Miss Manette unattractive, and is the correct answer.
9. B Because lifeless desert describes the whole scene, it refers to the physical landscape at which Carton is looking. Because (A) and (C) do not describe a landscape, both should be eliminated. Because Carton is looking at the city's landscape, not sand dunes, (D) should be eliminated, leaving (B), the correct answer.
10. B Because there is no indication of Miss Manette's feelings, positive or negative, towards Carton, (A) is not correct. Because Carton is described as incapable and resigned, it is clear that he cannot change his behavior. Therefore, (B) is correct. Because the passage does not

provide a physical description of Carton's apartment, (C) is incorrect. Because there is no indication that Stryver is exploiting Carton, (D) should be eliminated.

11. B Use POE to find the best answer that is consistent with the passage. Since the author is in support of the revolution, (B) is a good fit. While the author doesn't seem to support the Soviet Union in the passage, (A) is still too extreme. Eliminate (C) and (D), since the author is neither conflicted nor dismissive.

12. A Use the context from earlier in the passage, in which a secret non-aggression treaty between the Soviet Union and Nazi Germany is discussed. Therefore, look for a word or phrase that matches this description, such as "scheme." Choice (A) is the best fit, and therefore the correct answer.

13. A The author describes the songs as grim, but states that people had hope in their hearts. Choice (A) matches this contrast rather well. Choice (B) doesn't work because there is no distinction made between the themes of the songs and the anthems; rather, they are both categorized collectively as having grim and sorrowful themes. The military of Estonia isn't discussed, so eliminate (C). Song festivals are mentioned in the following paragraph, so eliminate (D).

14. B Based on the information earlier in the passage, it's clear that Estonia wanted to be free from the Soviet Union, or to have a legal "divorce," as stated at the end of the second paragraph. Therefore, this phrase directly correlates with this desire. Choice (B) is a good fit. Eliminate (A) because there is no mention of speaking Russian. Choice (C) is incorrect because it's never stated that Estonia wanted to be culturally separate from other Baltic nations. Eliminate (D) because the passage implies the opposite: Estonians took the festivals very seriously, and put a lot of effort and time into them. Choice (B) is the best answer.

15. D Based on the tone of the entire passage, the size of the amphitheater is used to show how much support this revolution had. Choice (D) matches this tone well. Choice (A) is not correct because the question asks for the purpose of this fact, and this answer does not address the purpose of including this statistic. Choice (B) is also incorrect because the author is not trying to show the popularity of the Soviet Union and its leaders. You can eliminate (C) because no comparison is made to other theaters in the passage. Choice (D) is the best answer.

16. C Cross out the word burden and replace it with your own word that is consistent with the text. The paragraph begins by stating that historians were defying "free speech," but that later it was musicians that needed to do this. So a good replacement for burden would be "authority" or "leadership." Choice (C) is the best match for this.

17. D The final paragraph states that the revolution was powerful and that sedition hung in the wind, so find an answer choice consistent with these descriptions. Choice (A) is incorrect, as "dread" is too extreme and there were positive outcomes from the revolution. Eliminate (B) because disagreement among revolutionaries is discussed. Choice (C) is incorrect since music and poetry is too broad. It was specifically these festivals that included music and poetry that were vital. Choice (D) must therefore be the correct answer.

18. C Use POE to find an answer that is supported by information in the passage. The passage does not discuss the Soviet Union's singing traditions, so eliminate (A). Choices (B) and (D) are directly contradicted by the passage, so get rid of them as well. Choice (C) is supported by the third paragraph that states that Estonia could not threaten the Soviet Union militarily. Choice (C) is the best answer.

19. A Use POE to find an answer that is supported by information in the passage. Choice (A) is a good match because lines 39-46 discuss the impact of the song festivals. Choice (B) is incorrect because the festival started over a hundred years ago, not during the Soviet occupation. Eliminate (C), as it's not stated that the song festivals were unique. Choice (D) is also incorrect because the passage doesn't discuss whether these songs were sung while working.

20. D Since the festivals were a means of demonstrating national and cultural pride, use POE to find the answer that best exemplifies this. Choice (D) is the best fit since the festivals united Estonians with poetry and music. Choices (A) and (C) are irrelevant to the festivals. Choice (B) discusses the festivals but does not mention anything about national or cultural pride. Thus, (D) is the best answer.

21. D According to the diagram, the Soviet Union acquired Estonia, Latvia, Lithuania, Bessarabia, and part of Poland in the pact. This land mass stretches from the Baltic Sea to the Black Sea; therefore, (D) is the correct answer. Although Germany did receive a portion of Poland, the Soviet Union also received a significant chunk. Therefore, (A) is incorrect. As depicted in the diagram, the Soviet Union is much larger than the part of Poland it acquired. Therefore, (B) is incorrect. And contiguous means sharing a common border; Lithuania and Estonia are separated by Latvia, so they are not contiguous, which means you can also eliminate (C).

22. C The fourth paragraph states, But sir, the right to control their own Government is not one

of the rights that the citizens of this country are called upon to surrender in time of war. Therefore, the author is objecting to the restrictions placed on those who have protested the war. Only (C) captures the author's dissenting views. While it is true that LaFollette is a lawmaker, no legislation is proposed, so you can eliminate (A). Since LaFollette argues for a single point of view throughout the text, you can eliminate (B). While it is true that LaFollette was dissenting against the war, this is not his primary purpose, so you can eliminate (D).

23. A The fourth paragraph states, ...all men recognize that in time of war the citizen must surrender some...But sir, the right to control their own Government according to constitutional forms is not one of the rights...Therefore, LaFollette believes that some rights are appropriately given up and some are not. Only (A) describes this distinction. LaFollette describes free speech as a fundamental personal right and never describes a moment in which it might be unnecessary, so you can eliminate (B). LaFollette never discusses what would and would not justify a war, so you can eliminate (C). LaFollette does mention the interests of humanity (how wars are ended) and the interests of this country (enduring peace), but does not draw a distinction between them, so you can eliminate (D).

24. B The answer to the previous choice was (A), which states that LaFollette draws a distinction between rights that are appropriately and inappropriately given up in times of war. Neither this distinction nor any other distinction is mentioned in (A), so it can be eliminated. The aforementioned distinction is mentioned in the lines referenced in (B). This is the best response. Neither this distinction nor any other distinction is mentioned in (C) or (D), so they can be eliminated.

25. B The passage states that people are being unlawfully arrested, thrown into jail...only to be eventually discharged without ever having been taken into court. A good way to describe these individuals would be detained and separated. The only answer choice that means something similar to this is (B), sequestered. Thus, (B) is the correct answer.

26. D The passage states that citizens must beware of those precedents in support of arbitrary action by administrative officials, which excused on the plea of necessity in war time, become the fixed rule when the necessity has passed and normal conditions have been restored. Thus, LaFollette is concerned that officials may restrict free speech during times of war but then fail to remove those restrictions when wartime has passed. More simply, LaFollette is worried that exceptions may become rules. Choice (D) matches this idea most closely. LaFollette does grant that the citizen must surrender some rights, but this is mentioned in paragraph 4. Thus, (A) can be eliminated. While LaFollette does say that some restrictions are arbitrary, paragraph 4 explicitly denies that all restrictions are arbitrary. Thus, (B) can be eliminated. While LaFollette does seem to be concerned with military action, (C) is never mentioned in the passage and can be eliminated.

27. A The passage states that the right of the citizens...to discuss...every important phase of this war; its causes, the manner in which it should be conducted, and the terms upon which peace should be made. In this paragraph LaFollette explicitly mentions declaring war, which is referenced in (C); how to conduct war, (D); and how to end a war, (B). Thus, each of these can be eliminated. While LaFollette probably believes that citizens ought to elect legislators and executives, it is never mentioned in the passage. Thus, (A) is the best answer.

28. B The beginning of the sentence in question states that it is the right of the citizens...to discuss...every important phase of this war. Thus, the list that follows serves as examples of the important phases of a war in which citizen oversight might be necessary. Choice (B) is the best match to this description. LaFollette's main point in the passage is to argue against the restriction of free speech during war, so (A) can be eliminated. LaFollette does offer reasons why the press might be afraid to speak out, but not in the referenced paragraph. Therefore, (C) can be eliminated. LaFollette does not believe that citizens understand wars better than the president, only that the country needs the counsel of all citizens, so (D) can be eliminated.

29. D The answer to the previous question is (B), that LaFollette believes that free speech is necessary for the conduct of war. Choice (D) introduces this idea explicitly. The lines in (A) reference reasons that people are currently afraid to publicly discuss the issues in question, but do not provide reasons why speech is necessary and can be eliminated. The lines in (B) explain why some are attempting to restrict speech and can be eliminated. The lines in (C) give reasons why we should be concerned by the attempts to restrict free speech, but they provide no explicit mention of why free speech is necessary during times of war. Eliminate (C) as well.

30. C The last paragraph of the passage states that now is precisely the time when the country needs counsel of all its citizens. Therefore, LaFollette believes that attempts to stifle discussion about issues of war are highly undesirable and contrary to the major goals of American democracy. Only (C) expresses an attitude that matches this position. LaFollette does not offer any sympathetic explanations for suppressing free speech, so (A) can be eliminated. LaFollette clearly cares about the suppression of free speech, so (B) can be eliminated. Choice (D), morose, is a negative attitude, but it is overly negative and too passive for the tone of the passage. LaFollette is displeased with the suppression of free speech, but he is not sad or

depressed about it.

31. C The first sentence of the last paragraph states that It is no answer to say that when the war is over the citizen may once more resume his rights.... Thus, LaFollette rejects even the idea of a temporary restriction of free speech, a right that he calls precious and fundamental. LaFollette thinks that free speech should never be withheld. Instead it should be maintained without interruption or restriction. Choice (C) is the best match to this meaning.

32. B Choice (B) is the correct answer, since satellite photos gave evidence of the fault lines at the edges of the earth's plates. Choice (A) is incorrect because it's too extreme, while (C) says that the theory was created in 1965, whereas the passage indicates that there had been investigations of the theory before then. Choice (D) is too narrow, since the San Andreas Fault is used as an example, but it alone didn't prove that plate tectonics is a valid theory.

33. C The author states in paragraph 3 that continental-drift theory described the continents as mobile chunks that moved through the ocean floor, while plate tectonics has the continents moving with the surrounding seabed, so (C) is correct. Choice (A) is too extreme, since the continents don't flow or stay immobile in either theory, nor do they move with or without purpose in either theory, as (C) states. Choice (D) sounds very similar to the metaphor given, but the actual distinction is the idea of plowing through versus moving in conjunction with. Thus, (D) is incorrect.

34. D The convection currents transfer or diffuse heat from the molten rock, and this leads to the plate movements. Thus, (D) is correct. Choices (A) and (B) are incorrect, since the word convection doesn't mean to liquefy or melt. Choice (C) is incorrect because, while the plates are moving, convection doesn't mean to move as in a military endeavor.

35. A The author introduces Yellowstone's hot springs as an example of how volcanoes can exist mid-plate when hot spots push lava up through the plate, so (A) is the correct answer. Choice (B) is incorrect because it is too extreme (one example doesn't prove anything). Choice (C) is incorrect because Yellowstone isn't used in this passage to support an opposing theory. Choice (D) is incorrect because it's referring to a mid-ocean ridge, which occurs at the borders of plates.

36. C The passage says that These plumes of molten rock, often called hot spots, rise and erupt through the crust of a moving plate, implying that the hot spots are punching up through a complete piece of the crust to create volcanoes, since there's no fracture for it to flow through. Thus, (C), As the crustal plate moves, the hot spot "punches" up a line of volcanic and hot-spring activity, is correct and you can eliminate (A), (B), and (D).

37. A The Hawaiian Islands are consistent or on a line with the movement of the Pacific plate, so (C) and (D) are wrong, since they state the opposite. The islands are created as the plate moves, but then the plate moves on and the islands don't change to suit it, so (B) is incorrect. Thus, (A) is the answer.

38. A Choice (A) is correct because it matches the passage, which states that Iceland was created by lava flow that bubbled up from between two tectonic plates at a mid-ocean ridge. Choice (B) contrasts an island and a continent, which the passage does not, while (C) says that the author mentions Iceland to prove that an island can be a volcano. The author never says that an island can't be a volcano, so (C) is incorrect. Choice (D) is true, but it doesn't answer the question. Iceland does straddle the mid-Atlantic ridge, but the reason that the author mentions Iceland is to give an example of an island that was created by lava flow at a hot spot.

39. D The passage says that the lava flows more abundantly in certain spots, producing volcanic islands (lines 70 - 72) and underlie the large, highly volcanic island of Iceland, which straddles the Mid-Atlantic Ridge (lines 75 - 76). Thus, (D) is correct. Choices (A), (B), and (C) do not coordinate with any answers in the previous questions and are, therefore, incorrect.

40. A The author uses the phrase Some geologists propose to show that plate tectonics are a theory, and there are still things about it that scientists don't know and want to learn. Thus, (A) is correct. The passage never mentions a lack of data, so (B) can be eliminated, while (C) implies that the phrase is introducing an opposing viewpoint, which it does not. Choice (D) refers to the continental-drift theory, which is not part of the logic of this paragraph, so it is incorrect.

41. B The passage states that plumes of molten rock, often called hot spots, rise and erupt through the crust of a moving plate. The diagram depicts this process with a line traveling up through the lithosphere to the surface. Therefore, (B) is correct. While the diagram does depict a continental rift zone by the ocean, there is no evidence in the graph or the passage that this is always the case. Therefore, (A) is incorrect. The passage states that mid-ocean ridges mark boundaries where plates are forced apart as new ocean floor is being created between them. So, (C) can be eliminated. There is no mention in either the passage or the diagram of the relative rigidity of oceanic and continental crust, so (D) can be eliminated as well.

42. B The author's main point in the first paragraph is that the construction of the Glen Canyon

Dam did affect downstream resources, including the loss of large beaches used for camping and the addition of several animals to the endangered species list. Choice (B) matches the context of this passage. Eliminate (A), as no mention is made of maintaining water resources. According to the passage, the fish were adapted to the pre-dam era, so (C) doesn't work because decimated is too extreme. Choice (D) is the opposite of what the first paragraph suggests, so eliminate it.

43. A The correct answer to the previous question was that the dam was built with a lack of foresight. This is shown best with (A), since it's mentioned that little consideration was given to how dam operations might affect downstream resources. Choices (B) and (D) both show consequences but don't necessarily match the phrase little consideration, so eliminate them. Choice (C) isn't negative at all, so get rid of it.

44. A The passage states that the scientists and recreationists observed the physical transformation of the river in Grand Canyon, so the correct answer should match this information. Choice (A) is a good fit, so keep it. Eliminate (B), as no mention is made of casual observation, as well as (C) because the passage never hints at collaboration between scientists and the public. Choice (D) is too extreme since the passage never proves anything. Choice (A) is the best answer.

45. C The first paragraph of Passage 1 discusses the humpback chub and mentions that it has been listed as endangered and that the dam and its operation jeopardized the continued existence of humpback chub in Grand Canyon. Choice (A) is incorrect because it's too extreme. The chub is endangered, not extinct. Choice (B) is referring to the fish later in the passage instead of the chub, so eliminate it. Choice (D) is never mentioned, so eliminate this choice as well. This leaves (C), since it can be inferred the chub can survive a variety of environments since it's still alive.

46. C Go to the first sentence of paragraph 2 in Passage 1 and cross out the word regime. Substitute this with your own word using the context of the paragraph. A good replacement would be "process," so find a word that would match this. Choice (C) would fit, so keep it for now. Choice (A) is a dictionary definition of regime, so eliminate it. Choices (B) and (D) are not related to "process" in any way, so get rid of them as well. Choice (C) is the best answer.

47. B Go to the second sentence of the paragraph 2 in Passage 2 and cross out the word suspended. Substitute this with your own word using the context of the paragraph. The paragraph mentions that sand is included at high concentration in the flow, so a good replacement would be "combined." Choice (B) is the best match.

48. C Use POE to find an answer consistent with the passage. Controlled floods are discussed in the final two paragraphs, so this should be the reference window. Choices (A) and (D) are incorrect because snowmelt is mentioned only in the first passage. While controlled floods sometimes lead to the higher concentrations of suspended sand, this is not always the case. Therefore, (B) can be eliminated. Choice (C) works since the first sentence of the final paragraph states that the floods may erode sandbars if the concentration of suspended sand during a controlled flood is too low. Therefore, (C) is the best answer.

49. D The correct answer to the previous question deals with the negative effects of controlled flooding on the health of the river, so the answer to this question should reflect that theme. The lines referenced in (D) describe sandbar erosion, which would certainly qualify as something "detrimental," and thus (D) is the correct answer. The lines from the passage referenced by the other answer choices do not illustrate any negative effects on the river.

50. A The High Flow Experiments mentioned in Passage 2 refer to controlled floods used to increase sandbars. Therefore, the author of Passage 1 would have a positive attitude towards these floods because Sandbars, riverbanks, and their accompanying aquatic habitats were reshaped, which is ultimately beneficial to the ecosystem. Choice (A) is a good match for this information. Eliminate (B), (C), and (D) because each of these is too negative.

51. B Passage 1 is mostly interested in the geologic history of the Glen Canyon Dam, whereas Passage 2 primarily discusses the use of controlled floods. Use POE to find the best answer. Eliminate (A), because even though a problem is presented in Passage 1, Passage 2 doesn't address the same problem or solution. Choice (B) is a good fit, so keep it for now. Choice (C) is pretty vague, and it's not clear whether the changes in Passage 2 are recent, so eliminate it. No experiment is discussed in Passage 1 with any specifics, so eliminate (D). Choice (B) is the best answer.

52. D Use POE to find an answer that is applicable to both passages. Eliminate (A) and (B) because neither passage discusses a scientific experiment or topographic changes. Choice (C) is true of both passages, so eliminate it as well. This leaves (D), which is correct, since Passage 2 never discusses any specific species, whereas Passage 1 mentions the humpback chub and Colorado pikeminnow.

## Section 2: Writing and Language

### And Justice for All

1. A If you can't cite a reason to use a comma, don't use one. In this case, no commas are necessary because the fact that she works at the mall is important as a contrast to more serious. Therefore, the best answer is (A).
2. C The idea before the punctuation (She would start applying to law schools soon) is complete. The idea after the comma and conjunction (she wanted to know what the law looked like in action.) is also complete. Remember the STOP punctuation rules. Choices (A) and (D) can be eliminated because two complete ideas cannot be joined with just a conjunction or just a comma; both are needed. The comma in (B) is in the wrong place, so the answer is (C).
3. B Notice the question! It asks which statement is most in keeping with the main idea. The passage is centered around the Department of Corrections, and the only choice that introduces this information is (B). The next sentence doesn't even make sense without the specific information in (B).
4. A Notice the question! It asks for a statement that reinforces ideas in this sentence and the preceding one. The ideas in these sentences are centered on no one paying the Department of Corrections much mind. Choice (B) contradicts this idea. Choices (C) and (D) are the wrong focus. Therefore, (A) is the answer.
5. D The subject of this sentence is meaning, which is singular. Eliminate the choices with plural verbs—(A), (B), and (C)—because they are inconsistent. The correct choice is (D).
6. D The underlined pronoun refers to Everyone, which is singular. Choice (D) is the only possible answer because it is consistent in number.
7. D The sentence should come after another question about the treatment of inmates in order to make sense of the phrase by the same token. This question appears in sentence 6, so this sentence needs to go after sentence 6, as (D) suggests.
8. D Choices (A), (B), (C), and (D) all say essentially the same thing, but (D) does so in the most concise way possible. The best answer is therefore (D).
9. B The subject of this verb is politics and the law, which is plural, thus eliminating (A) and (C) due to inconsistency. Choice (B) is the best answer because it is more concise than (D).
10. A The idea before the conjunction (We may believe that we never come into contact with the law) is complete, and the idea after the conjunction (it is written into everything...ourselves) is also complete. When a conjunctive adverb connects two complete ideas in one sentence, it is preceded by a semicolon and followed by a comma. Therefore, (A) is correct.
11. C This essay focused on Amanda's personal discoveries about the law; therefore, it would not have met the goal of criticizing the justice system. Eliminate (A) and (B). Choice (D) is incorrect because the passage doesn't speak to her entire career, just the summer before she applied to law schools. Choice (C) is correct.

### Alexander's Empire of Culture

12. B The correct idiom is disappear from. As it is currently written, the sentence implies two things have disappeared when it should be just the study of the classics. Eliminate (A). Choices (C) and (D) are not the correct form of the idiom. Choice (B) is the correct answer.
13. A This sentence is correct as written. Although the words for all that might sound foreign, they are being used correctly here. Choice (B) does not make sense. Choices (C) and (D) are basically the same as (A), and if there is no grammatical reason to change the original, don't. Therefore, (A) is the best answer.
14. B The correct idiom uses the words in and right, so (A), (C), and (D) can be eliminated.
15. B The correct choice will feature words or phrases that are as precise as possible. As it is written, it is unclear to whom the pronoun is referring: Alexander or Aristotle. Choice (B) clears up this pronoun ambiguity. Choice (C) can be eliminated because Alexander was born in Pella, and his arrival as a newborn would not have announced an enlightened era, nor did they likely arrive together.
16. D Notice the question! It asks for a concluding statement that emphasizes the change that Alexander's rule brought. Choices (A), (B), and (C) do not address the change from militaristic Philip to enlightened Alexander. Only (D) has the correct emphasis.
17. C Notice the question! It asks for an introductory phrase that emphasizes continuity from the

previous rule. The only choice that refers to the previous rule and explains how the second sentence connects to the first in the paragraph is (C).

18. A Check the answer choices against the map. Make sure that the information is consistent with the figure. Choices (B) and (D) contain information that cannot be gleaned from the map. Choice (C) is information that contradicts the map. Choice (A) is consistent with the map, so this choice is the correct answer.

19. B The first part of the sentence as written creates a comma splice, wherein a comma separates two complete ideas. Choice (A) can be eliminated. Then, of the remaining answers, (B) is better because it is the most concise. A conjunction such as although or moreover is not needed due to the however in the preceding sentence. This sentence's purpose is to explain the preceding sentence.

20. C Unprecedented means never done or known before. Choices (A), (B), and (D) also have the same definition so they can be eliminated as the question asks for what would NOT be acceptable. Choice (C) means lacking historical context and would not be an acceptable alternative.

21. D The idea before the period (Alexandria, Egypt, perhaps the most...continues to thrive) is a complete idea. The idea after the period (It is the second...of Egypt) is also a complete idea. Therefore, the two cannot be joined together with only a comma due to STOP punctuation rules. Eliminate (B). Then, of the remaining choices, the question asks for the most effective way to combine. Choice (D) is the most effective because it eliminates the need to repeat the subject, which makes the sentence flow better.

22. A The sentence as written is consistent in structure with between man and god and the individual and the world, both of which use the conjunction and. As the last item in this list, and should be used between the natural and the unnatural. All other choices are not consistent and change the meaning.

## Brother, Can You Spare a Dime?

23. C The correct choice will feature phrases that are as precise as possible. It is the dime novel that was printed cheaply and for quick consumption, so the words dime novel need to be placed immediately next to that modifier phrase. Choices (A), (B), and (D) all include this misplaced modifier. Only (C) makes the sentence precise.

24. D Notice the question! It asks for the phrase that gives the most specific information. Choice (D) provides specific names of authors who wrote by way of literary periodicals. Choices (A), (B), and (C) refer to the authors only in vague terms.

25. D The title of Stowe's book is necessary information, which means we do not want to surround it in commas, so eliminate (B). Choices (A) and (C) have other unnecessary commas. The best choice is no commas at all, as in (D).

26. A The correct choice will support the passage while being as precise as possible. The next sentence begins with the subject That book, and without the phrase the publishers were clamoring for an actual book, the reader wouldn't know what that book is. This reasoning is summed up in (A). Choice (B) is incorrect because we have no support for publishers being greedy. Choice (C) is incorrect because the passage says Stowe was already popular as a periodical series.

27. C The average annual income of a man of this period is not in line with the main idea of the paragraph, which is discussing the shift from periodicals to novels. To add this statement would be inconsistent with the focus. Choice (C) reflects this.

28. A Choices (B) and (D) use the wrong verb tense. Choice (C) is not in keeping with the focus of the paragraph. We also do not know if the series is still known this way, so (A) is the best answer.

29. B Effect is generally a noun, while affect is a verb except in certain unusual circumstances. The underlined portion needs to be a noun, so affects is incorrect. Eliminate (A) and (D). The sentence is discussing multiple effects, not something belonging to the effects, so we need the plural form, not the possessive. Eliminate (C). This leaves (B) as the correct answer.

30. B The correct choice will feature words or phrases that make the passage as precise as possible. Without the actual names, the phrase William Bonney and James Butler Hickcock became the folk heroes doesn't make any sense. We need the names of transformed folk heroes in order to make sense of it. Eliminate (C) and (D). Choice (A) is incorrect because the rest of sentence does not speak in generalities; it provides two names already.

31. C The correct idiom is learned from, not taught from, so we can eliminate (A). The new media has not brought anything from the dime novel's popularity because it is something entirely new, so we can eliminate (D). Learned is more precise than got, so the best choice is (C).

32. C As the sentence is written, it is unclear for whom or what the foundation is being laid, so

eliminate (A). The underlined portion needs to follow the word foundation in order to clarify this. The correct choice will allow the passage to be as precise as possible. This is (C).

33. B A frame of reference is a set of criteria or stated values in relation to which measurements or judgments can be made. Integration, (B), is the intermixing of people or groups previously segregated. As this would not serve as an acceptable alternative to frame of reference, it is the correct answer.

## The Tiger Moth's Phantom Target

34. C Make sure to compare similar things to maintain consistency and precision. In the sentence as it is written, methods are being compared to humans. Compare methods to methods, or change the construction of the sentence. Eliminate (A) and (D) because both make the same mistake. Choice (B) uses the singular pronoun that to refer to the plural methods, so eliminate it. Choice (C) uses the correct comparison and the plural pronoun, so it is correct.

35. A All four choices use similar words. Choose the one that expresses the idea most clearly. In this case, the clearest choice is (A). Choice (B) contains unnecessary commas and is passive. Choice (C) contains the awkward phrase main among which is its. Choice (D) uses curious as an adjective instead of a noun, implying that the weaponry is curious about something instead of being a curiosity itself.

36. D This sentence is not referring to the bats (bats cannot shout). Eliminate (A) and (B). The sentence uses the word you later, so this underlined portion should be consistent with the rest of the sentence. Eliminate (C). Choice (D) correctly replaces they with you.

37. D All four choices use similar words. Choose the one that expresses the idea most clearly and concisely. In this case, the best choice is (D). Instincts do not need to be repeated since the word innate was already used.

38. B Notice the question! The question asks for a phrase that emphasizes a common misunderstanding about bats' vision. Choice (A) compares bats' vision to shrimp, which is not a common misunderstanding. Choices (C) and (D) describe aspects about bats' hunting but do not emphasize a common misunderstanding. Only (B) discusses the common thought (or cliché) about bats being blind.

39. C The pronoun its is ambiguous, as it is unclear whether it refers to the tiger moth or the bat. The correct choice features words that are as precise as possible, so eliminate (A). The rest of the choices clear up the ambiguity, but only (C) has the correct possessive, singular pronoun needed. Choice (B) uses a plural pronoun, but since only a single system of echolocation is referred to, the singular "bat's" is appropriate.

40. B The words inedible and toxic specifically explain WHY the warning would result in the bats not going after the moths. This is best summarized in (B). Choice (A) is incorrect because we do not know about ANY predators, just bats. Choice (C) is incorrect because inedible and toxic do not give any information about the mechanism of the clicks. Choice (D) is incorrect because the information is not stated elsewhere.

41. C The pronoun refers to the tiger moth which is the name of a species and therefore a collective noun. Collective nouns are singular, so eliminate (A) because it is inconsistent. When you are dealing with pronouns, possessives use NO apostrophes, and contractions use apostrophes. Choice (B) contains a contraction. It would not make sense to say the tiger moth and it is sonar jamming, so eliminate (B). There is no such word as its', so eliminate (D). The sonar jamming belongs to the tiger moth, so a possessive pronoun is needed, as in (C).

42. A All of the commas are correct as written. There should be a comma after each item in a list. A comma is needed after counterattack, but one is not needed after and or adapt. Choices (B), (C), and (D) contain unnecessary commas.

43. A Check the answer choices against the figures. Only (A) can be supported by the diagram. There is no indication of other animals, as in (B), or what sounds are or are not heard, as in (D), or bats running into each other, as in (C).

44. D Paragraph 5 does not fit as a conclusion, so eliminate (A). This paragraph should come after the discussion of the tiger moth and its tactics and before the conclusion of the essay. This indicates the best placement is after paragraph 3, as in (D).

## Section 3: Math (No Calculator)

1. A The vertex form of a parabola is  $y = a(x - h)^2 + k$ , where  $(h, k)$  denotes the vertex. Plug in the point  $(3, -3)$  into the vertex form to get  $y = a(x - 3)^2 - 3$ . The correct answer is (A).

2. C You can plug in to make sense of this equation. Say that  $x = \$100$ . The amount of the keg would then be  $\$107 + \$17$ . The  $\$17$  must be the untaxed deposit since it is a flat fee rather than percentage based. Therefore, the tax is  $\$7$ , which is 7% of the original  $\$100$  base price. The answer is (C).

3. D Whenever there are variables in the question, plug in. Be sure to plug in a number that

$$\frac{1}{3}$$

is divisible by 3. Let  $d = 300$ .  $\frac{1}{3}$  of the original amount of \$300 is \$100, and that is deducted by the company, leaving Syed with \$200. Now, subtract the wire transfer fee to get  $\$200 - \$30 = \$170$ , which is the target number. Plug in 300 for  $d$  in the answers to see which answer is equal

$$\frac{1}{3}$$

to the target number of 170. In (A),  $\frac{1}{3}(300) - 30 = 70$ . This is not the target number, so

$$\frac{1}{3}$$

$$\frac{2}{3}$$

eliminate (A). Likewise in (B),  $\frac{1}{3}(300 - 30) = 90$ , and in (C),  $\frac{1}{3}(300 - 30) = 180$ . Neither

$$\frac{2}{3}$$

of these is the target number, so eliminate (B) and (C). In (D),  $\frac{1}{3}(300) - 30 = 170$ , which is the target number. The correct answer is (D).

4. C All of the answers are written in the slope-intercept form  $y = mx + b$ , where  $b$  is the  $y$ -intercept and  $x$  and  $y$  are points on the line. Eliminate (D) because the  $y$ -intercept in that equation is 2. For the remaining answer choices, plug in the  $x$ - and  $y$ -values to determine which

$$\frac{1}{2}$$

equation works. If  $x = 1$  and  $y = 6$ , (A) becomes  $6 = \frac{1}{2}(1) + 4$ . Solve both sides of the equation

$$\frac{1}{2}$$

to get  $6 = 4\frac{1}{2}$ . Eliminate (A). Choice (B) becomes  $6 = 1 + 4$ , so eliminate (B). Choice (C) becomes  $6 = 2(1) + 4$ , or  $6 = 6$ . Therefore, the correct answer is (C).

5. C Whenever there are variables in the question and the answer choices, think Plugging In. If 2 purchases were made, then  $p = 2$ , and the number of bonus points can be calculated as  $4(2) + 7 = 8 + 7 = 15$ . If the number of purchases were then increased by 3, the new  $p$  equals 5 and the number of bonus points can be calculated as  $4(5) + 7 = 27$ . The bonus points increased by  $27 - 15 = 12$ . Therefore, the correct answer is (C).

6. B This is a good Plug In the Answers problem. Start with (B) and plug in 2 for  $x$  and 3 for

$$\left(\frac{4}{3}\pi r^3\right)$$

$r$  in the equation to get  $V = 24\pi + 2\left(\frac{4}{3}\pi r^3\right)$ , which is equal to the target amount of  $96\pi$ , so (B) is correct.

7. C Whenever there are variables in the question and in the answers, think Plugging In. Let  $c$

$$\frac{1}{3}$$

$= 30$ . Therefore,  $b = 2 + \frac{1}{3}(30) = 2 + 10 = 12$ . Plug 12 in for  $b$  in the answers to see which

$$\frac{12 - 2}{3} = \frac{10}{3}$$

$$= \frac{3}{12 + 2} = \frac{3}{14}$$

answer equals the target number of 30. Choice (A) becomes

$$= \frac{3}{12 + 2} = \frac{3}{14}$$

(A), since it does not equal the target number. Choice (B) becomes  $\frac{3}{12 + 2} = \frac{3}{14}$ . Eliminate (B). Choice (C) becomes  $3(12 - 2) = 3(10) = 30$ . Keep (C), but check (D) just in case it also works. Choice (D) becomes  $3(12 - 6) = 3(6) = 18$ . Eliminate (D). The correct answer is (C).

8. D Treat this question as a translation problem. According to the question,  $R(h) =$  four rotations per second less than three times the square of the height of the liquid. The height of the liquid is represented by  $h$ . Therefore, three times the square of the height of the liquid  $= 3h^2$ . Four less than this amount is  $3h^2 - 4$ . Since the original speed was 1,000, subtract this value from 1,000 to get the current rate of rotation. The correct answer is (D).

9. B Start with the easier equation and use Process of Elimination. The easier equation is related to the total number of ounces,  $c + b$ , in the tube. According to the question, the tube

has 24 ounces, so  $c + b = 24$ . Eliminate (A), since it does not include this equation. The other equation in the set is related to the amount of active ingredients. According to the question,  $c$  includes 0.25% of sodium fluoride and  $b$  contains 0.30% triclosan.  $0.25\% = 0.0025$  and  $0.30\% = 0.003$ . Therefore, in the correct equation,  $c$  should be associated with 0.0025 and  $b$  should be associated with 0.003. Eliminate (C) and (D) because both of these equations get the percentages wrong. The correct answer is (B).

10.

C Whenever the question includes variables and the answer choices are numbers, think Plugging In the Answers. In (A),  $d = -4$ , and the equation becomes

$$\frac{2(-4)^2 - (-4) - 10}{(-4)^2 + 7(-4) + 10} = \frac{(-4)^2 - 4(-4) + 3}{(-4)^2 + 2(-4) - 15}$$

$$\frac{2(16) + 4 - 10}{16 - 28 + 10} = \frac{16 + 16 + 3}{16 - 8 - 15}$$

Solve both sides of the equation to get  $\frac{26}{-2} = \frac{35}{-7}$ .

Reduce both fractions to get  $-13 = -5$ . This is not true, so eliminate (A). In (B),  $d = 2$ , and the equation becomes

$$\frac{2(2)^2 - 2 - 10}{2^2 + 7(2) + 10} = \frac{2^2 - 4(2) + 3}{2^2 + 2(2) - 15}$$

$$\frac{2(4) - 2 - 10}{4 + 14 + 10} = \frac{4 - 8 + 3}{4 + 4 - 15}$$

$$\frac{-1}{\frac{7}{1}} = \frac{\frac{7}{7}}{\frac{1}{1}}$$

Eliminate (B). In (C),  $d = 4$  and the equation becomes

$$\frac{2(4)^2 - 4 - 10}{4^2 + 7(4) + 10} = \frac{4^2 - 4(4) + 3}{4^2 + 2(4) - 15}$$

$$\frac{2(16) - 4 - 10}{16 + 28 + 10} = \frac{16 - 16 + 3}{16 + 8 - 15}$$

$$\frac{1}{\frac{16 + 28 + 10}{1}} = \frac{\frac{18}{54}}{\frac{3}{9}}$$

Reduce both fractions to get  $\frac{1}{3} = \frac{1}{3}$ .

3. The correct answer is (C).

11.

D All the answer choices are equal to 4 (which is  $r^2$ , making  $r = 2$ ), so you need to focus on where the center of the circle lies. If the circle is tangent to both the  $x$  axis (which is equivalent to the line  $y = 0$ ) and the line  $x = 4$ , then the center must be 2 units from  $y = 0$  and 2 units from  $x = 4$ . Choices (A) and (B) both have centers with an  $x$  value of  $-2$  (remember the standard form of the circle equation is  $(x - h)^2 + (y - k)^2 = r^2$ , where  $(h, k)$  is the center and  $r$  is the radius), which is 6 units from  $x = 4$ . Eliminate (A) and (B). Choice (C) has a center at  $(2, -4)$ . The  $x$  value is 2 units from  $x = 4$ ; however, the  $y$  value is 4 units from  $y = 0$ . Eliminate (C) and choose (D).

12.

B According to the question, Reactant A does not react unless B gets to a certain concentration. Therefore, the correct answer will have an initial flat line for A while the line for B is rising. Only graph (B) shows this initial relationship. Therefore, the correct answer is (B).

13.

A All of the answers have the same lines graphed, so this question is really about the shading. Plugging In is probably the easiest way to approach this problem. Start with  $(0, 0)$  because this is an easy value to check. This works in all three equations since  $0 \leq 8$ ,  $-3 \leq 0$ , and  $1 \geq 0$ . Therefore, this value needs to be shaded as a possible answer. Eliminate (B), (C), and (D) because they do not include this point. The correct answer is (A).

14.

C First draw lines AC and BD. Now, since tangent is opposite over adjacent,  $\frac{BA}{BC} = \frac{4}{9}$ . Also,  $BA \times BC = 324$ . Using these two equations as a system of equations can now help get what is

needed. Rearrange the first equation by multiplying both sides by BC to get  $BA = \frac{4}{9} BC$ . Now

$$\frac{BA}{BC} = \frac{4}{9}$$

4

4

4

substitute  $\frac{4}{9}$  BC into the first equation to get  $\frac{4}{9}$  BC (BC) = 324; this simplifies to  $\frac{4}{9}$  BC<sup>2</sup> =

9

324. Multiply both sides by  $(\frac{4}{9})$  to get BC<sup>2</sup> = 729, and then take the square root to get BC = 27. Since the diagonal has to be larger than any of the sides, (A) and (B) are out. Choice (D) can also be eliminated because our previous calculations can get the length of DC, which is used in the Pythagorean theorem to get BD. Therefore, the correct answer is (C).

15.

D Whenever there are variables in the question and answers, think Plugging In. If  $m = 2$ , the expression becomes

$$\frac{2(2) + 6}{4} \times \frac{6(2) - 36}{3(2) + 9} = \frac{4 + 6}{4} \times \frac{12 - 36}{6 + 9} = \frac{-24}{15} = \frac{10}{4} \times \frac{-240}{60}$$

= -4. Plug 2 in for m in the answers to see which answer equals the target number of -4. Choice (A) becomes

$$\frac{12(2)^2 - 216}{12(2) + 36} = \frac{12(4) - 216}{24 + 36} = \frac{48 - 216}{60} = \frac{-168}{60} = -2.8. \text{ This}$$

does not match the target number, so eliminate (A). Choice (B) becomes

$$\frac{8(2) - 30}{3(2) + 13} = \frac{16 - 30}{6 + 13} = \frac{-14}{19}. \text{ Eliminate (B). Choice (C) becomes}$$

$$\frac{-4}{4} = -1. \text{ Eliminate (C). Choice (D) becomes } m - 6 = 2 - 6 = -4. \text{ The correct answer is (D).}$$

3

16.

1.5 or 2

Plug the given values into the equation:  $18 = (3)(4)(x)$ . Multiply the right side of the equation and

18

you find that  $18 = 12x$ . Divide both sides by 12 and you find that  $x = \frac{3}{2}$ . Both 18 and 12 are

3

divisible by 6, so this fraction reduces to 2.

17.

53 Jean charges  $5.50 \times 2 = \$11$  per hour for babysitting. Therefore, her entire earnings for three hours can be calculated as  $(3 \times 11) + 20 = 53$ . The correct answer is 53.

18.

10 To solve the problem without a graphing calculator, set the two equations equal to each other:  $-x^2 + 5x + 6 = x + 12$ . Multiply the entire equation by 2 to get  $-2x^2 + 10x + 12 = -x + 24$ . Rewrite the equation so that it equals 0, so it becomes  $-2x^2 + 11x - 12 = 0$ . Multiply the entire equation by -1 to get  $2x^2 - 11x + 12 = 0$ . Factor the quadratic to get  $(2x - 3)(x - 4) =$

3

0. Solve for the two possible values of x: If  $2x - 3 = 0$ , then  $x = \frac{3}{2}$ , and if  $x - 4 = 0$ , then  $x = 4$ . Because the slope of the line is negative, the x-value of the point that is farthest to the right along the x-axis must also be closer to the x-axis. Plug 4 in for x in the second

1

equation to get  $y = -\frac{1}{2}(4) + 12 = -2 + 12 = 10$ . The correct answer is 10.

11

19.

3 or 3.66 or 3.67

Whenever there are two equations with the same two variables, they can be solved simultaneously by adding or subtracting them. Take the second equation and rewrite it so that the variables are on the left side of the equation:  $17r + 22v = 63$ . Stack the equations and add them together.

$$\begin{aligned}13r + 8v &= 47 \\17r + 22v &= 63 \\30r + 30v &= 110\end{aligned}$$

$$\begin{array}{r} 110 \\ \hline 30 \end{array}$$

Divide the entire equation by 30 to get  $r + v = \frac{11}{3}$ . This is too big to grid in, so reduce it to  $\frac{11}{3}$ .

20. 2 The area of the current plot is  $4 \times 6 = 24$  square feet, so the new plot will be  $24 \times 2 = 48$  square feet. According to the question,  $x$  feet will be added to each side to obtain the new area of 48 feet. Since the length is only 2 feet more than the width, you need two factors of 48 that differ by 2. You may recognize these factors are 6 and 8. So the increase was 2 feet in each direction. Alternatively, you could write a quadratic:  $(4 + x)(6 + x) = 48$ . Expand the right side of the equation to get  $x^2 + 10x + 24 = 48$ . Set the equation to 0 by subtracting 48 from both sides to get  $x^2 + 10x - 24 = 0$ . Factor the equation to get  $(x + 12)(x - 2) = 0$ . Therefore,  $x = -12$  or  $x = 2$ . Since lengths can never be negative the only possible value is  $x = 2$ . The correct answer is 2.

## Section 4: Math (Calculator)

1. C Use Process of Elimination to answer this question. According to the question,  $P$  represents the population, so the outcome of the entire equation has something to do with the population. Therefore, eliminate both (A) and (B) because 1.0635 can't represent the population if  $P$  does. In the equation given, the only operations are multiplication and addition, which means that over time the population would increase. Therefore, eliminate (D). The correct answer is (C).

2. B To solve the quadratic equation, first set the equation equal to 0. The equation becomes  $x^2 + 12x - 64 = 0$ . Next, factor the equation to get  $(x + 16)(x - 4) = 0$ . Therefore, the two possible solutions for the quadratic equation are  $x + 16 = 0$  and  $x - 4 = 0$ , so  $x = -16$  or 4. Since the question states that  $x > 0$ ,  $x = 4$  is the only possible solution. Another way to approach this question is to plug in the answers. Start with (B),  $x = 4$ . Plug 4 into the equation to get  $4^2 + 12(4) = 64$ . Solve the left side of the equation to get  $16 + 48 = 64$ , or 64 = 64. Since this is a true statement, the correct answer is (B).

3. A To figure out the total number of shelving units Sai could use, find the total available wall space and divide by the length of the units. The total amount of wall space can be calculated as  $119 - 21$ . Because the length of each unit is 7 feet, the maximum number of units

$$\begin{array}{r} 119 - 21 \\ \hline 7 \end{array}$$

Sai could put up can be calculated as 7. Because this is the maximum number of units Sai could put up,  $r$  has to be less than or equal to this number. Therefore, the correct answer is (A).

4. C Weight is shown on the vertical axis of the graph, given in ounces. Make your own mark indicating 5.75 on this axis; then draw a horizontal line from that mark to the line of best fit. Once you hit it, draw a vertical line straight down to the horizontal axis. It should hit between 75 and 80 days, slightly closer to the mark for 75. This makes (C) the credited response. Draw your lines carefully, using your answer sheet as a straightedge if necessary.

5. C Whenever the question includes variables, plug in. If  $s = 2$ , the shirts cost  $2(\$24.50) = \$49$ . The tax on the shirts is  $0.07(\$49) = \$3.43$ . So, the shirts with tax and the \$6 shipping fee cost  $\$49 + \$3.43 + \$6 = \$58.43$ . Plug in 2 for  $s$  in the answers to see which answer equals the target number of \$58.43. In (A),  $0.07[24.50(2) + 6] = 3.85$ . This is not the target number, so eliminate (A). In (B),  $1.07(24.50 + 6)(2) = 65.25$ . Again, this is not the target number, so eliminate (B). In (C),  $1.07[24.50(2)] + 6 = 58.43$ . This is the target number, so keep it, but be sure to check the remaining answer choice. In (D),  $1.07(24.50 + 2) + 6 = 34.355$ , which is not the target number. Therefore, the correct answer is (C).

6. B The question states that after 6 weeks the plant is 54 centimeters tall. Therefore, when  $w = 6$ ,  $h(w) = 54$ . Plug in 6 for  $w$  in the answers to see in which answer  $h(w)$  equals the target number of 54. In (A)  $h(w) = 6(6) = 36$ . Eliminate (A). In (B),  $h(w) = 9(6) = 54$ . The correct answer is (B).

7. D Because the operation between the parentheses is addition, the parentheses can be

removed, and the resulting expression becomes  $12x^2 + 4x + 5y + 3x^2 - 2x + 3y$ . Reorder the terms so that like terms are next to each other:  $12x^2 + 3x^2 + 4x - 2x + 5y + 3y$ . Combine like terms to get  $15x^2 + 2x + 8y$ . The correct answer is (D).

8. D You do not know how the survey is conducted, nor do you know how many veterinarians were surveyed (it may be the case that only 8 were surveyed). Therefore, you cannot infer that the survey accurately measures all veterinarians' beliefs about Royal Rat Rations. Choice (A) is not supported. First, you do not know what veterinarians believe in general, and second veterinarians may be recommending Royal Rat Rations for a reason other than its nutrition. Choice (B) is similarly not supported. Besides not knowing veterinarians' beliefs, this choice assumes that no other rat food is acceptable. Choice (C) is not supported because you do not know the sample size of the survey, nor is there any indication that there is only one veterinarian who does not recommend Royal Rat Rations. Choice (D) is the credited response. You know the opinions only of the veterinarians surveyed by Royal Rat Rations.

$$\frac{1}{2} \quad \frac{3}{4}$$

9. D Use a calculator to translate the fractions into decimals.  $\frac{1}{2}t + 4 = \frac{3}{4}t - 5$  becomes  $0.5t + 4 = 0.75t - 5$ . Subtract  $0.5t$  from both sides to get  $4 = 0.25t - 5$ , and then add 5 to both sides. This results in  $9 = 0.25t$ . Use a calculator to divide!  $t = 36$ ; therefore, the correct answer is (D).

10. C Taking the two dogs together, Everett has  $35 + 55 = 90$  pounds of dog. Set up the following proportion to determine the lowest amount of water the dogs need per day:

$$\frac{8.5 \text{ ounces}}{10 \text{ lbs}} = \frac{x}{90 \text{ lbs}}$$

Cross-multiply to get  $10x = 765$ , so  $x = 76.5$ . Multiply by 7 days to get the weekly amount of water the dogs need:  $76.5 \times 7 = 535.5$  ounces, or approximately 536 ounces. Only (C) includes 536 as the low-end amount. Therefore, the correct answer is (C).

11. A In order to answer this question, you need to deal with the ratio as well as the unit conversion. For the large batch of dry rub, Priya's friend is planning to use 91 ounces of chili powder. Since the paprika and the chili powder must be used in a ratio of 4 to 7, you can

$$\frac{4}{7} = \frac{x}{91}$$

set up a proportion to determine how much paprika is needed:  $\frac{4}{7} = \frac{x}{91}$ . Cross-multiply and solve for  $x$  to determine that  $x$  (i.e., paprika) = 52 ounces. So you have 52 ounces of paprika and 91 ounces of chili powder for a total of 143 ounces. Multiply that by your conversion number, 28.3, to determine that this is equivalent to 4,046.9 grams, which is closest to (A).

12. D Whenever there are variables in the problem and in the answer choices, plug in. If  $w = 20$ , then Luciano's cup has  $20 - 2 = 18$  ounces at the end of day 1. At the end of 7 days, Luciano's cup would have  $18 - 8 = 10$  ounces. After 11 days, Luciano's cup would hold  $10 - 5 = 5$  ounces. Plug in 20 for  $w$  in the answer choices to see which answer is equal to the target

$$\frac{20 - 2}{8} = \frac{18}{8}$$

number of 5. Choice (A) becomes  $\frac{20 - 2}{8} = \frac{18}{8} = 2.25$ . This does not match the target number

$$\frac{20 - 2}{8} = \frac{18}{8}$$

of 5, so eliminate (A). Choice (B) becomes  $\frac{20 - 2}{2} = \frac{18}{2} = 9$ . This matches the target number; therefore, the correct answer is (B).

$$\left(\frac{1}{2}\right)$$

Eliminate (B). Choice (C) becomes  $\frac{20 - 2}{(20) - 10} = \frac{18}{10} = 1.8$ . Eliminate (C). Choice (D)

$$\frac{20 - 10}{2} = \frac{10}{2}$$

becomes  $\frac{20 - 10}{2} = \frac{10}{2} = 5$ . This matches the target number; therefore, the correct answer is (D).

13. B According to the line of best fit, in 1995 there were 20 coyotes in the park. In 2000, there were 140 coyotes in the park. This is an increase of 120 coyotes over a period of 5 years, so

$$\frac{120}{5}$$

= an average increase of 24 coyotes per year, which is (B).

14. D The median number of coyotes in the park in 1995 was 20, and the median number of coyotes in the park in 1996 was 60. (Be careful to RTFQ: the question wants median, NOT line of best fit!) In order to calculate the percent increase, it is necessary to use the percent change formula:

*difference*

*original*

$\times 100$ . The calculation here will be  $\frac{60 - 20}{20} \times 100 = \frac{40}{20} \times 100 = 2 \times 100 = 200\%$ , which is (D).

15.

A Start with the easier equation and use Process of Elimination. The easier equation is related to the total number of shirts and pants,  $s + p$ , sold on a regular day. The question

$$\frac{2}{3}$$

states that on a regular day Bailey's sells  $\frac{2}{3}$  the number of pants and shirts sold during a

sale.  $\frac{2}{3}(60) = 40$ . Therefore, one of the equations in the correct answer should be  $s + p = 40$ . Eliminate (C) and (D) since neither of these answers include this equation. The other equation is related to the money Bailey's earns on a regular day. According to the question, Bailey's earns a total of \$1,875 on a regular day, so the equation must equal \$1,875. Eliminate (B) because the total in the money equation is incorrect. The correct answer is (A).

16.

C There are a few different ways to approach this question. In any approach, the best first step is to figure out how much income Bryan earned during the two-week period without the commission. Since he worked an average of 35 hours per week for two weeks, he worked a total of 70 hours. At a rate of \$10.00 per hour base pay, this would add up to \$700.00 ( $70 \times 10 = 700$ ). Since Bryan's earnings were actually \$850.00, that means he must have earned \$150.00 of commission ( $850 - 700 = 150$ ). At this point, you can calculate the percent commission algebraically or simply work backwards from the answers. Algebraically, you know that \$150.00 is equal to a certain percent of \$5,000.00 in sales, which can be represented as follows:  $150 = \frac{x}{100}$

$100(150) = 5,000x$ . Solve for  $x$ , and you get 3, which is (C). If instead you wish to work backwards from the answers, you can take the answers and calculate what 1%, 2%, etc. of \$5,000.00 would be, and then add that back to \$700.00 to see which choice matches your target of \$850.00: (C).

17.

C Cross-multiply to get  $3(C + x) = (x - 3)(x + 8)$ . Expand the right side of the equation to get  $3(C + x) = x^2 + 5x - 24$ . Distribute the 3 to get  $3C + 3x = x^2 + 5x - 24$ . Subtract  $3x$  from both sides of the equation to get  $3C = x^2 + 2x - 24$ . Factor the right side of the equation to

$$\frac{(x + 6)(x - 4)}{3} = \frac{1}{x}$$

get  $3C = (x + 6)(x - 4)$ . Divide both sides by 3 to get  $C = \frac{1}{3}(x + 6)(x - 4)$ . The correct answer is (C).

18.

A Start with the easiest piece of information first, and use Process of Elimination. Given that  $h$  is the number of hours spent hiking and  $d$  is the number of hours driving, the total number of hours Lennon spends in the park can be calculated as  $h + d$ . The question states that Lennon has up to 6 hours to spend in the park—"up to" means  $\leq$ . So,  $h + d \leq 6$ . Eliminate (B), (C), and (D). The correct answer is (A).

19.

B The quality control expert discovered that 13 out of 1,000 randomly selected tennis balls

$$\frac{13}{1000}$$

were defective.  $\frac{13}{1000} = 0.013$ , which is equivalent to 1.3%. This means that  $100 - 1.3 = 98.7\%$  of tennis balls tested were not defective, and this data most supports answer (B).

20.

C When solving inequalities, the natural impulse is to isolate the variable. In this case, though, look at what the question is asking. The question doesn't want you to find just the value of  $z$  but rather the value of  $9z - 18$ . To get from the value of  $-3z + 6$  given in the inequality to this new value, the original inequality must be multiplied by  $-3$ . Just multiply the entire inequality by this value, making sure to flip the inequality signs when multiplying

$$-\frac{20}{7} > -3(-3z + 6) > -3\left(-\frac{11}{5}\right)$$

by a negative number. The equation becomes  $-3\left(-\frac{20}{7}\right) > -3(-3z + 6) > -3\left(-\frac{11}{5}\right)$  or

$$\frac{60}{7} > 9z - 18 > \frac{33}{5}$$

$9z - 18 > \frac{60}{7}$ . The question asks for the greatest possible integer value, so focus on

$$\frac{60}{7}$$

the high end of the given values. The value at that end,  $\frac{60}{7}$ , equals 8.57, so the greatest

integer less than that is 8. The answer is (C).

21. A Whenever there are variables in the question and numbers in the answer choices, think Plugging In the Answers. In (A),  $j = 6$ , and  $k = -6$ . Plug these two values into the first equation to get  $-24 - 8(6) = 12(-6)$ . Solve for both sides of the equation to get  $-24 - 48 = -72$ , or  $-72 = -72$ . Therefore, the values work for the first equation. Plug the values into the

$$\begin{array}{c} 5 \\ \hline 3 \end{array} \quad \begin{array}{c} 7 \\ \hline \end{array}$$

second equation to get  $3 + 3(-6) = -6(6)$ . Solve both sides of the equation to get  $3 + (-10) = -7$ , or  $-7 = -7$ . Since the values given in (A) work in both equations, the correct answer is (A).

22. C First, you know the new proportion must be less than the current 0.34 for biofuels (because the total amount spent on alternative energy is increasing, but the amount spent on biofuels is remaining the same), so you can eliminate (D). Next, determine the amount that will be spent on biofuels in 2017 by multiplying 0.34 by the total of \$254 million:  $0.34 \times 254 = \$86.36$  million. Because 57 million new dollars will be spent on alternative energy, the new total will be  $254 +$

$$\underline{\underline{86.38}}$$

$57 = \$311$  million. Divide \$86.36 million by \$311 million to get the new proportion:  $\frac{311}{86.36} = 0.28$ , which is (C).

23. D In quadrant II, the  $x$ -coordinate is negative, and the  $y$ -coordinate is positive. Therefore, eliminate (C). Whenever the question includes variables and the answers are numbers, think Plugging In the Answers. Of the remaining answers, (B) is easiest to work with. In (B), the  $x$ -value is  $-4$  and the  $y$ -value is 2. Plug these values into the second equation to get  $-4 = -2 + 2$ . Given that this is not a true statement, eliminate (B). Try the values in (A) in the second equation to get  $3\sqrt{2} = -(-3\sqrt{2}) + 2$ . This is also not true, so the correct answer is (D).

24. B Right away, (A) can be eliminated, since point C has a negative  $y$ -coordinate. Given any two

$$\frac{y_2 - y_1}{x_2 - x_1}$$

points, the slope of the line can be determined using the equation  $\frac{y_2 - y_1}{x_2 - x_1}$ . Use this formula to find the value of  $b$  by setting the slope of  $\overline{AB}$  equal to the slope of  $\overline{BC}$ . Use points  $(0, 3)$  and  $(5b, b)$  in the left side of the equation and points  $(5b, b)$  and  $(10b, -b)$  in

$$\frac{3 - b}{0 - 5b} = \frac{-b - b}{10b - 5b}$$
$$\frac{3 - b}{-5b} = \frac{-2b}{3 - b}$$

the right side of the equation to get  $\frac{3 - b}{-5b} = \frac{5b}{5b}$ , or  $\frac{3 - b}{-5b} = \frac{-2}{5}$ . Simplify both sides of the equation to get  $5(3 - b) = 10b$ . Divide both sides by 5 get  $3 - b = 2b$ , then  $3 = 3b$ , and finally  $b = 1$ . Plug in  $b = 1$  for point C to get  $[10(1), -1]$ , or  $(10, -1)$ . Therefore, the correct answer is (B).

25. A The formula for compound interest is  $A = P(1 + r)^t$ , where  $P$  is the starting principle,  $r$  is the rate expressed as a decimal, and  $t$  is the number of times the interest is compounded. Melanie received less than 5% interest, so you can eliminate (B) because  $1.05 = 1 + 0.05$ , indicating she was receiving 5% interest. You can also eliminate (C) because over the course of

$$\frac{1}{3}$$

a year the interest is compounded 4 times, not  $\frac{1}{3}$  of a time. Because Melanie invested \$1,100 at what she thought was 5% compounded 4 times (12 months in a year  $\div$  3 months per period), she expected  $1,100(1 + 0.05)^4 = \$1,337.06$  after a year. Instead, she has  $1,337.06 - 50 = \$1,287.06$  after one year. Because  $t$  is in years in the answer choices, make  $t = 1$  in (A) and (D) and eliminate any choice which does not equal 1,287.06. Only (A) works.

26. B You can start by Plugging In a value for  $x$ ; try  $x = 4$ . Because angle  $AOB$  is  $120^\circ$  and the triangle is isosceles, angles A and B are each  $30^\circ$ . Cut triangle  $AOB$  in half to make two  $30-60-90$  triangles with a hypotenuse of 4 and sides of 2 and  $2\sqrt{3}$ . The side with length  $2\sqrt{3}$  lies on chord  $AB$ . Double it to get the total length:  $4\sqrt{3}$  or just  $\sqrt{3}x$ , which is (B) when you put  $x = 4$  into the answer choices.

27. C Whenever there are variables in the question and in the answers, think Plugging In. The question states the value of  $g$ , but it is a constant and a weird one at that. Pick numbers for

all the variables that will make the math more straightforward. If  $v = 4$  and  $g = 2$ , then

$$t = \frac{2(4) \cdot \sin(\theta)}{2} = \frac{8 \cdot \sin(\theta)}{2} = 4 \cdot \sin(\theta),$$

$$R = \frac{4^2 \cdot \sin(2\theta)}{2} = \frac{16 \cdot \sin(2\theta)}{2} = 8 \cdot \sin(2\theta)$$

answers to see which equation works. Choice (A) becomes

$$4 = \frac{4 \cdot \sin(\theta) \cdot \sin(\theta)}{2[8 \sin(2\theta) \sin(\theta)]},$$
$$4 = \frac{4 \cdot \sin(\theta) \cdot \sin(\theta)}{16 \sin(2\theta) \sin(\theta)}, \text{ or}$$

Simplify the right side of the equation to get

$$4 = \frac{\sin(\theta)}{4 \sin(2\theta)}$$

This will not simplify further, so eliminate (A). Choice (B) becomes

$$4 = \frac{2[4 \sin(\theta)] \sin(\theta)}{8 \sin(2\theta) (\sin(\theta))}$$

$$4 = \frac{8 \sin(\theta) (\sin(\theta))}{8 \sin(2\theta) (\sin(\theta))} \text{ or}$$

$$4 = \frac{2[8 \sin(2\theta)] \sin(\theta)}{(4 \sin(2\theta)) (\sin(2\theta))}$$

$$4 = \frac{16 \sin(2\theta) \sin(\theta)}{(4 \sin(\theta)) (\sin(2\theta))}$$

Simplify the right side of the equation to get  
Distribute the 2 to get  
Reduce the equation to get or  $4 = \frac{16}{4}$  or  $4 = 4$ . The correct answer is (C).

28.

D  $i^a = 1$  when  $a$  is a multiple of 4. Using your exponents rules,  $413 + x$  must also be a multiple of 4. Plug in the answers and look for what makes  $413 + x$  a multiple of 4. Only (D) works.

29.

C The zero of  $g$  is the value of the variable, in this case  $x$ , when the equation is set to 0. This is also called the root or solution of an equation. Set the equation to 0 to get  $0 = 2x^2 - dx - 6$ . Plug 6 in for  $x$  to get  $0 = 2(6^2) - d(6) - 6$ . Simplify the equation to get  $0 = 72 - 6d - 6$ , or  $0 = 66 - 6d$ . Solve for  $d$  to get  $-66 = -6d$ , so  $11 = d$ . Plug 11 in for  $d$  and set the quadratic to 0 to get  $0 = 2x^2 - 11x - 6$ . Factor the equation to get  $0 = (x - 6)(2x + 1)$ . The

$$\frac{-1}{2}$$

other zero of the equation is when  $2x + 1 = 0$ . Solve for  $x$  to get  $2x = -1$ , or  $x = \frac{-1}{2}$ . The correct answer is (C).

30.

D The flu shot is most effective against Strain C, which is least prevalent in March. To determine the overall efficacy of the flu shot at this time, multiply the prevalence of each strain of flu by the efficacy of the flu shot against that strain, and then add those products to get a weighted average of the efficacy of the shot:  $(0.23 \times 0.35) + (0.25 \times 0.13) + (0.13 \times 0.76) + (0.39 \times 0.68) = 0.477 = 47.7\%$ , which is closest to (D).

31.

3 Solve the equation for  $v$ . Take  $9 > 3v - 3$  and add 3 to both sides to get  $12 > 3v$ . Now divide both sides by 3 to find that  $4 > v$ . Therefore, the largest integer that  $v$  could be is 3. Grid in 3.

$$\frac{5}{6} \text{ or } 0.83$$

$$\frac{2}{2}$$

Start by multiplying the second fraction in the denominator of the equation by  $\frac{2}{2}$  to get

$$\frac{\frac{6}{5}}{\frac{12}{2y} - \frac{10}{2y}} = 1$$

. Combine the fractions in the denominator to get  $\frac{6}{\frac{5}{1}} = 1$ . Reduce the fraction in the denominator to get  $y$ .

$$\frac{\frac{6}{5}}{\frac{2}{2y}} = 1$$

. Reduce the fraction in the denominator to get  $y$ .

Dividing by a number is the same as multiplying by its reciprocal, so the equation becomes  $\frac{5}{6} \times y = 1$ . Multiply both sides of the equation by  $\frac{6}{5}$  to get  $y = \frac{6}{5}$ . The correct answer is  $\frac{6}{5}$ .

33. 1,279 614 students voting for Candidate A represents 0.48 of the population out of 1. Set up a

$$\frac{0.48}{1.00} = \frac{614}{x}$$

proportion:  $\frac{0.48}{1.00} = \frac{614}{x}$ , where  $x$  is the total number of students in the school. Cross-multiply:  $0.48x = 614$ . Divide both sides by 0.48 and you get approximately 1,279.

$$\frac{5}{13}$$

34.  $\frac{5}{13}$  or 0.384 or 0.385

Draw a right triangle and label a non-right angle  $\theta$ . SOHCAHTOA tells you that tangent is opposite

adjacent, so the leg opposite  $\theta$  is 12 and the leg adjacent to  $\theta$  is 5. Cosine is adjacent

hypotenuse, so you need to find the hypotenuse of the triangle. You can use the Pythagorean theorem, or you can recognize this as a 5-12-13 Pythagorean triplet. The hypotenuse

$$\frac{5}{13}$$

is therefore 13. The leg adjacent to  $\theta$  is still 5, so  $\cos \theta = \frac{5}{13}$ .

35. 7,054 First, you need to determine the current exchange rate. The 7% fee is the same (relative to the exchange rate), whether it was applied to the Cedi or USD. Therefore, 7% of 651 Cedi is equal to 32.30 USD. Translate English to math:  $0.07(651) = 32.30$ , or  $45.57 \text{ Cedi} = 32.30 \text{ USD}$ . Next, you want the value of an item worth 5,000 USD in Cedi, so set up a proportion:

$$\frac{45.57 \text{ Cedi}}{32.30 \text{ USD}} = \frac{x \text{ Cedi}}{5,000 \text{ USD}}$$

Cross-multiply:  $(45.57)(5,000) = 32.30x$ , or  $227,850 = 32.30x$ . Divide both sides by 32.30 and you get  $x = 7,054.18$  USD, which rounds to 7,054.

36. 63.6 or 63.7

First, draw a square inscribed in a circle. Because the diameter of the circle is equal to the diagonal of the square, you can plug in a number like  $2\sqrt{2}$  for the length of the diameter. Because the diameter forms a  $45^\circ$ - $45^\circ$ - $90^\circ$  triangle, each side of the square has a length of 2. Using the area formula for a square ( $A = s^2$ ), plug in 2 for the  $s$  to get  $A = 2^2$ , which simplifies to  $A = 4$ . The area of the square is 4. To find the area of the circle, use the formula  $A = \pi r^2$ . Because the diameter of the circle is  $2\sqrt{2}$ ,  $r = \sqrt{2}$ . Plug that into the area formula to see that  $A = \pi(\sqrt{2})^2$ , which simplifies to become  $A = 2\pi$ . To find the

solution to the problem, translate what you are being asked from English into math. The area of

$x$

the square is what percent of the area of the circle becomes:  $4 = \frac{x}{100} 2\pi$ . Solve for  $x$ : First, divide each side by  $2\pi$ , and then multiply each side by 100. The answer is a non-repeating decimal beginning 63.66197... When entering your answer, simply cut off the decimal (do not round) so it takes up four spaces. You should enter 63.6.

$$\frac{7}{10}$$

37. or 0.7

$$\frac{5}{6}$$

If the mean of the new set is  $\frac{5}{6}$ , then the sum of the diameters of the cylinders divided by the

$$\frac{5}{6}$$

number of cylinders must equal  $\frac{5}{6}$ . Set up the equation:  $\frac{5}{6} =$   
$$\frac{1}{2} + \frac{3}{4} + \frac{4}{5} + 1 + \frac{5}{4} + x$$

$$\frac{6}{1} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{5}{}$$

, where  $x$  is the unknown cylinder. Multiply both sides by 6

to simplify:  $5 = \frac{2}{1} + \frac{3}{4} + \frac{5}{4} + 1 + \frac{5}{4} + x$ . Combine like terms (use your calculator, but be  
$$\frac{43}{10}$$
 careful with parentheses!):  $5 = \frac{10}{10} + x$ . Subtract  $\frac{43}{10}$  from both sides and you get  $\frac{7}{10}$ .

38.  $1 \leq y \leq 1.25$

A set with an even number of elements will have as its median the average of the middle two terms. In

$$\frac{4}{5}$$

$$\frac{9}{10}$$

the current set,  $\frac{5}{4}$  and 1 have an average of  $\frac{9}{10}$ , so the new cylinder must be equal to or

$$\frac{4}{}$$

greater than 1, so the median will be the average of  $\frac{5}{4}$  and 1. The range of the set of five

$$\frac{5}{4} \quad \frac{1}{2} \quad \frac{3}{4}$$

$$\frac{1}{4}$$

cylinders is the greatest minus the least:  $\frac{5}{4} - \frac{1}{2} = \frac{3}{4}$ . Because the new cylinder must be  $\frac{1}{4}$

$$\frac{1}{2}$$

$$\frac{3}{4}$$

$$\frac{5}{4}$$

inches to  $\frac{1}{2}$  greater than  $\frac{3}{4}$ , the cylinder must be between 1 and  $\frac{5}{4}$  inches in diameter.