TEST 4

Reading Test

65 MINUTES, 52 QUESTIONS

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

DIRECTIONS

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

Questions 1-10 are based on the following passage.

This passage is taken from a novel that appeared in 2013. In the scene that follows, two colleagues, Catherine and Edmond, are driving through the French countryside.

The road passed through the forest, now tinged with the russet shades of autumn; Catherine watched the afternoon shadows sway back and forth while Edmond, though familiar with the road, stared conscientiously ahead. For the most part, the trees crowded the roadside, yet every now and then there was a small open space, rather rutted in the places where drivers had stopped for recreation. In some of these clearings, there were stacks of logs from felled trees.

"The French are so cheeky!" Catherine exclaimed. "Imagine churning up the forest like that. Look at those women over there: they just stopped their car in the middle of the glade and went to pick mushrooms. Anywhere else, those women would be prosecuted for Trespassing and Theft. I wonder what the owner would say."

"Nothing, I should think," remarked Edmond. "Actually, I am one of the owners."

Catherine shot him a surprised glance. Edmond explained, his English as balanced and careful as ever: "The national forests belong to the people of France. It is the right of every French citizen to forage in the forests and gather food and kindling from the forest floor. Of course, the state attempts to look after the forest: thus the tree-felling and the protection of forest animals when hunting is no longer in season. Otherwise, we can do anything we like there."

"Even hunting, like English hunting? With hounds and horses?" Catherine was suddenly impassioned. "I hate hunting. It should be banned outright. There is no excuse for allowing a cruel and disgusting sport indulged in by the idle rich—unspeakable activities in pursuit of uneatable animals."

"There speaks the modern Englishwoman, who thinks that her food, perfectly shaped and washed and packaged, appears miraculously at the supermarket, ready to go into the microwave. We French know that good food is food taken straight from the earth and not frozen and given a sell-by date. We take food seriously. Our forests are full of edible produce: truffles, mushrooms, herbs, and of course deer and wild boar."

"So, you believe that hunting is acceptable?"

"Certainly, if the aim is to hunt food for the table. The English don't believe that. They hunt for sport, for the thrill of the chase."

"No, hunting in any form is wrong. Chasing terrified animals with hounds ready to rip their prey to pieces—it's barbaric."

Edmond shrugged his shoulders. "I agree. No Frenchman would touch venison brought down in that way. Here, hunting an animal is not akin to murder. In France, the hounds chase the deer because the deer are agile runners—it is what makes their meat so lean and healthy—and the dogs' role is to direct the deer to where it can be brought down by the huntsman, with one clean shot, so that it will be acceptable for eating."

"That is no way to treat any wild animal."

"All animals were originally wild. You think that because some animals are reared on farms, those animals they are somehow house-trained; that's why you call them 'domestic' animals. Little calves and piglets are so sweet."

"Well, so they are."

"Oh, yes, sweet for three months, and then you take them to the slaughterhouse. How else would you get your ham and veal?"

Catherine's face flushed. She felt confused, and wished she could answer Edmond in a French as flawless as his English.

There was silence in the car for the next few kilometers, then Edmond said, "I would like to turn off into the next Aire, if you do not mind."

"What's an 'Aire'?" Catherine asked crossly. "You mean a parking area?"

CONTINUE

"Yes, a parking area," he answered gently.

The car bumped over a grass verge and into a small clearing. Edmond switched off the engine. The stillness now seemed tremendous, universal. Catherine gazed out the window. A red squirrel darted across the grass and scampered up the gnarled trunk of an ancient oak. Then, once again, silence settled all around.

Catherine leaned back in her seat. "It is beautiful." she said at last. "Your forest is so beautiful."

1

Which choice best describes the developmental pattern of the passage?

A) A record of an often tense conversation
B) A response to a nationwide controversy
C) A description of a compromise
D) A depiction of contemporary society

2

It can be inferred from the passage that Edmond is

A) of English descent and familiar with several other cultures.
B) of English descent but educated primarily in France.
C) of French descent and speaks English without difficulty.
D) of French descent but has relocated to the English countryside.

3

As used in line 39, "aim" most nearly means

A) line of sight.
B) positioning of a weapon.
C) direction.
D) objective.

4

In the passage, Edmond responds to Catherine's remarks by

A) accusing Catherine of actively supporting English hunting practices.
B) paraphrasing the line of reasoning that he assumes she is following.
C) forcefully persuading her to accept a moderate position.
D) distracting her with an entirely new proposal.

5

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

A) Lines 18-21 ("The national . . . floor")
B) Lines 30-33 ("There speaks . . . microwave")
C) Lines 45-47 ("No Frenchman . . . murder")
D) Lines 71-73 ("The car . . . universal")

6

In lines 45-52 ("Edmond . . . eating"), Edmond explains his stance on hunting by

A) comparing hunting to other environmental problems.
B) explaining a source of hostility between two countries.
C) describing some of his own experiences as a hunter.
D) presenting generalizations about his compatriots.

7

As used in line 51, "clean" most nearly means

A) ethical.
B) precise.
C) sanitized.
D) smooth.

8

Why does Catherine ask Edmond what an "Aire" is in lines 68-69?

A) She is frustrated with her imperfect French.
B) Her anger towards Edmond has abated completely.
C) She wishes to irritate Edmond further.
D) She has no idea where Edmond intends to drive next.

9

Catherine responds to the French attitude toward nature in a manner that is best described as

A) completely uninformed.
B) grudgingly tolerant.
C) sharply condemnatory.
D) entirely puzzled.

CONTINUE

10

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

A) Lines 9-10 ("The French . . . like that")
B) Lines 25-26 ("Even hunting . . . horses?")
C) Lines 62-64 ("Catherine's face . . . English")
D) Lines 68-69 ("What's an . . . area?")

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

Adapted from Danielle Barkley, "International Sporting and the Economics of Enjoyment."

When the Olympic Games were originally held in Ancient Greece, these athletic contests acted as both a religious ritual and an opportunity to celebrate the feats of the human body. In the present day, the latter motivation remains and a new one has been added: much of the rhetoric surrounding the Games involves economic advantages to be gained by the country and city hosting the Games. As recent budgets for hosting the Games have ballooned, so has the insistence that spending money will make money for the host destination. The financial benefits are seen as playing out in three major ways. First, tourism will increase for the duration of the Games, creating additional revenue. Second, the required investments in infrastructure completed prior to the Games will create economic opportunities. Third, though most nebulous, media attention will open an opportunity to attract long-term business investment; in this final sense, the Games send a signal that the host country is a viable player in the world economy.

All of this sounds admirable in theory: what country wouldn't want to both draw in global prestige and economic profit? The problem is that for most host cities there are few, if any, well-documented short-term economic rewards to hosting the Games. Building the necessary stadiums and competition sites costs millions of dollars, and very few hosts have been able to meaningfully repurpose these structures once the Games wrap up. Moreover, these construction projects occupy real estate that often could have been used for more lucrative or strategic projects.

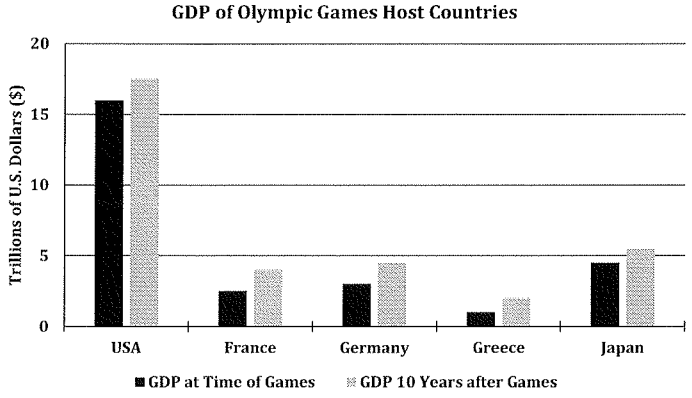
Simply put, Olympics infrastructure is a bad investment, and Olympics tourism may not be much better of a prospect. While hosting the Games inarguably results in increased tourism, visitors who come to see the Games tend to do little else, so that traditionally popular and profitable tourist attractions will actually see a decline in business. In a city that would draw visitors with or without the Games, tourism may actually decrease as prospective visitors indifferent to the Olympics seek to avoid the crowds and chaos. When London hosted the Summer Olympics in August 2012, the number of foreign tourists visiting Britain was actually 5% lower than in August 2011. Attractions such as the British Museum and a number of popular London theaters experienced significant drop-offs in visitor volume.

Although the Olympics can easily backfire as a short-term investment, the findings surrounding the long-term payoff of hosting are more complex. A 2009 study investigating the impact of hosting did find that countries that hosted the Olympics unequivocally experienced increased international

CONTINUE

trade in subsequent years. However, in an interesting twist, countries that made bids to host the Olympics but then failed to secure the hosting opportunity experienced the same upsurge in trade. And, because these apparent "losers" didn't have to spend billions of dollars actually hosting the Games, they saw a far greater increase in overall economic benefit. There may be a link between the Olympics and a global perception of having a stable economy, yet having the confidence to simply bid on the Games is all a country needs to play the Games to its advantage.

Philip Porter, an economist who specializes in the impact of sporting events, has concluded that "the bottom line is, every time we've looked—dozens of scholars, dozens of times—we find no real change in economic activity." There is a growing belief among these scholars that the only way to make the Olympics palatable to citizens is to promise long-term economic benefits, whether or not those gains will ever be realized. Moreover, the same studies that Porter and others have used to argue against tangible economic benefits do show significant increases in national pride and public satisfaction when a country hosts the Games. At least in that sense, the Olympics may be a wise investment after all.



11

Over the course of the first paragraph (lines 1-17) the focus shifts from

A) a recounting of particular Olympic Games in an impoverished country to a discussion of the effects of the Games on its economy.

B) a synopsis of the creation and history of the Olympic Games to a brief description of the different host cities over the past century.

C) a summary of the historical motivations behind the Olympic Games to a list of supposed advantages of hosting the Games.

D) an explanation of the process behind the selection of a host country for the Olympics to an anecdote from a diplomat representing a host country.

12

The author implies that the Olympic Games

A) are usually hosted in cities popular with tourists.

B) ensure fame and success for a host city.

C) are no longer as profitable as they once were.

D) no longer exist to serve a spiritual purpose.

13

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

A) Lines 2-4 ("these athletic . . . remains")

B) Lines 7-9 ("As . . . destination")

C) Lines 14-16 ("media . . . investment")

D) Lines 20-22 ("The problem . . . Games")

14

As used in line 24, "meaningfully" most nearly means

A) expressively.

B) seriously.

C) usefully.

D) thoughtfully.

15

The author indicates that during the Olympics, a host city

A) receives both short-term and long-term benefits since the Games give the city media exposure that it would not receive otherwise.

B) that is already a popular tourist destination loses visitors as people seek to evade the crowds that flock to the city primarily for the Olympics.

C) gradually loses its culture as increased tourism and publicity make the city a target for commercialization.

D) eventually increases in population because media attention and prolonged tourism from the Games cause visitors to settle nearby.

16

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

A) Lines 18-20 ("what . . . profit")

B) Lines 33-36 ("In a city . . . chaos")

C) Lines 52-56 ("There may . . . advantage")

D) Lines 61-63 ("the only . . . benefits")

CONTINUE

17

As used in line 64, "realized" most nearly means

A) comprehended.
B) understood.
C) noticed.
D) fulfilled.

18

The "scholars" mentioned in the final paragraph (lines 57-68) would likely react to the "2009 study" (line 44) with

A) wholehearted enthusiasm.
B) restrained optimism.
C) utter indignation.
D) complete disagreement.

19

According to the passage, a positive effect of a country hosting the Olympics is that

A) citizens are more satisfied with the country and show increased patriotism.
B) growing tourism causes small businesses to flourish and industry to thrive.
C) foreigners become more educated and aware of the country's culture.
D) social issues prevalent in the country are exposed by the media.

20

Based on the graph, the GDP of countries that had hosted the Olympic Games generally

A) increased exponentially.
B) decreased after the Games.
C) stayed the same since the Games.
D) increased in modest amounts.

21

The author of the passage would most likely respond to the information in the graph with

A) agreement that hosting an Olympic Game guarantees a country an increase in tourism and a spike in economic activity.
B) doubt that the Olympic Games could cause economic progress and an increase in trade in countries that did not have stable markets before the Games.
C) the assertion that countries who had made bids to host the games but did not receive the opportunity had obtained the same long-term economic benefits.
D) the argument that a country hosting the Olympic Games receives no economic, cultural, or social advantages whatsoever.

CONTINUE

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

Adapted from Nancy Hoffman, "Killing Leukemia Naturally: A New Approach Re-Deploys the Body's Own Defenses."

Leukemia is a cancer that targets and afflicts blood cells, which are formed in the bone marrow and, when mature, travel to all parts of the body through the blood vessels. There are many types of leukemia, each of which can affect a different element of human blood; most often the white blood cells are affected but bone marrow, red blood cells, and platelets can also become cancerous. Traditional treatments such as chemotherapy, radiation, and bone marrow transplants can be useful, but the success of such measures depends on many factors, including how early the cancer is detected and the cancer's speed of progression.

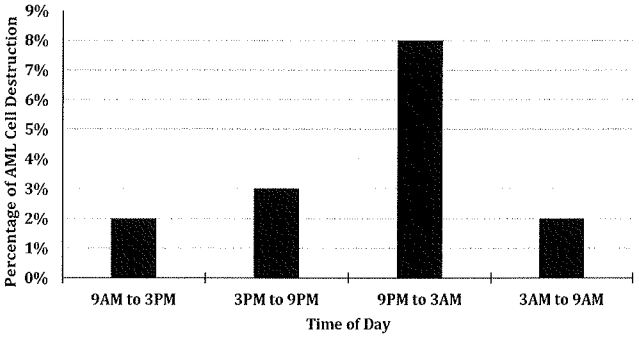
Some of the newer cancer treatments focus on using the body's natural defensive mechanisms to destroy leukemia. For example, researchers have located genes called tumor suppressor genes, which, like all genes, can be either activated or deactivated. A group led by Dr. Ross Dickins of the Walter and Eliza Hall Institute recently demonstrated that turning off a gene called Pax5 causes normal cells to become leukemia cells, and vice versa. Dr. Dickins suggests that this research will lead scientists to "begin to look at ways of developing drugs that could have the same effect as restoring Pax5 function." Despite the promise of these findings, genes are not simple one-function switches; this experimental treatment improved patients' disease prognoses while also causing a variety of negative side effects. Yet if further research is undertaken, it may be found that tumor suppressor genes could hold the key to treating many cancers.

Another new approach that uses the body's own defenses involves the immune system, which is sharply affected in leukemia patients. In Acute Myeloid Leukemia (AML), the myeloid cells that fight bacterial infections, assail parasites, and stop the spread of tissue damage become cancerous and proliferate until they reach dangerous volumes. AML spreads quickly and is the most common form of leukemia in adults, so that effective treatments are valuable. A team at the Scripps Research Institute, convinced that "a major goal in cancer research is to discover agents that transform malignant cells into benign cells," has discovered a mechanism that accomplishes just this goal and then goes one step further: the team has found a way to convert the cancerous myeloid cells into a particular type of benign immune cell, the natural killer cell. These fearsome-sounding cells are a key part of how the body ensures good health, since they quickly destroy virally-infected cells and even tumors before an antibody response (which tends to be somewhat slower) can trigger the activity of other types of immune cells, which destroy infected or malignant cells. Natural killer cells are normally highly adaptive and therefore are potentially useful to this type of cancer research.

When the Scripps team began its investigation, the team members were mainly looking for ways to get under-active bone marrow to produce more white blood cells, which could help people with immunodeficiency diseases. To do this, they used antibodies to trigger growth in immature bone marrow cells so that these cells would mature. They were successful in this goal, but also intrigued to discover that some of the matured cells were of a completely different type and had turned into dendritic cells, the so-called messenger cells between antibodies and white blood cells. After the dendritic cells matured further, they turned into natural killer cells.

The most astonishing result of this research was that, when scientists added the growth antibody to a sample of AML cells, the AML cells that turned into natural killer cells only killed malignant AML cells: within one day, the converted natural killer cells had destroyed 15% of the AML cells. Because these cells only seem to kill cells of their former type, the researchers are referring to this treatment tactic as "fratricidal therapy," and are hopeful that this specialized method will effectively combat many types of cancer.

Destruction of AML Cells by Natural Killer Cells Within 24 Hours



22

The purpose of the first paragraph is to

A) explain an ailment and introduce a few methods that have been used to address it in the past.

B) indicate that Leukemia is becoming more prevalent and urge researchers to abandon past approaches.

C) introduce a speculation that will be substantiated later in the passage.

D) outline an argument that will be contradicted later in the passage.

CONTINUE

23

The author characterizes the research involving "tumor suppressor genes" (lines 14-15) as

A) superior to all other existing leukemia treatments.
B) inferior to more traditional leukemia treatments.
C) potentially valuable yet currently problematic.
D) fascinating in theory but still not tested experimentally.

24

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

A) Lines 7-11 ("Traditional . . . progression")
B) Lines 16-19 ("A group . . . versa")
C) Lines 21-25 ("Despite . . . effects")
D) Lines 28-30 ("Another . . . patients")

25

As used in line 31, "assail" most nearly means

A) combat.
B) mistreat.
C) vilify.
D) encounter.

26

It can be inferred from the passage that natural killer cells

A) are widely believed to be destructive and cancerous cells.
B) are being investigated by researchers interested in diseases other than cancer.
C) are not easily cultivated in laboratory settings.
D) are already instrumental in helping healthy individuals fight disease.

27

As used in line 45, "trigger" most nearly means

A) inflame.
B) initiate.
C) persuade.
D) agitate.

28

As described in the passage, the research project undertaken at the Scripps Research Institute involved

A) an insurmountable obstacle.
B) an unforeseen result.
C) an ongoing dispute.
D) a humanitarian agenda.

29

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

A) Lines 39-42 ("the team . . . killer cell")
B) Lines 50-54 ("When the Scripps . . . diseases")
C) Lines 56-60 ("They were . . . blood cells")
D) Lines 67-71 ("Because these . . . cancer")

30

It can be inferred from the passage that the Scripps researchers hope that their findings will

A) be applicable to ailments other than leukemia.
B) bolster the reputation of the Scripps Research Institute.
C) supersede the research undertaken by Dr. Ross Dickins.
D) help scientists to better understand the function of dendritic cells.

31

Data in the graph indicate that the greatest percentage of AML cell destruction occurred at which time?

A) 9AM to 3PM
B) 3PM to 9PM
C) 9PM to 3AM
D) 3AM to 9AM

32

Based on the graph and the passage, it can be reasonably inferred that the maturation of dendritic cells most likely occurred

A) before 9AM, but after 3AM.
B) before 3PM, but after 9AM.
C) before 9PM, but after 3PM.
D) before 3AM, but after 9PM.

CONTINUE

Questions 33-42 are based on the following passage.

The following passage is an excerpt from a speech on the topic of modern American journalism, delivered by vice president Spiro Agnew on November 13, 1969.

At least 40 million Americans every night, it's estimated, watch the network news. Seven million of them view A.B.C., the remainder being divided between N.B.C. and C.B.S.
Line According to Harris polls and other studies, for millions of
5 Americans the networks are the sole source of national and world news. In Will Rogers' observation, what you knew was what you read in the newspaper. Today for growing millions of Americans, it's what they see and hear on their television sets.

Now how is this network news determined? A small group
10 of men, numbering perhaps no more than a dozen anchormen, commentators, and executive producers, settle upon the 20 minutes or so of film and commentary that's to reach the public.

This selection is made from the 90 to 180 minutes that may be available. Their powers of choice are broad. They
15 decide what 40 to 50 million Americans will learn of the day's events in the nation and in the world. We cannot measure this power and influence by the traditional democratic standards, for these men can create national issues overnight. They can make or break by their coverage and commentary a moratorium
20 on the war. They can elevate men from obscurity to national prominence within a week. They can reward some politicians with national exposure and ignore others. For millions of Americans the network reporter who covers a continuing issue—like the ABM or civil rights—becomes, in effect, the
25 presiding judge in a national trial by jury.

It must be recognized that the networks have made important contributions to the national knowledge—through news, documentaries, and specials. They have often used their power constructively and creatively to awaken the public
30 conscience to critical problems. The networks made hunger and black lung disease national issues overnight. The TV networks have done what no other medium could have done in terms of dramatizing the horrors of war. The networks have tackled our most difficult social problems with a directness and
35 an immediacy that's the gift of their medium. They focus the nation's attention on its environmental abuses—on pollution in the Great Lakes and the threatened ecology of the Everglades. But it was also the networks that elevated George Lincoln Rockwell, founder of the American Nazi Party, from obscurity
40 to national prominence.

Nor is their power confined to the substantive. A raised eyebrow, an inflection of the voice, a caustic remark dropped in the middle of a broadcast can raise doubts in a million minds about the veracity of a public official or the wisdom
45 of a Government policy. One Federal Communications Commissioner considers the powers of the networks equal to that of local, state, and Federal Governments all combined. Certainly it represents a concentration of power over American public opinion unknown in history.

50 Now what do Americans know of the men who wield this power? Of the men who produce and direct the network news, the nation knows practically nothing. Of the commentators, most Americans know little other than that they reflect an urbane and assured presence,
55 seemingly well-informed on every important matter. We do know that to a man these commentators and producers live and work in the geographical and intellectual confines of Washington, D.C., or New York City, the latter of which James Reston terms "the most unrepresentative
60 community in the entire United States."

Both communities bask in their own provincialism, their own parochialism. We can deduce that these men read the same newspapers. They draw their political and social views from the same sources. Worse, they talk
65 constantly to one another, thereby providing artificial reinforcement to their shared viewpoints. Do they allow their biases to influence the selection and presentation of the news? David Brinkley states, "objectivity is impossible" to normal human behavior. Rather, he says,
70 we should strive for "fairness."

33

The main purpose of the passage is to

A) emphasize the need for political transparency.
B) highlight the severity of media distortion.
C) differentiate local and national news.
D) question the influence of an elite group.

34

The central problem that Agnew describes in the passage is that the news has been

A) restricted by the influence of only a few.
B) limited by the availability of topics.
C) confined by staunch political correctness.
D) dominated by overwhelming medical coverage.

35

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

A) Lines 1-2 ("At . . . news")
B) Lines 9-12 ("A small . . . the public")
C) Lines 28-30 ("They . . . problems")
D) Lines 30-31 ("The . . . overnight")

CONTINUE

36

Agnew claims that which of the following was a relatively recent development?

A) The exposure of dishonest politicians
B) The decline in newspaper distribution
C) The increasing concern for the environment
D) The popularity of network news

37

As used in line 14, "broad" most nearly means

A) fortified.
B) general.
C) extensive.
D) liberal.

38

What function does the fourth paragraph (lines 26-40) primarily serve in the passage as a whole?

A) It acknowledges how the potential benefits of influential news programs can be also be detrimental.
B) It illustrates with several examples the favorable aspects of the news.
C) It provides a counterargument to those in support of the network news.
D) It endorses a practice that the author later proves to be problematic.

39

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

A) Lines 22-25 ("For . . . jury")
B) Lines 33-35 ("The networks . . . their medium")
C) Lines 38-40 ("But . . . prominence")
D) Line 41 ("Nor . . . substantive")

40

Agnew contends that the "communities" (line 61) are problematic because

A) they are of a distinct social class.
B) they lack varied viewpoints.
C) they are highly influenced by global news.
D) they remain disconnected from politics.

41

As used in line 63, "draw" most nearly means

A) depict.
B) derive.
C) persuade.
D) lure.

42

It can be reasonably inferred that Agnew believes which of the following about network news?

A) Its pervasive influence is fueled by corporate greed.
B) It ultimately betrays its intended purpose.
C) Its presentation and choice of information are distressingly subjective.
D) It unfortunately neglects to highlight actual societal problems.

CONTINUE

Questions 43-52 are based on the following passages.

The following two readings consider recent research in cell and molecular biology.

Passage 1

Are viruses alive? Among the criteria for life is the requirement that an organism be able to reproduce; most organisms do so without the help of other species. For example, bacteria use binary fission, in which they replicate their genes and then split into two new cells. More complex organisms, such as humans, combine genes from two parents in order to produce offspring.

With these biology fundamentals in mind, some scientists argue that viruses are not alive because they require hosts in order to reproduce. In other words, viruses do not possess autonomous genetic material, and instead need to infect a host so that the host cells will generate and transmit infected genes. According to Paul Berg, a Nobel Prize winner in chemistry, scientists at Oak Ridge National Laboratory "discovered that the virus 'turns off' the cell's machinery for making its own proteins and 'instructs' the cell's machinery to make proteins characteristic of the virus" instead.

However, many parasitic organisms require hosts in order to reproduce. For example, experiments performed by Ronald Ross showed that *Plasmodium* (the malaria parasite) is injected into human blood when an infected female *Anopheles* mosquito bites a human. The parasite multiplies and develops in the human host and then circulates in the host's blood. When a mosquito bites the infected human, the parasites are swallowed by the mosquito. They then migrate to the mosquito's salivary glands. When the infected mosquito bites another human, the parasite's life cycle begins again.

Despite the fact that *Plasmodium* would not be able to reproduce without infecting both mosquitoes and humans, *Plasmodium* is classified as an organism. Thus, the fact that viruses require host infection in order to reproduce should not exclude them from the category of living things.

Passage 2

At least in their own minds, many researchers have settled the question of whether viruses are organisms or not. "A rock is not alive. A metabolically active sack, devoid of genetic material and the potential for propagation [i.e. a virus], is also not alive. A bacterium, though, is alive," declared Luis P. Villarreal in the 2008 *Scientific American* article "Are Viruses Alive?" Of course, Villarreal could have shut down the discussion then and there—but he didn't. Instead, he spent the remainder of his feature article explaining that the question of how to classify viruses is important because "how scientists regard this question influences their thinking about the mechanisms of evolution."

Despite their inability to propagate without taking control of a host, viruses possess other rudiments of life: Villarreal and other researchers, such as Philip Bell of Macquarrie University, have argued that cell nuclei are "of viral origin." But the evolutionary mechanism of "survival of the fittest" is also closely associated with viruses. Some of this, of course, is pop culture hype: thanks to Michael Crichton's science fiction novel *The Andromeda Strain*, readers all over the world have been presented with the spectacle of hostile viruses from outer space, the microscopic kin of bigger, bloodier Hollywood aliens. Some of this, however, is sound science: the struggle for dominance that plays out on a viral level can perhaps help us understand the struggles that play out across ecosystems.

Nor are viruses the only host-dependent life-forms or quasi-life-forms that illuminate the larger mechanisms of survival in the natural world. While debates over the status of viruses are settling down, a new discussion has sprung up over another source of biological affliction: tumors. In 2010, Mark Vincent of the London Regional Cancer Program argued that tumor appearances are "speciation events," each of which involves the generation of a "cancer genome." Similar ideas were set forth one year later by researchers from the University of California, Berkeley, who argued that a body cell that mutates into a cancer cell becomes "a cell with totally new traits—that is, a new phenotype." It now becomes possible to ask a radical new question: if tumors are essentially parasitic life forms struggling for survival, might viruses be similar yet more rudimentary forms, struggling to attain the structures and advantages of autonomous life?

43

The main purpose of each passage is to

A) introduce and analyze perspectives in a scientific debate that surrounds viruses.

B) systematically argue in favor of the idea that viruses are living organisms.

C) explain why the question "are viruses alive?" cannot be answered in any definitive way.

D) suggest that viruses are similar to tumors.

44

As used in lines 15 and 16, "machinery" most nearly means

A) artificial creations.

B) specific technology.

C) social arrangements.

D) vital functions.

CONTINUE

45

Like Luis P. Villarreal in Passage 2, the author of Passage 1 would agree that

A) viruses should not under any circumstance be classified as life forms.
B) viruses may plausibly be classified as life forms.
C) viruses do not contain their own independent genes.
D) viruses and bacteria have several common traits.

46

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

A) Lines 3-5 ("For example . . . cells")
B) Lines 10-12 ("In other . . . genes")
C) Lines 18-19 ("However, many . . . reproduce")
D) Lines 30-32 ("Thus, the fact . . . things")

47

The phrase "biology fundamentals" in line 8 of Passage 1 refers to

A) facts about how organisms create offspring.
B) questions about whether viruses are alive.
C) processes unique to single-cell organisms such as bacteria.
D) information about how viruses take over host cells.

48

The author of Passage 1 discusses *Plasmodium* (line 20) in order to show that

A) the ideas of Ronald Ross are gaining popularity.
B) both viruses and bacteria can cause disease epidemics.
C) viruses commonly infect large hosts by entering their blood cells.
D) viruses share important characteristics with recognized life forms.

49

The author of Passage 2 argues that current ideas about viruses have been

A) definitively summarized by Luis P. Villarreal.
B) impacted by works of the imagination.
C) held up to doubt as researchers learn more about tumors.
D) wrongly neglected by cell biologists.

50

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

A) Lines 39-40 ("Of course . . . didn't")
B) Lines 45-46 ("Despite their . . . life")
C) Lines 51-54 ("thanks to . . . space")
D) Lines 68-72 ("Similar ideas . . . phenotype")

51

As used in line 67, "generation" most nearly means

A) creation.
B) inspiration.
C) age group.
D) subdivision.

52

According to the author of Passage 2, tumors and viruses are similar in that both are

A) detrimental to fully-formed organisms.
B) rudimentary organic forms that can become independent organisms.
C) capable of "speciation events."
D) studied by scientists who seek to understand the origins of cell nuclei.

STOP

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

Writing 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 supplementary material.

Marine Biology: Combining Industry, Ecology, and Nutrition

For many marine biologists, careers in education and research [1] may be very appealing. Other marine biologists may gravitate to the numerous opportunities for industry and applied science careers after earning a Bachelor's or a Master's degree in marine biology— [2] believe it or not, in the aquaculture industry, which has had an 8.3% annual rate of growth worldwide since the mid-1980s and is currently the fastest-growing food production industry.

1

A) NO CHANGE.
B) are intrinsic to self-actualization.
C) are undeniably great things to have.
D) may appeal in truly massive ways.

2

A) NO CHANGE
B) astonishingly,
C) for instance,
D) in contrast,

CONTINUE

American demand for seafood 3 have risen in recent years, partly due to growing awareness of the health benefits of fish; the 2010 USDA Dietary Guidelines recommend that Americans eat eight ounces of fish per week for the beneficial omega-3 fatty acids. However, the majority of the farmed seafood that Americans consume is produced in foreign countries and imported to the U.S., which 4 produces five times less seafood than it once did.

3

A) NO CHANGE
B) has risen
C) have rose
D) has rose

4

Which choice offers the most accurate and relevant interpretation of the data in the table?

A) NO CHANGE
B) purchases most of its seafood from China.
C) produces five times less seafood than China.
D) is only the fifth largest-producer in the world.

Country	Global Rank	Million Metric Tons Produced Annually
China	1	44
Indonesia	2	5.8
India	3	4.9
Japan	4	4.73
United States	5	4.48

CONTINUE

In the United States, two-thirds of the marine aquaculture industry is shellfish production: oysters, clams, 5 and production of mussels. Marine shellfish are farmed in coastal areas, which makes these farms easily accessible but also limits the potential locations for these operations. Yet for a marine biologist looking to work in aquaculture, such a location can be the 6 cite of a promising career.

Some shellfish farms consist of floating cages or nets, to which shellfish like oysters and mussels 7 are attached. These organisms are exposed to the natural fluctuations in their environment. Other farms consist of enclosed tanks, 8 which have never been a source of controversy among animal rights groups. It is important for marine biologists to monitor these factors in the waters around shellfish farms in order to ensure that conditions remain optimal for the health and growth of the shellfish. Marine biologists can also research and provide novel solutions 9 with problems in shellfish production. For example, farmers can accelerate oyster growth by agitating the oysters in a tumbler. When tumbled, an oyster opens and closes its shell, resulting in a stronger core muscle and ultimately a bigger oyster, once it is harvested.

5

A) and production of mussels.
B) and that of mussels.
C) and mussels are produced.
D) and mussels.

6

A) NO CHANGE
B) sight
C) site
D) sighting

7

A) NO CHANGE
B) were attached
C) being attached
D) which are attached

8

The author wishes to provide information that explains the practical benefits of the enclosed tanks. Which choice best accomplishes the author's purpose?

A) NO CHANGE
B) which are growing more popular despite their high maintenance costs.
C) which utilize technologies first developed for agriculture.
D) which permit the farmer to control variables like temperature and salinity.

9

A) NO CHANGE
B) as problems
C) to problems
D) from problems

While not all aquaculture development is beneficial to the local environment, shellfish production can have a positive effect on local waters due to the way that oysters and mussels filter water as they feed. One oyster filters approximately 1-4 liters of water per hour. When the particles that the oyster consumes are contaminated with pollutants, the oyster consumes these pollutants and excretes them to the bottom of the waterway, where seaweed grows and captures the pollutants in 10 their cells. Marine biologists who have a thorough understanding of local ecology can ensure that a region's aquaculture is not only economically productive in the 11 short term; also sustainable in the long term.

10

A) NO CHANGE
B) there
C) its
D) its'

11

A) NO CHANGE
B) short term, it is also
C) short term, although also
D) short term but also

CONTINUE

Questions 12-22 are based on the following passage.

Furnishing Your Room with Mushrooms

The fields of home decoration and architectural design 12 has often taken inspiration from forms found in the natural world. But what happens when designers directly incorporate the natural world, instead of simply imitating or approximating the shapes of trees, fungi, and other organic material? In some respects, this question has been answered by Phil Ross, the founder of MycoWorks and 13 pioneering in mushroom-based home decoration.

[1] According to its web site, MycoWorks creates "inventions that use nature's systems to solve human challenges." [2] Ross calls the practice of creating mycelium shapes and designs "mycotecture." [3] While it is yet to be seen whether mycelium can become the basis of actual, full-scale architecture, 14 Ross's mycotecture has yielded a few promising constructions. [4] Mycelium can be shaped into individual bricks, and Ross 15 unveiled arches and also revealed wall segments made of such bricks in 2009 at the Dusseldorf Art Museum. [5] The most important of these inventions is the company's namesake, mycelium, a versatile fungus compound that is lightweight, biodegradable, and easily molded into different shapes. 16

12

A) NO CHANGE
B) have often taken
C) which often takes
D) which often take

13

A) NO CHANGE
B) pioneering with
C) a pioneer in
D) a pioneer with

14

A) NO CHANGE
B) although Ross's mycotecture has yielded
C) if Ross's mycotecture yields
D) Ross's mycotecture yielding

15

A) NO CHANGE
B) unveiled arches and he revealed
C) unveiled both arches and
D) unveiled arches, revealing

16

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

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

Ross and his team have also unveiled a group of chairs and end tables called the Yamanakita series: these creations were "inspired by the fashion designer Alexander McQueen" and 17 collaborate textured, gold-tinted mycelium with elegant touches (such as smooth chair legs of solid walnut wood) that McQueen would have envied.

Mycelium 18 has indeed shown its promise as a design element. But perhaps more importantly for the environment-conscious executives and employees of MycoWorks, mycelium has revealed itself as an environment-friendly substance. The mycelium used in the Yamanaka furniture, for example, was grown 19 in large batches over several months. (If not disposed of properly, such by-products can become a source of pollution.) 20 Another innovation is the series of shapes called the "polyominoes." These oddly-angled bricks can hold traditional building elements, such as wooden beams, firmly in place. However, the polyominoes also bind to one another naturally, without any need for industrial or toxic adhesives, due to the cohesive action of the mycelium cells.

17

A) NO CHANGE
B) corroborate
C) confuse
D) combine

18

A) NO CHANGE
B) has however shown
C) in contrast shows
D) shockingly shows

19

Which choice most effectively supports the author's claims about the appeal of mycelium?

A) NO CHANGE
B) using a process known only to MycoWorks.
C) in the most inexpensive manner possible.
D) by recycling a few different agricultural by-products.

20

Which choice most effectively combines the underlined sentences?

A) Another innovation is the series of shapes called the "polyominoes," traditional building elements, such as wooden beams, being held firmly in place by oddly-angled bricks.
B) Another innovation is the series of shapes called the "polyominoes," oddly-angled bricks that can firmly hold in place traditional building elements, such as wooden beams.
C) Another innovation, called the "polyominoes," are a series of shapes and they are oddly-angled bricks that can hold more traditional elements, such as wooden beams, firmly in place.
D) Another innovation, called the "polyominoes," is a series of shapes and oddly angled bricks, it can hold more traditional building elements, such as wooden beams, firmly in place.

CONTINUE

But will Ross's mycelium ever be widely used, in home decoration or any other field? 21 At present, the Yamanakita tables sell for $300 each, the chairs for $3000. There is a sense that Ross's entire endeavor is something of an eccentric passion project, though, to be fair, Ross himself seems to sense this: he recently appeared in Scientific American wearing an impractically huge mycelium hat. The MycoWorks team nonetheless 22 soldiers on, and continues to find new believers. As the Scientific American reporter who covered MycoWorks declared, "the mushroom chairs might be beacons to the dream of a mushroom future. At the very least, they alerted me that such a dream existed."

21

The writer is considering deleting the underlined sentence. Should the writer do so?

A) Yes, because the author does not discuss the price of mycelium at any other point in the passage.
B) Yes, because it is inconsistent with the thoroughly positive tone taken by the author when discussing mycelium.
C) No, because it provides an example that leads into the discussion of differing perceptions of mycelium.
D) No, because it is consistent with the harshly critical tone taken by the author when discussing mycelium.

22

A) NO CHANGE
B) soldier
C) will soldier
D) had soldiered

Questions 23-33 are based on the following passage.

A Late Start, and a Better Start

"Early to bed, early to rise" has been a mantra for many generations. However, it may not be accurate for high school students. Humans have circadian rhythms, more commonly known as biological 23 clocks. These rhythms dictate when we would naturally be awake and asleep, as well as when we are most alert. When those rhythms are 24 disputed, students feel more tired, do not learn as effectively, 25 yet suffer from increased susceptibility to emotional problems, particularly depression.

According to a study published in *Learning, Media and Technology*, adolescents require nine hours of sleep per night, more 26 than other ages require. In addition, teens exhibit optimal mental and emotional functioning when they sleep later. The researchers in charge of the study noted the common belief among adults "that adolescents are tired, irritable and uncooperative because they choose to stay up too late or 27 are difficult to wake in the morning because they are lazy." In reality, teens' biological clocks simply run on a later timetable.

23

Which choice best combines the two sentences at the underlined portion?

A) clocks, even though they
B) clocks, when they
C) clocks, and
D) clocks, which

24

A) NO CHANGE
B) distressed
C) disrupted
D) demolished

25

A) NO CHANGE
B) and suffer
C) although they
D) suffering

26

A) NO CHANGE
B) then other ages
C) than people of other ages
D) then people of other ages

27

A) NO CHANGE
B) had been
C) have been
D) were

CONTINUE

The researchers also noted the unfortunate difference between "social time" (the time of day in which teens are expected to attend school, do homework, and participate in after-school activities) 28 to "biological time" (the time during which teenagers are most alert and receptive to new information). The latter time is not a matter of choice; rather, it is dictated by adolescents' biological clocks. 29 Many high schools start classes between 7:00 and 8:00 a.m., so that students are required to wake up around 5:00 or 6:00 a.m. Teenage circadian rhythms, however, suggest that teens should wake up around 9:00 or 9:30, and so a school start time of 11:00 or 11:30 a.m. would be optimal.

28

A) NO CHANGE
B) from
C) and
D) or

29

Which choice best supports the author's argument that school schedules are not coordinated to follow the biological clocks of high school students?

A) NO CHANGE
B) School administrators have attempted to keep their students energetic by providing healthy breakfast choices.
C) When teenagers get out of school, they often have reserves of excess energy that should be harnessed for homework and extracurricular pursuits.
D) Many teenagers would prefer to do their homework between 8:00 and 10:00 at night, yet parents with traditional views insist that hours immediately after school (3:00 to 6:00) are optimal.

[1] Even though 8:40 am is probably still too early for high school students to function at their best, data indicate that the results of the change were promising. [2] After becoming aware that teens might benefit from later school start times, the Minneapolis school district performed an 30 experiment involving the temporary adoption of a later start time for its high schools: 8:40 am instead of the traditional 7:15 am. [3] In a study of 50,000 Minneapolis students, student achievement and satisfaction rose with the later start time, and most parents reported that their teens were "easier to live with." [4] It is thus not surprising that approximately 90% of the Minneapolis parents surveyed were in favor of the later start time. 31

32 These positive results along with other scientific data, suggest that adolescents would benefit not only academically but also emotionally from start times that align with their circadian rhythms. As a result of having happier and more successful children, 33 later high school start times would reap benefits for parents too.

30

A) NO CHANGE
B) experiment; involving
C) experiment, it involved
D) experiment, this involves

31

To make the order of ideas in the paragraph most logical, sentence 1 should be placed

A) where it is now.
B) after sentence 2.
C) after sentence 3.
D) after sentence 4

32

A) NO CHANGE
B) These positive results, along with other scientific data
C) These positive results along, with other scientific data,
D) These positive results, along with other scientific data,

33

A) NO CHANGE
B) benefits too would be reaped for parents by later high school start times.
C) parents too would reap benefits from later high school start times.
D) high schools that have later start times would reap benefits for parents too.

CONTINUE

Questions 34-44 are based on the following passage.

Richard Brinsley Sheridan: A Man for All Comedies

—1—

"Comedy of Manners" is the classification that literary critics use for these plays. Wycherley and Congreve were the major seventeenth-century innovators, but this mode of writing has continued through to the present day; 34 they claim that the popular *Carry On* films are examples of this persistent yet frequently tedious form of comedy. The two main concerns of the genre seem to be wealth and romance. While no one would deny 35 when the pursuit of love and money occupies a great deal of energy and time, the treatment of these themes under Comedy of Manners conventions was, 36 unfortunately, often superficial.

—2—

Thirty years after the death of Shakespeare, the performance of plays was 37 forbid by order of British head of state Oliver Cromwell. This ban was not lifted until the return of the Stuart monarchy in 1660, when a new, very different brand of theater was instituted. The recently-returned king, the "Merry Monarch" Charles II, 38 had been sent into exile by politicians who viewed Cromwell favorably and was ready to give encouragement to all the delights of the new theaters. Many of the new plays presented were comedies, and comedies moreover that derived their humor from mocking the manners and foibles of their fashionable audiences.

34

Which of the following is the best replacement for the underlined portion?

A) critics
B) plays
C) Wycherley and Congreve
D) wealth and romance

35

A) NO CHANGE
B) because the pursuit
C) if the pursuit
D) that the pursuit

36

A) NO CHANGE
B) surprisingly,
C) consequently,
D) for example,

37

A) NO CHANGE
B) forbidding
C) forbidden
D) being forbid

38

Which of the following most effectively offers background explaining why Charles would promote the delights of the new theaters and the comedies they presented?

A) NO CHANGE
B) had enjoyed years of revelry in the more frivolous France
C) was well known for his merry temperament
D) knew much about the theaters from Shakespeare's time

— 3 —

Luckily, there is at least one Comedy of Manners writer who allows 39 one to see how laughter can lead us beyond the artificiality of witty dialogue, who enables us to glimpse the true depths of the human condition. That man was Richard Brinsley Sheridan. Sheridan was born in Ireland in 1751, moved to England with his theatrically-inclined parents, eloped with a young heiress, and 40 eventually became the owner of the Royal Theatre in London. He went on to write several comedies, all of them successful in their time. Sheridan loved the wit and depth of language, not only what words reveal in their day-to-day usage but also what they can reveal of character in their rhythm and sound. He gave his characters names that indeed 41 don't make any sense at first, but in fact reveal specific personalities and psychologies: Mr. Snake, Mrs. Candour, Sir Benjamin Backbite, Lady Teazle.

39

A) NO CHANGE
B) you to see
C) us to see
D) DELETE the underlined portion

40

A) NO CHANGE
B) eventually he became the owner
C) became eventual the owner
D) he became the owner eventual

41

A) NO CHANGE
B) are really weird
C) seem rather superficial
D) nobody in the real world has

CONTINUE

—4—

A playwright of multi-faceted intelligence, 42 humor and misfortune can go hand-in-hand, as Sheridan also knew. When his own theater caught fire and burned to the ground, Sheridan was ruined financially. 43 Although the theater was destroyed, a friend found him in a coffee house across the road, a glass of wine in his hand. Sheridan looked up and said gently, "A man may surely be allowed to take a glass of wine by his own fireside."

—5—

Now, *that* is Comedy of Manners.

Question 44 asks about the previous passage as a whole.

42

A) NO CHANGE
B) humor and misfortune can go hand-in-hand, as Sheridan has also known.
C) Sheridan also knew that humor and misfortune can go hand-in-hand.
D) Sheridan has also known that humor and misfortune can go hand-in-hand.

43

A) NO CHANGE
B) On the night of the fire,
C) In the vicinity of the theater,
D) Moreover,

Think about the previous passage as a whole as you answer question 44.

44

To make the passage most logical, paragraph 1 should be placed

A) where it is now.
B) after paragraph 2.
C) after paragraph 3.
D) after paragraph 4.

STOP

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

Math Test - No Calculator

25 MINUTES, 20 QUESTIONS

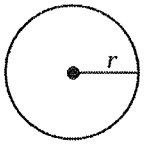
DIRECTIONS

For each question from 1-15, choose the best answer choice provided in the multiple choice bank and fill in the appropriate circle in the provided answer key. Alternatively, for questions **16-20**, answer the problem and enter your answer in the grid-in section of the answer key. Refer to the directions given before question 16 as to how to enter your answers for the grid-in questions. You may complete scratch work in any empty space in your test booklet.

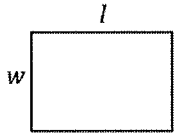
NOTES

A. Calculator usage **is not allowed** in this section.
B. Variables, constants, and coefficients used represent real numbers unless indicated otherwise.
C. All figures are created to appropriate scale unless the question states otherwise.
D. All figures are two-dimensional unless the question states otherwise.
E. The domain of any given function is all real numbers x for which the function, $f(x)$, is a real number unless the question states otherwise.

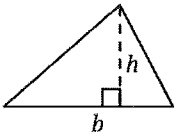
REFERENCE



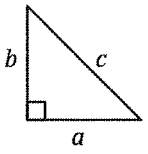
$A = \pi r^2$
$C = 2\pi r$



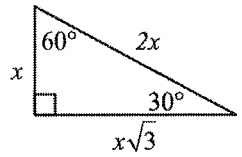
$A = lw$



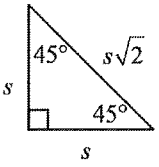
$A = \frac{1}{2}bh$



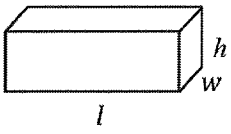
$c^2 = a^2 + b^2$



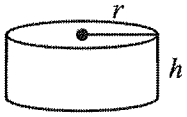
Special Right Triangle



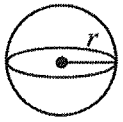
Special Right Triangle



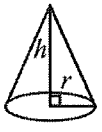
$V = lwh$



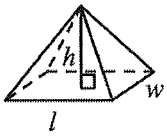
$V = \pi r^2 h$



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



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



$V = \frac{1}{3}lwh$

There are $360°$ in a circle.
There are 2π radians in a circle.
There are $180°$ in a triangle.

CONTINUE

1

Resha and Kiley wrote a total of 842 text messages in the last month. If Resha wrote 4 less than twice the number of text messages that Kiley wrote, which of the following equations could be solved to find x, the number of text messages written by Kiley?

A) $2x-4=842$

B) $3x-4=842$

C) $4-2x=842$

D) $4-x=842$

2

$$b\sqrt{b}$$

The expression above is *not* equivalent to which of the following expressions?

A) $\sqrt{b^3}$

B) $b^{\frac{3}{2}}$

C) $\frac{b^3}{b^2}$

D) $\sqrt{\frac{b^5}{b^2}}$

3

If $4x^2-17=11$, what is the value of $16x^2$?

A) -24

B) 7

C) 56

D) 112

4

$$4x+9y=12$$
$$5x+3y=12$$

What is the value of $3x+4y$ given that the coordinate pair (x,y) is a solution to the system of equations above?

A) 6

B) 8

C) 12

D) 24

CONTINUE

5

$$\frac{a-2}{2}=\frac{3a}{a+8}$$

If the equation above is true, what is the value of a^2?

A) –4

B) 4

C) 16

D) 256

6

A professional steam cleaning service charges its clients by using the expression $CLh+f$, where C is the number of cleaning machines, L is the number of laborers, h is the number of hours, and f is the square footage of the area to be cleaned. If the carpets at a certain location are stained much deeper than expected, which of the following values would be affected the most?

A) C

B) L

C) f

D) CLh

7

Line m is perpendicular to a line with the equation $y=-Kx+t$. If line m goes through the point $(4,3)$ and has a y-intercept at the point $(0,b)$, which of the following is equivalent to b?

A) $b=4-\frac{3}{K}$

B) $b=3-\frac{4}{K}$

C) $b=4+3K$

D) $b=3+4K$

8

$$2x+y=15$$
$$kx-4y=100$$

If the system of equations above has one solution at the point $(1,y)$, what is the value of k?

A) 13

B) 48

C) 152

D) 168

CONTINUE

9

The quadratic function $y=-(x-2)^2+4$ intercepts the origin. If the absolute maximum of the function occurs at point A, what is the distance between point A and the origin?

A) $2\sqrt{3}$

B) $2\sqrt{5}$

C) 5

D) $4\sqrt{3}$

10

In the polynomial $g(x)$, if $g(2)=1$, which of the following must be true?

A) $x-2$ is a factor of $g(x)$.

B) $x-1$ is a factor of $g(x)$.

C) $x+2$ is a factor of $g(x)$.

D) The remainder when $g(x)$ is divided by $x-2$ is 1.

11

The quadratic function $y=x^2-12x+20$ intercepts another quadratic function $y=-x^2+12x-34$ at the points A and B. What is the length of $\overline{AB}$?

A) 3

B) 4

C) 6

D) 9

12

If the expression $2x^2-7x+M$ is divided by the binomial $2x+5$, the remainder is $\frac{4M}{2x+5}$. What is the value of M?

A) 6

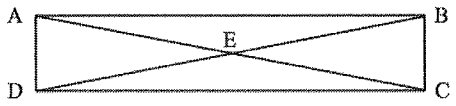
B) 10

C) 36

D) 100

CONTINUE

13



In the figure above, quadrilateral ABCD is a rectangle. If the measure of $\angle DAE$ is four times the measure of $\angle BAE$, what is the measure of $\angle AED + \angle BEC$ in degrees?

A) 18

B) 36

C) 72

D) 144

14

For integers a and b, if $|a-b| = 2a$ and $a+b=0$, which of the following must be true?

I. $a^2 = b^2$

II. $a-b<0$

III. $ab<0$

A) I only

B) I and III only

C) II and III only

D) I , II, and III

15

The coordinate pairs $(\frac{-1+\sqrt{13}}{3},0)$ and $(\frac{-1-\sqrt{13}}{3},0)$ are solutions to which of the following equations?

A) $y=3x^2+2x-4$

B) $y=\frac{3}{2}x^2+2x-8$

C) $y=x^2-16x+39$

D) $y=3x^2-40x+13$

CONTINUE

DIRECTIONS

For each question from 16-20, solve and enter your answer in the grid-in section of your answer sheet as described below.

A. Write out your answers in the boxes at the top of each column in order to help you fill in the circles accurately. Remember, you will only receive credit for the circles that are filled in correctly, not for the written answer at the top of the columns.

B. Mark only a single circle in each column.

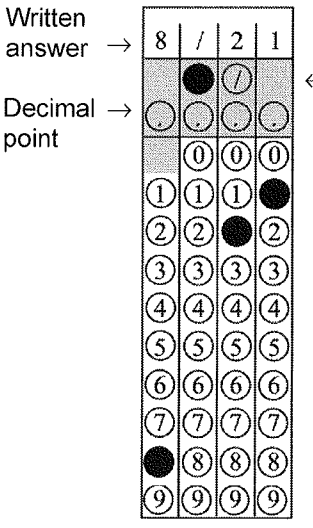
C. There are no negative answers.

D. If the problem has more than one correct answer, grid only one of the correct answers.

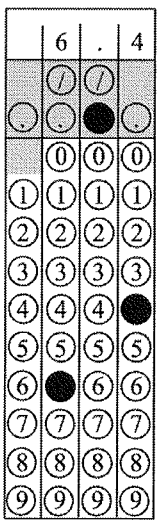
E. When your answer is a **mixed number**, such as $1\frac{1}{2}$, it should be entered as 1.5 or 3/2. You cannot enter a mixed number because there is no room to fill in a circle that represents a space.

F. If you enter a **decimal answer** with more digits then the grid can handle, the answer may be rounded or truncated, but it absolutely must fill the entire grid.

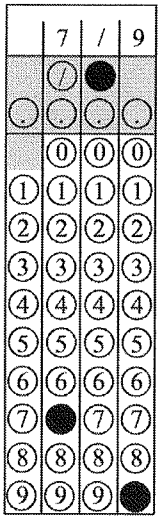
Answer: $\frac{8}{21}$

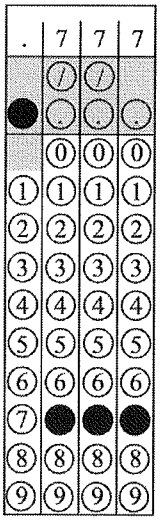


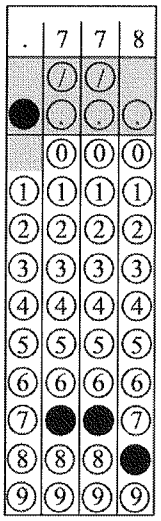
Answer: 6.4



The ways to correctly grid $\frac{7}{9}$ are:

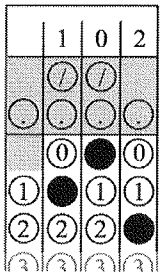


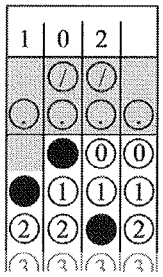




Answer: 102 - both positions are correct

REMEMBER:
You can begin writing your answers in any column as long as there is enough space. Leave unused columns blank.





CONTINUE

16

$$2+\frac{3}{7}(x-\frac{1}{3})=\frac{5}{2}$$

What value of x makes the equation above true?

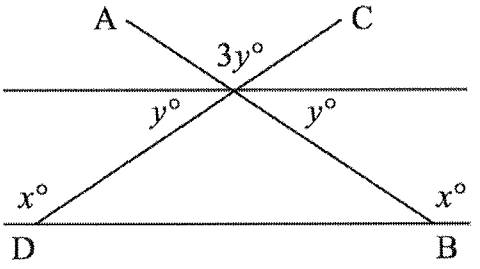
17

For what value of x, where $x>0$, is the equation $255=(x^2+1)(x^2-1)$ true?

18

In a recent gymnastics competition, Team A scored 30 points less than four times the number of points that Team B scored. Team C scored 61 points more than half of the number of points that Team B scored. If Team A and Team C shared in the victory, having earned the same number of points, how many more points did each team have than Team B?

19



If $\overline{AB}$ intersects $\overline{CD}$ as shown in the figure above, what is the value of x?

CONTINUE

20

A 26 foot bridge crosses a stream at an incline. If one bank of the river is 2 feet above the height of the water and the other bank is 12 feet above water level, what is the tangent of the angle that the bridge makes with the surface of the water?

STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.

Math Test - Calculator

55 MINUTES, 38 QUESTIONS

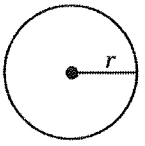
DIRECTIONS

For each question from 1-30, choose the best answer choice provided in the multiple choice bank and fill in the appropriate circle in the provided answer key. Alternatively, for questions **31-38**, answer the problem and enter your answer in the grid-in section of the answer key. Refer to the directions given before question 31 as to how to enter your answers for the grid-in questions. You may complete scratch work in any empty space in your test booklet.

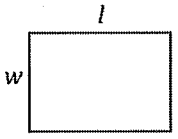
NOTES

A. Calculator usage **is allowed**.
B. Variables, constants, and coefficients used represent real numbers unless indicated otherwise.
C. All figures are created to appropriate scale unless the question states otherwise.
D. All figures are two-dimensional unless the question states otherwise.
E. The domain of any given function is all real numbers x for which the function, $f(x)$, is a real number unless the question states otherwise.

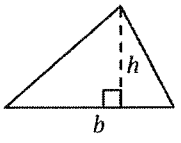
REFERENCE



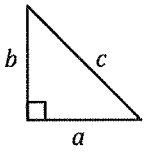
$A = \pi r^2$
$C = 2\pi r$



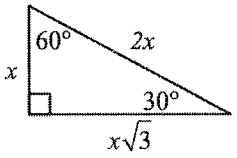
$A = lw$



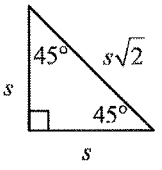
$A = \frac{1}{2}bh$



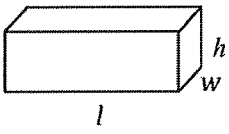
$c^2 = a^2 + b^2$



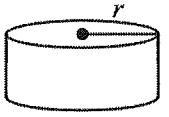
Special Right Triangle



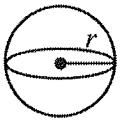
Special Right Triangle



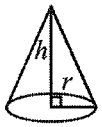
$V = lwh$



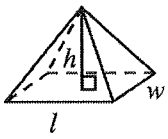
$V = \pi r^2 h$



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



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



$V = \frac{1}{3}lwh$

There are $360°$ in a circle.
There are 2π radians in a circle.
There are $180°$ in a triangle.

CONTINUE

1

$$(12x^2+5x+1)-(10x^2-5x-1)$$

The difference of the polynomials shown above is equivalent to which of the following expressions?

A) $2x^2+10x+2$

B) $2x^2+10x$

C) $2x^2+2$

D) $2x^2$

2

x	y
-3	5
0	7
6	11
9	13

Which of the following linear equations is displayed in the *xy*-table above?

A) $y=\frac{2}{3}x+7$

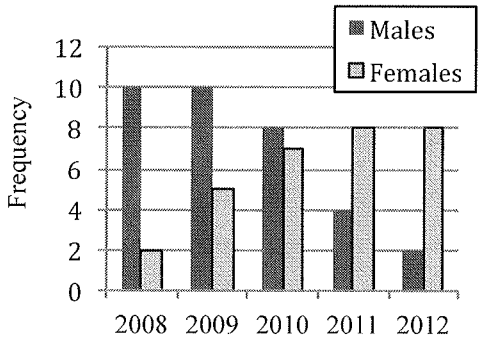
B) $y=\frac{2}{3}x+5$

C) $y=2x+7$

D) $y=3x+5$

3

Distribution of Actuarial Students



If one actuarial student were to be selected at random from all of the actuarial students from 2008 to 2012, what is the probability that the student is a female from either 2011 or 2012?

A) $\frac{3}{32}$

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

C) $\frac{1}{4}$

D) $\frac{11}{32}$

4

Approximately 22% of the students at Lakesedge High School are sophomores and 40% of the sophomores took the class Contemporary American Issues. If there are 1670 students in Lakesedge High School, approximately how many sophomores took Contemporary American Issues?

A) 135

B) 150

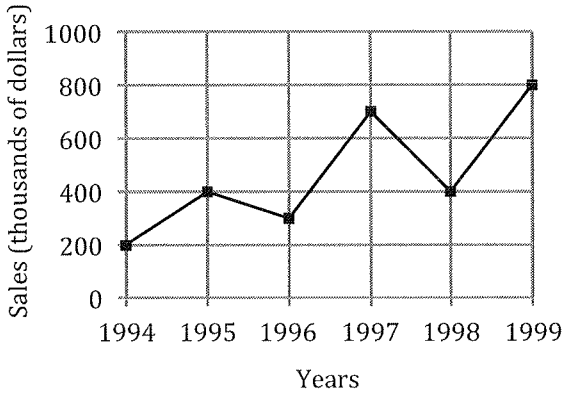
C) 370

D) 670

CONTINUE

5

Sales for a Computer Wholesale Company from 1994 to 1999



The graph above shows the total sales in thousands of dollars each year from 1994 to 1999 for a computer wholesale company. Which of the following best describes the trend in sales from 1994 to 1999?

A) The sales steadily increased each year.

B) The sales increased and then decreased.

C) The sales increased on average by approximately \$100 each year.

D) The sales increased on average by approximately \$100,000 each year.

6

If $\frac{7}{2}a = \frac{5}{b}$ and $a = 5$, what is the value of b?

A) $\frac{2}{7}$

B) $\frac{7}{2}$

C) $\frac{50}{7}$

D) 14

7

Madeline can drink 13 bottles of water in 5 minutes. Approximately how many seconds would it take Madeline to drink 3 bottles of water?

A) 1.2

B) 15

C) 23

D) 69

8

The enrollment for a training seminar for construction foremen on how to employ tablets as a means of updating progress at construction sites has increased by 18 people since the seminar's inception six years ago. If the current enrollment is 42 construction foremen, which of the following linear equations could be used to estimate the enrollment, y, based on the number of years, x, that have passed since the first year the seminar was held?

A) $y = 18x + 42$

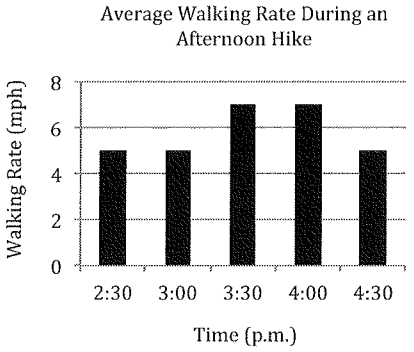
B) $y = 18x + 24$

C) $y = 3x + 42$

D) $y = 3x + 24$

CONTINUE

9



Hernando was hiking one afternoon and he would record his walking rate in miles per hour every half an hour until his hike was over. At one point during his hike, Hernando switched from walking uphill to walking downhill. If Hernando walks at a constant rate uphill and a constant rate downhill, Hernando most likely transitioned from walking uphill to walking downhill during which of the following time frames?

A) 2:30 to 3:00

B) 3:00 to 3:30

C) 3:30 to 4:00

D) 4:00 to 4:30

10

$$y = a(x-h)^2 + k$$

The quadratic equation above is the vertex form of a quadratic function where a, h, and k are constants and (h,k) is the vertex of the function's graph. Which of the following equations gives the x-coordinate of the vertex in terms or y, a, x, and k, where $x > 0$?

A) $h = \frac{y-k}{a} - x$

B) $h = x - \frac{y-k}{a}$

C) $h = \sqrt{\frac{y-k}{a}} - x$

D) $h = x - \sqrt{\frac{y-k}{a}}$

Questions 11 and 12 refer to the following information.

Name of Tree	Growth Rate (Feet per year)	Years to Maturity
Empress	15	3.33
Lombardy Poplar	10	6
Eucalyptus	8	5
Quaking Aspen	5	10
Cleveland Pear	4	7.5

The chart above shows the names, growth rates, and years to maturity of 5 of the fastest growing trees in the world. A tree's maturity is defined as the point at which a tree's future growth is negligable and the tree has reached its highest height.

11

Which of the following pairs of trees will be of the same approximate height when they have reached maturity?

A) Empress and Lombardy Poplar

B) Eucalyptus and Cleveland Pear

C) Empress and Quaking Aspen

D) Lombardy Poplar and Quaking Aspen

12

The tree with the greatest height at maturity is what percent taller than the tree with the lowest height at maturity?

A) 50

B) 66

C) 100

D) 200

CONTINUE

13

At an arcade, a machine dispenses 4 tokens for every dollar placed in the machine. If a boy uses his tokens at a steady rate and puts a ten dollar bill in the machine every 20 minutes, which of the following equations represents t, the total number of tokens dispensed by the machine in m total minutes of time?

A) $t = 20(4)m$

B) $t = 20(10)(4)m$

C) $t = \frac{4m}{20}$

D) $t = \frac{10(4)m}{20}$

14

Name	Time (seconds)
Andrew	12
Brenda	9
Larissa	14
Mandeep	8
Roger	13
Shobitha	6
Willamina	12
Xavier	8

As a fun project to get her students interacting with each other, a kindergarten teacher decided to have every student tie both of his or her shoes and she recorded the time that it took each student to complete the task. She recorded the data in the table above. What is the median time it takes one of the students to tie his or her shoes?

A) 9

B) 10.5

C) 11.5

D) 12

15

A student conducting an experiment would like to test the theory that temperature affects the elasticity before breaking of a rubber band. The student takes a random sample of 20 rubber bands from Company A and places them in the freezer for 15 minutes. The student also takes a random sample of 20 of the same sized rubber bands from Company B and places them on a warming tray for 15 minutes. After the 15 minutes have passed, the student tests all 40 rubber bands. All of the rubber bands from the freezer snapped at under 10 inches of stretch length and all of the rubber bands from the warming tray broke at over 10 inches of stretch length. Which of the following conclusions can be drawn by the student?

A) Frozen rubber bands have less elasticity before breaking than rubber bands that have not been frozen.

B) Frozen rubber bands have less elasticity before breaking than rubber bands that have been warmed.

C) Frozen rubber bands from Company A have less elasticity before breaking than frozen rubber bands from Company B.

D) The student cannot draw a conclusion because he does not know whether the frozen rubber bands have less elasticity before breaking because they were frozen or because they were made by a different company.

16

Osmium is the densest of all metals. A single liter of osmium weighs 50 pounds. If there are 3.88 liters in every gallon, how many gallons of osmium would weigh 582 pounds?

A) 2

B) 2.65

C) 3

D) 11.64

CONTINUE

Questions 17 and 18 refer to the following information.

$$y = 10 + 62x$$

$$y = 10(2)^x$$

Two stock market analysts have generated models for the growth of a stock that recently became publicly traded. The models predict the trading price of the stock, y, based on x, the number of years that have passed from the stock's opening trading date. Both analysts believe that the stock is going to be extremely successful over its first few years. However, one analyst believes that the stock will follow a linear growth model and the other analyst believes that the stock will see exponential growth.

17

By how much more does the analyst who generated the exponential model feel that the stock is going to increase from its 3rd to 4th year, than the analyst who predicts linear growth?

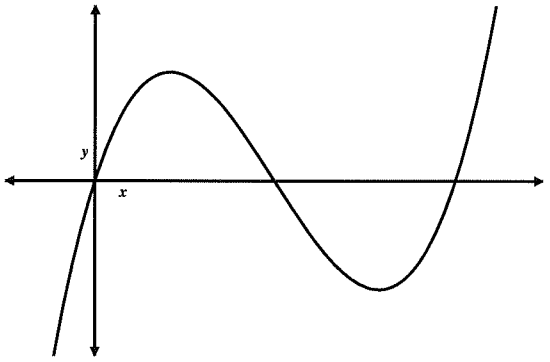
A) 18
B) 22
C) 40
D) 80

18

The linear growth model places the stock at its greatest advantage over the exponential model after approximately how many years have passed?

A) 2
B) 3
C) 4
D) 5

19



The function $g(x)$ is graphed in the xy-plane above. Which of the following could be the equation for $g(x)$?

A) $y = -x^2 + 2x$
B) $y = (x-3)^3$
C) $y = x^3 - 6x^2 + 8x$
D) $y = x^3 + 6x^2 + 8x$

20

The sum of four numbers is 84. If one of the numbers is equivalent to the sum of the other three numbers, what is the average of the other 3 numbers?

A) 7
B) 14
C) 21
D) 42

CONTINUE

21

On halloween, Mrs. Darcy had enough candy to give each person who came by her house 2 pieces of candy, and she then had 24 pieces of candy left over. If Mrs. Darcy had given each trick-or-treater 5 pieces of candy, she would have needed twice as much candy to give an equal amount to everyone that came by her house. How many trick-or-treaters came by Mrs. Darcy's house?

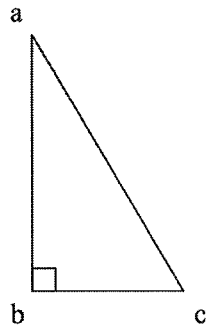
A) 48

B) 60

C) 96

D) 120

22



If the measure of $\angle acb$ is equivalent to $7x+4$ degrees and the measure of $\angle cab$ is equivalent to $4x-2$ degrees, what is the tangent of $\angle acb$?

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

B) $\frac{1}{\sqrt{3}}$

C) $\sqrt{3}$

D) 2

23

A cylindrical container of salt stands 6 inches tall and has a diameter of 3 inches. If all of the salt in the container is poured into another cylindrical container that has 3 times the diameter of the first container, how tall must the second container be, in inches, in order to hold the same amount of salt?

A) $\frac{1}{3}$

B) $\frac{2}{3}$

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

D) 2

24

$$H(x) = 2.1x + 48$$

The equation above is a best fit line that is used to predict the height of a person in inches, $H(x)$, given the person's shoe size, x, for shoe sizes where $6 < x < 13$. In a scatterplot, the residual of a data point is defined as the difference between an observed data point and a predicted data point, or *observed* – *predicted*. If the residual for a particular person who had a size 10 shoe was -3, what was the observed height in inches of the person?

A) 66

B) 69

C) 72

D) 75

CONTINUE

25

By what percent must each side of a cube with a volume of 8 cubic inches be increased in order to attain a volume of 27 cubic inches?

A) 25%

B) 50%

C) 67%

D) 150%

26

Which of the following *does not* detail an account balance that grows exponentially?

A) At the end of each month, an account grows by 5% of the total value of the account.

B) At the end of each month, an account increases by one tenth of its current value.

C) At the end of each month, an account increases by 10% more than $100.

D) At the end of each month, an account increases by 99% less than its current value.

27

Two different lines with two different slopes are both satisfied by the coordinate pairs $(5,24)$ and $(15,h^2)$, where h happens to be the value of each of their respective slopes. What is the sum of the two slopes?

A) -10

B) -2

C) 10

D) 14

28

$$a = 2b+3$$
$$4c = 5d+6$$

In the system of linear relationships above, if a is equivalent to $3c$, which of the following expressions is equivalent in value to d?

A) $\frac{8b-6}{15}$

B) $\frac{8b+6}{5}$

C) $\frac{8b-3}{15}$

D) $\frac{2b-3}{5}$

CONTINUE

29

A radioactive isotope has decayed to a size of 202 kilograms over the last 20 years. If the isotope has a half-life of 40 years, which of the following is equivalent to I, the initial mass of the isotope 20 years prior?

A) $I = 202(\frac{1}{2})^2$

B) $I = 101(\frac{1}{2})^2$

C) $I = 101\sqrt{2}$

D) $I = 202\sqrt{2}$

30

In a group of 250 men and women, some are doctors and some are lawyers. There are 50 more women than men and there are 100 fewer doctors than lawyers. If there are 30 male doctors and a woman is to be selected at random, what is the probability that the woman is a lawyer?

A) $\frac{3}{10}$

B) $\frac{2}{5}$

C) $\frac{3}{5}$

D) $\frac{7}{10}$

CONTINUE

DIRECTIONS

For each question from 31-38, solve and enter your answer in the grid-in section of your answer sheet as described below.

A. Write out your answers in the boxes at the top of each column in order to help you fill in the circles accurately. Remember, you will only receive credit for the circles that are filled in correctly, not for the written answer at the top of the columns.

B. Mark only a single circle in each column.

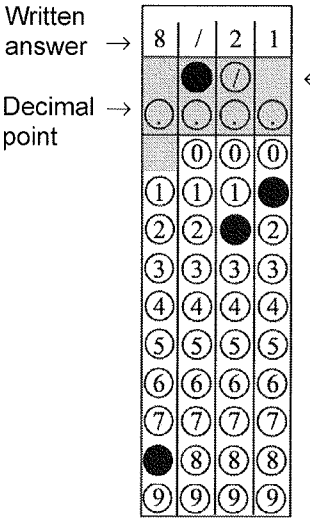
C. There are no negative answers.

D. If the problem has more than one correct answer, grid only one of the correct answers.

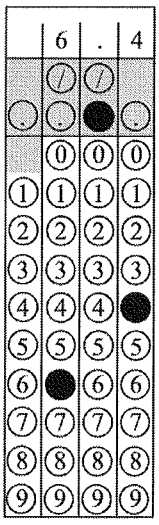
E. When your answer is a **mixed number**, such as $1\frac{1}{2}$, it should be entered as 1.5 or 3/2. You cannot enter a mixed number because there is no room to fill in a circle that represents a space.

F. If you enter a **decimal answer** with more digits then the grid can handle, the answer may be rounded or truncated, but it absolutely must fill the entire grid.

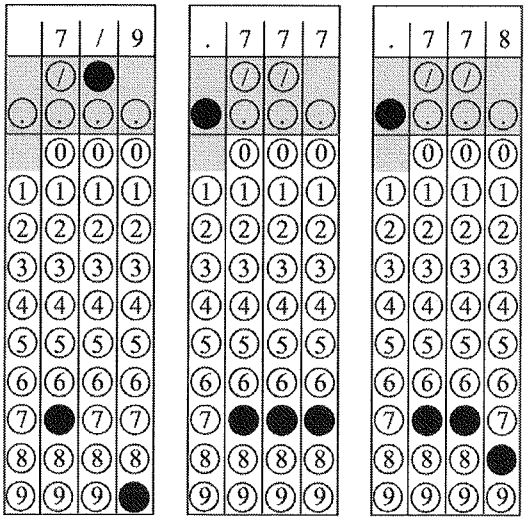
Answer: $\frac{8}{21}$



Answer: 6.4

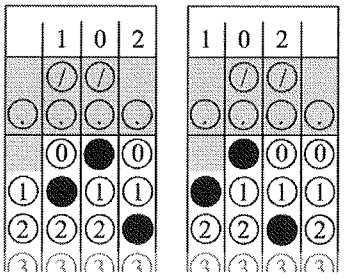


The ways to correctly grid $\frac{7}{9}$ are:



Answer: 102 - both positions are correct

REMEMBER: You can begin writing your answers in any column as long as there is enough space. Leave unused columns blank.



CONTINUE

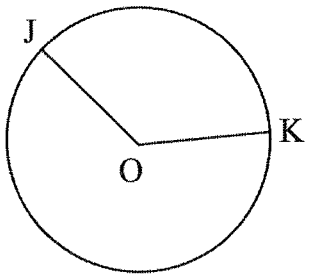
31

If the function $g(x)$ is created by adding the expression $-x^2+22$ to the expression $2x^2+7x-52$, what is the absolute value of the sum of the roots of $g(x)$?

32

Jefferson has at least one ten-dollar bill, one five-dollar bill, and one one-dollar bill in his wallet. If Jefferson has $30 in his wallet, what is one possible number of one-dollar bills he can have in his wallet?

33



If the measure of arc $\overset{\frown}{JK}$ is 7 and the area of circle O is 16π, what is the measure of $\angle JOK$ in radians?

34

If $x>-2$ and $y\geq\frac{13}{2}x+20$, what is the least integer value of y that satisfies the system of linear inequalities?

CONTINUE

35

The sum of 8 different positive integers is 124. If at least 3 of the integers are greater than 10, what is the greatest possible value that one of the integers can have?

36

$$f(x) = x^2 + abx + bc$$

In the function above, a, b, and c are positive integer constants. If $f(x)$ has only one root at the point $(-4,0)$ and $b < a < c$, what is one possible value for the product abc?

CONTINUE

Questions 37-38 refer to the following information.

$$w = mg$$

The weight of an object, measured in Newtons, N, is the force of gravity acting on the object It can be calculated by multiplying the mass of an object, in kilograms, or kg, by gravitational acceleration in meters per second squared, or m/s^2. The gravitational acceleration on Earth is 9.8 m/s^2 and the gravitational acceleration on Mars 3.75 m/s^2.

37

If one Newton of force is equivalent to approximately 0.225 pounds of force and a 200-pound man were to stand on a standard scale on the surface of Mars, what would the scale read in pounds? *(Round the answer to the nearest tenth of a pound.)*

38

If the same man were to stand on the scale on a mysterious planet and the scale read 1,000 pounds, the planet would have to have a gravitational acceleration that was how many times as large as the gravitational acceleration on Mars? *(Round the answer to the nearest whole number.)*

STOP

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