2017

NEW YORK CITY PUBLIC SCHOOLS
SPECIALIZED HIGH SCHOOLS ADMISSIONS TEST
GRADE 8

USE A PENCIL ONLY

SIDE 1

8

1. **STUDENT STATEMENT:** I am well enough to take this test and complete it. I understand that once I break the seal of the test booklet, I may not be eligible for a make-up test. I am a New York City resident and a Grade 8 student taking a Grade 8 test. I understand that a student who is not a New York City resident, who takes the test more than once in a given school year, or who takes the test at the wrong grade level will be disqualified from acceptance to any of the specialized high schools.

Signature (full name, first name first): _____

2. **TODAY'S DATE:** _____

    Month   Day   Year

3. **DATE OF BIRTH:** _____

    Month   Day   Year

CAREFULLY RECORD YOUR NAME, SCHOOL CHOICES, INFORMATION ABOUT THE SCHOOL WHERE YOU ARE NOW ENROLLED, DATE OF BIRTH, AND STUDENT ID NUMBER.
USE A PENCIL ONLY. INCORRECT MARKS MAY DELAY THE SCORING OF YOUR ANSWER SHEET.

4. **FIRST NAME (please print)** — **MI**

5. **LAST NAME (surname) (please print)**

5. **CHOICES OF SPECIALIZED HIGH SCHOOLS**

Indicate your school choice in order of preference.
- Fill in only one school for each choice.
- You **must** fill in a first choice school.
- Fill in only one circle in a row and only one circle in a column.

School choices indicated on the answer sheet are final.

SCHOOLS	1st choice	2nd choice	3rd choice	4th choice	5th choice	6th choice	7th choice	8th choice
Bronx Science	○	○	○	○	○	○	○	○
Brooklyn Latin	○	○	○	○	○	○	○	○
Brooklyn Tech	○	○	○	○	○	○	○	○
HS Math, Sci., & Engineering	○	○	○	○	○	○	○	○
HS American Studies/Lehman	○	○	○	○	○	○	○	○
Queens Sci./York	○	○	○	○	○	○	○	○
Staten Island Tech	○	○	○	○	○	○	○	○
Stuyvesant	○	○	○	○	○	○	○	○

6. **DATE OF BIRTH**

Month	Day			Year		
JAN	1	11	21	19	0	0
FEB	2	12	22	20	1	1
MAR	3	13	23		2	2
APR	4	14	24		3	3
MAY	5	15	25		4	4
JUN	6	16	26		5	5
JUL	7	17	27		6	6
AUG	8	18	28		7	7
SEP	9	19	29		8	8
OCT	10	20	30		9	9
NOV			31			
DEC						

7. **SCHOOL WHERE YOU ARE NOW ENROLLED**

NAME OF SCHOOL _____

School Code

Ⓟ Fill in for private or parochial schools only

(School Code columns include letters: K M Q X R W)

8. **STUDENT ID NUMBER**

9. **BOOKLET LETTER AND NUMBER**

(Letters: A B C D E F G H J K L P Q W; digits 0–9)

198824-001:321

38

Test Booklet Letter   Test Booklet Number

Student's First Name (please print)

Student's Last Name (please print)

PART 1   ENGLISH LANGUAGE ARTS

1. (A) (B) (C) (D)
2. (E) (F) (G) (H)
3. (A) (B) (C) (D)
4. (E) (F) (G) (H)
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57. (A) (B) (C) (D)

PART 2   MATHEMATICS

58, 59, 60, 61, 62 (grid-in response boxes with digits 0-9)

63. (A) (B) (C) (D)
64. (E) (F) (G) (H)
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111. (A) (B) (C) (D)
112. (E) (F) (G) (H)
113. (A) (B) (C) (D)
114. (E) (F) (G) (H)

SAMPLE TEST, FORM A
PART 1 — ENGLISH LANGUAGE ARTS

Suggested Time — 90 Minutes

57 QUESTIONS

REVISING/EDITING

QUESTIONS 1–20

IMPORTANT NOTE

The Revising/Editing section (Questions 1-20) is in two parts: Part A and Part B.

REVISING/EDITING Part A

DIRECTIONS: Read and answer each of the following questions. You will be asked to recognize and correct errors in sentences or short paragraphs. Mark the **best** answer for each question.

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1. Read this sentence.

> During a nightly-news segment about a cooking contest, a reporter talked to some people who did the best in the contest.

Which of these is the most precise revision for the words **talked to some people who did the best in the contest**?

A. conversed with some of the people who won the contest
B. spoke to the three contestants who did well
C. discussed the contest with some of the winners
D. interviewed the top three contestants

2. Read this paragraph.

> (1) When coal was used to heat homes, it frequently left a soot stain on the walls. (2) Brothers Cleo and Noah McVicker, who owned a cleaning product company, created a doughy substance to help people remove this soot. (3) Over time, as natural gas becomes more common, people had little need for soot cleansers, and the McVickers' family company struggled to stay in business. (4) Then one day, Joe McVicker, Cleo's son, learned that his sister-in-law had been using the substance for art projects in her classroom, so he remarketed the product as the toy known today as Play-Doh.

Which sentence should be revised to correct an inappropriate shift in verb tense?

E. sentence 1

F. sentence 2

G. sentence 3

H. sentence 4

3. Read this sentence.

> The animal shelter, which is located on Midway Street, is looking for volunteers to help with a variety of tasks, such as walking dogs cleaning kennels, hand-feeding newborn kittens, and supporting the pet adoption process.

Which edit should be made in this sentence?

A. delete the comma after *shelter*

B. insert a comma after *volunteers*

C. insert a comma after *dogs*

D. delete the comma after *kennels*

4. Read these sentences.

> (1) Flyby missions near Jupiter have been happening since 1973.
>
> (2) Flyby missions allow scientists to collect data about Jupiter and its moons.

What is the best way to combine these sentences to clarify the relationship between the ideas?

E. Flyby missions near Jupiter, which allow scientists to collect data about the planet and its moons, have been happening since 1973.

F. Although there have been flyby missions near Jupiter since 1973, they have allowed scientists to collect data about the planet and its moons.

G. Flyby missions near Jupiter allow scientists to collect data about the planet and its moons, which have been happening since 1973.

H. Since 1973 flyby missions have been happening near Jupiter, but they allow scientists to collect data about the planet and its moons.

5. Read this paragraph.

> (1) Eliza and Brianna have been singing in their school chorus since they were in fourth grade. (2) The girls always sing a duet at the school talent show, and they take turns singing the national anthem before school sporting events. (3) Outside of school, she also sings in a choir made up of young and old members of her community. (4) Both girls hope that they will be able to continue singing for many more years.

Which sentence should be revised to correct a vague pronoun?

A. sentence 1

B. sentence 2

C. sentence 3

D. sentence 4

6. Read this sentence.

> In 1962 the agile athletic Wilt Chamberlain became the first and only professional basketball player in the United States to score 100 points in a single game.

Which edit should be made to correct this sentence?

E. insert a comma after *agile*

F. insert a comma after *Chamberlain*

G. insert a comma after *only*

H. insert a comma after *States*

DIRECTIONS: Read the passage below and answer the questions following it. You will be asked to improve the writing quality of the passage and to correct errors so that the passage follows the conventions of standard written English. You may reread the passage if you need to. Mark the **best** answer for each question.

Unlock, Ride, Return

(1) In metropolitan areas around the world, millions of cars, trucks, and taxis pack the streets every day, causing headaches for commuters and polluting the environment. (2) Public transportation eases some of this congestion, but crowding and potential delays are still an issue for many travelers. (3) In recent years, another transportation option has been gaining momentum in some cities. (4) This option is all about sharing bicycles, which is a creative and new idea for some.

(5) The bike share concept is fairly simple. (6) Bike stations are set up at multiple locations in a city. (7) Frequent users can purchase a membership pass, while less-frequent users or tourists can buy a daily permit. (8) Many city bikers prefer bike sharing over ownership. (9) They are not responsible for the bike's storage or its maintenance. (10) Tourists also benefit from having an affordable way to experience the sites of a city.

(11) The largest bike sharing program in the United States today is in New York City. (12) Known as Citi Bike, the program was launched in 2013 and now boasts 10,000 bikes spread across 600 stations in Manhattan, Brooklyn, and Queens. (13) Similarly, in Hangzhou, China, a city of 7 million residents, there are approximately 75,000 bikes offered across 2,700 stations. (14) In 2016, people used Citi Bike for a lot of trips, which turned out to be a huge increase in the number of people taking rides from the previous year. (15) These numbers are likely to increase further, since the program is set to expand into additional neighborhoods soon. (16) According to Citi Bike, the bike sharing concept has gained rapid popularity because it is "faster than walking, cheaper than a taxi, and more fun than the subway."

(17) New York City officials estimated that in 2016 the bike share program had kept nearly 5,000 tons of carbon dioxide out of the city's air. (18) Officials in Montreal, Canada, and Lyon, France, have noted similar impacts on air quality.

(19) As populations grow, fuel costs increase, and environmental concerns escalate, people will continue to search for more economical and environmentally friendly ways to travel. (20) Bike sharing is a new mode of transportation.

7. Which sentence should replace sentence 4 to more clearly introduce the topic of this passage?

   A. Bike share programs have become an accessible and environmentally friendly solution for many urban travelers.

   B. Bike share programs are successful because both residents and tourists can use the bicycles to travel within a city.

   C. Bike share programs offer an alternative form of transportation in urban areas that is faster than using a car or taxi.

   D. Bike share programs have created an affordable mode of transportation for people in large cities throughout the world.

8. Which sentence can best follow sentence 6 to help develop the ideas in the second paragraph (sentences 5–10)?

    E. Bike sharing stations that are located near tourist destinations or major transportation hubs are the most popular.

    F. A person obtains a bike from one station, rides it for a period of time, and then returns the bike to the original station or to another station within the system.

    G. A mechanism called a dock keeps each bicycle securely locked to the station until a user comes along, releases the lock, and starts a ride.

    H. Bike sharing stations have been built in many of the largest cities in the United States, including Boston, San Francisco, Chicago, Minneapolis, and Denver.

9. What is the best way to combine sentences 8 and 9 to clarify the relationship between the ideas?

    A. Although they prefer bike sharing over ownership, many city bikers are not responsible for the bike's storage or its maintenance.

    B. Many city bikers prefer bike sharing over ownership, and they are not responsible for the bike's storage or its maintenance.

    C. Since many city bikers prefer bike sharing over ownership, they are not responsible for the bike's storage or its maintenance.

    D. Many city bikers prefer bike sharing over ownership because they are not responsible for the bike's storage or its maintenance.

10. Which revision of sentence 14 uses the most precise language?

    E. In 2016, data revealed that Citi Bike was used for millions of trips, which shows that the program had a 40 percent increase in ridership from the previous year.

    F. In 2016, nearly 14 million trips were recorded by Citi Bike, which adds up to a huge increase in ridership compared with the previous year.

    G. In 2016, Citi Bike documented nearly 14 million trips, which amounted to an astonishing 40 percent increase in ridership from the previous year.

    H. In 2016, Citi Bike saw several million trips, which turned out to be a big increase in ridership from the previous year.

11. Which sentence should be added before sentence 17 to improve the organization of the fourth paragraph (sentences 17–18)?

    A. Experts increasingly want to discuss the positive effects of bike sharing programs, such as Citi Bike, in big cities.

    B. While bike sharing programs offer clear benefits to riders, some people cite another reason for their support of the bike share model.

    C. If bike sharing programs are going to continue to increase in popularity, it is important for communities to discuss all the benefits these programs offer.

    D. Citi Bike is an innovative program that can cite positive statistics about ridership from one year to another.

12. Which sentence could best follow sentence 18 and support the main point of the fourth paragraph (sentences 17–18)?

    E. Bike share programs are developed in cities mainly to improve air quality.

    F. Participating in a bike share program is the main way travelers can improve air quality in cities.

    G. Cities may begin to experience improved air quality as more travelers use bike share programs.

    H. Bike share programs may be more effective at improving air quality in some cities than they are in other cities.

13. Which sentence is irrelevant to the ideas in the third paragraph (sentences 11–16) and should be deleted?

    A. sentence 12

    B. sentence 13

    C. sentence 15

    D. sentence 16

14. Which concluding sentence should replace sentence 20 to better support the information presented in the passage?

    E. Over time, bike sharing may become a routine part of modern urban life.

    F. Even small- or medium-sized cities can benefit from implementing a bike share program.

    G. Compared with other solutions, bike sharing seems to have the most potential.

    H. Ultimately, bike sharing is an interesting and unique way for tourists to explore a city.

Pursuing a Hobby

(1) A hobby is an activity or interest that a person pursues for pleasure or relaxation. (2) For some it is a sport or a game, while for others it is an art, a craft, or a volunteer opportunity. (3) Becoming involved in a hobby can seem difficult and time consuming, but that should not stop people from pursuing one.

(4) Hobbies can be an outlet for the stress of everyday life. (5) School, work, family responsibilities, and relationships can all compete for a person's time and attention. (6) Many people exhibit psychological symptoms of stress, such as boredom, tension, and anxiety. (7) Others report physical symptoms, including low energy, headaches, and insomnia. (8) Reading books, creating works of art, or playing games can give the human mind a reprieve from stress. (9) But stress relief is not the only benefit of pursuing a hobby.

(10) People who regularly pursue a hobby spend time in what is called active leisure. (11) Active leisure involves doing an activity that is relaxing but that also expends some mental or physical energy, such as following a pattern to knit a scarf, analyzing statistics about a favorite sports team, or doing light noncompetitive exercise. (12) During active leisure, people may experience what experts call flow, or a state of effortless concentration. (13) Pursuing a stimulating hobby can help a person find flow, which psychologists believe is more relaxing and restorative than passive leisure activities, such as watching television. (14) Many successful businesspeople and celebrities have said that they pursue hobbies in their free time.

(15) Another benefit of hobbies is that they can encourage positive social interaction among people with similar interests. (16) A hobbyist might decide to do something to get better at a hobby or go to places with other people interested in the hobby. (17) Making connections and having discussions with fellow hobbyists can enhance a person's knowledge about a hobby while fostering new friendships.

(18) Free time is a precious commodity, and spending it engaged in a hobby has many advantages. (19) Finding an enjoyable hobby may take effort, but the physical, mental, and social effects of engaging in a hobby are overwhelmingly positive.

15. Which sentence should follow sentence 3 to state the main claim of the passage?

    A. Hobbies offer a variety of benefits, and people should set aside time to pursue them.

    B. People should select a hobby carefully before investing the time and resources.

    C. Hobbies are a productive way to spend free time, so people should pursue them.

    D. People should find hobbies that bring them pleasure and enjoyment.

16. Which transition word or phrase should be added to the beginning of sentence 6?

    E. For example

    F. Indeed

    G. As a result

    H. Also

17. Read this sentence.

> Active hobbies, such as jogging or yoga, can also provide relief from some of the effects of stress, because they prompt the body to release chemicals called endorphins, which can promote positive feelings.

Where should this sentence be added to best support the ideas in the second paragraph (sentences 4–9)?

- **A.** between sentences 6 and 7
- **B.** between sentences 7 and 8
- **C.** between sentences 8 and 9
- **D.** at the end of the paragraph (after sentence 9)

18. Which revision of sentence 16 uses the most precise language?

- **E.** A hobbyist might try to learn more about a hobby or go to events with other people who also like the same hobby.
- **F.** A hobbyist might enroll in a course related to the hobby or attend a convention with other people who enjoy the hobby.
- **G.** A hobbyist might try to find new information about a hobby or go to places where other people are involved with the hobby.
- **H.** A hobbyist might want to expand his or her knowledge of a hobby or do an activity with other people who pursue the same hobby.

19. Which sentence would best follow sentence 17 to support the ideas in the fourth paragraph (sentences 15–17)?

- **A.** Meaningful friendships are associated with an increased sense of self-confidence and happiness.
- **B.** Participating in a hobby with friends is usually more enjoyable than pursuing a hobby alone.
- **C.** Friends who enjoy pursing a hobby together will likely enjoy pursuing other hobbies together.
- **D.** Forming deep and rich friendships can become more challenging as people get older.

20. Which sentence is irrelevant to the ideas presented in the third paragraph (sentences 10–14) and should be deleted?

- **E.** sentence 10
- **F.** sentence 11
- **G.** sentence 13
- **H.** sentence 14

DIRECTIONS: Read the passage below and answer the questions following it. Base your answers **on information contained only in the passage.** You may reread a passage if you need to. Mark the **best** answer for each question.

The eruption of the Philippine volcano Mount Pinatubo in June 1991 sent a huge cloud of gas and dust encircling the globe. The dust and ash from Mount Pinatubo was blamed
5   for a two-year decrease in global temperature, changes in weather patterns, and damage to the ozone layer. The situation brings to mind a meteorological event that occurred 175 years earlier. At that time,
10   harsh weather conditions plagued much of eastern North America and, to a lesser extent, northern Europe.

April 1816 brought typical spring weather to upstate New York and New England; trees
15   budded, and farmers prepared to plow and plant. In May, however, the expected warm temperatures failed to arrive. Most people remained optimistic, waiting for the summer that was "just around the corner." They
20   waited in vain. June ushered in what modern meteorologists call "The Year Without a Summer." During the first week of June, ten inches of snow fell on New England. Throughout the month, temperatures rarely
25   rose above the 30s. Many farmers replanted crops several times, only to see them stunted or destroyed by sleet, hail, and icy winds. July and August brought little improvement. During most days the temperature stayed in
30   the 40s. Farmers' diaries document the farmers' daily struggles with near-freezing temperatures, failing crops, and dying farm animals. The few crops that managed to survive were killed by frost in mid-
35   September. Winter came early in New England and was unusually severe. Even the South was affected; on July 4, the high temperature for Savannah, Georgia, was only 46 degrees!

40   Some religious leaders warned their congregations that the unusual weather meant that the end of the world was drawing near. Other leaders attributed the cool weather to unusual sunspot activity. The
45   proliferation of the newly invented lightning rod was also blamed. Some people believed that lightning rods had interrupted the natural temperature balance of Earth, causing the cooler temperatures.

50   It was not until October that the first plausible explanation for "The Year Without a Summer" was suggested. A German astronomer, Friedrich Bessel, reported seeing thick clouds of dust in the upper atmosphere.
55   He theorized that these dust particles screened portions of Earth from the warming rays of the sun. It was discovered that in April 1815, Mount Tambora, an Indonesian volcano, had erupted with such force that it
60   had sent an estimated 100 cubic miles of fine dust into the atmosphere. Witnesses to the eruption reported that the sky remained dark for two days. The dust then rose high into the stratosphere, where it encircled the world for
65   several years to come.

Skeptics in 1816 doubted that a faraway volcano could steal their summer. However, most present-day researchers believe Bessel's explanation to be generally correct,
70   demonstrating the global nature of weather. The dust in the atmosphere eventually settled, and the spring of 1817 was back to normal.

21. Which of the following best tells what this passage is about?

   A. the belief of some religious leaders that the end of the world was coming in 1816
   B. a summer of strange weather and its probable cause
   C. the importance of summer weather to agriculture in New England
   D. a comparison of the weather of 1816 and 1991

22. What is the most likely reason farmers persisted in replanting their crops?

   E. They believed that the cold weather could not continue all summer long.
   F. They thought that crops would be able to survive even though the weather remained cold.
   G. The weather had warmed up by July.
   H. They thought the June snowfalls would provide needed moisture.

23. In the winter that followed the summer of 1816, New Englanders most likely experienced

   A. new weather events that they had not encountered before.
   B. temperatures that were warmer than usual for that time of year.
   C. shortages of fruits, vegetables, and other essential crops.
   D. difficulty adjusting to a different time line for planting crops.

24. Which of the following is implied by the phrase "the global nature of weather" (line 70)?

   E. Understanding weather events around the world is important for making weather predictions.
   F. Extreme weather conditions in some parts of the world can have a lasting impact on a geographical area.
   G. Natural disasters tend to occur in different parts of the world at the same time.
   H. Conditions in one part of the world can affect weather in another part of the world.

25. The author includes the details about the eruption of Mount Tambora in lines 57–65 in order to

   A. emphasize that the aftermath of the eruption still affects the environment today.
   B. highlight the severe impact that the eruption had on the atmosphere.
   C. provide details about what happens during a volcanic eruption.
   D. suggest that weather events around the world caused the eruption.

26. The cold summer of 1816 was most likely caused by

    E. unusual sunspot activity.
    F. the excessive use of lightning rods.
    G. damage to the ozone layer.
    H. an increase in dust in the atmosphere.

27. How does the third paragraph contribute to the passage?

    A. It presents the most probable cause of the 1816 weather.
    B. It shows how nineteenth-century people explained the 1816 weather.
    C. It presents a theory about the 1816 weather that some skeptics doubted.
    D. It includes eyewitness reports to describe the source of the 1816 weather.

The British novelist Charles Dickens is well known for the colorful and eccentric characters he created in his many novels. But one of his books, *David Copperfield*, seems to
5 have a great deal to do with fact as well as fiction. After attempting to write his autobiography, Dickens abandoned the project and began to work on a novel, the plot of which was loosely based on his own
10 boyhood experiences. Apparently, it was easier for him to weave the events of his own life into the fiction of *David Copperfield* than to write about them in nonfiction.

Some of Dickens's most troubling memories
15 involved a job he held in 1824 as a 12-year-old child. Because his family was deeply in debt, he was forced to quit school and go to work in a London factory, pasting labels on pots of shoe polish. Dickens lived in a
20 boardinghouse, using his meager wages to support himself and to help pay his family's debts. He worked in the dreary, run-down factory six days a week from 8:00 a.m. to 8:00 p.m. Such long hours were not unusual
25 at the time, for children or adults, but Dickens was miserable during the entire four months he spent working at the factory.

Even when the family finances improved, Dickens continued to work at the factory
30 until his father quarreled with Dickens's boss, who promptly dismissed the son. Dickens was upset at being fired but relieved to be out of the factory. Thus he felt betrayed when his mother, anxious for the boy's weekly
35 wage, succeeded in making peace and getting Dickens's job back for him. The father, however, now sided with his son, and the boy

was sent back to school. "I know how these things have worked together to make me
40 what I am," Dickens later wrote, but he never forgot that his mother was eager for him to return to work.

As an adult, Dickens always remembered the shame and humiliation he felt during those
45 months at the factory. For years afterward, whenever in London, he could not go near the sites of the factory and boardinghouse, going out of his way to avoid those painful reminders of his past. In fact, Dickens never
50 told his wife and children about his childhood work experience. It was only after his death that they heard of it from a family friend whom Dickens had confided in.

Instead, Dickens expressed his feelings by
55 giving his fictional "other self," David Copperfield, a job similar to the one he had so hated. In the novel, ten-year-old David is forced by his harsh stepfather to work as a bottle washer in a factory. Young David, who
60 "suffered exquisitely" as a child manual laborer, was apparently Dickens's way of dealing with his own past. *David Copperfield* was to become Dickens's most popular novel, and Dickens himself called it his "favorite
65 child."

28. Which of the following best tells what this passage is about?

E. Dickens's motivations for becoming a writer
F. Dickens's childhood relationship with his parents
G. the autobiographical basis for Dickens's *David Copperfield*
H. the characters created by Dickens for *David Copperfield*

29. In the fourth paragraph, the author includes details about Dickens's experiences as an adult in order to

A. highlight that the time Dickens spent working in the factory affected him throughout his life.
B. emphasize that Dickens made sure he would never have to work in a factory again.
C. highlight that Dickens did not readily share details about his childhood with others.
D. emphasize that Dickens did not want his own children to experience hardships.

30. The details in the second and third paragraphs suggest that young Dickens

E. struggled to perform his job in the factory.
F. worried about the financial situation of his family.
G. wished he had a better relationship with his parents.
H. preferred attending school to working in a factory.

31. Which of the following is the most likely reason that Dickens wrote *David Copperfield*?

A. He needed money from the novel to help pay his family's debts.
B. He needed a way to cope with the difficulties of his childhood.
C. He wanted to avoid telling his children about his experiences in the factory.
D. He wanted to explain how his childhood had influenced his adult life.

32. Based on the details in the third paragraph, what can be concluded about the relationship between Dickens and his mother?

E. He avoided her after he was allowed to return to school.
F. He resented her for putting the need for his wages above his happiness.
G. He hoped she would understand why attending school was important to him.
H. He recognized that she had the authority to negotiate on his behalf.

33. What most directly enabled Charles Dickens to return to school?

A. the discussion between his mother and his boss
B. the argument between his father and his boss
C. getting fired from the factory
D. getting support from his father

When you eat an orange, your experience of its flavor comes from the combination of its aroma and its taste. Taste buds, the sensory receptors on the tongue, convey information to the brain about chemicals in food while the food dissolves in saliva. The sense of smell comes into play when the olfactory nerve in the nasal passages senses even very low concentrations of food chemicals in gaseous form. The sense of smell has a larger role in tasting flavors than most people realize—that is, until they have a stuffy nose and nothing tastes good.

If taste and smell depend on our detection of food chemicals, one might expect that chemists would be able to duplicate the flavors of foods. In fact, a surprising number of popular food flavors can now be reproduced in the laboratory, and even more are on the way. Orange, perhaps the most popular flavor worldwide, has been reproduced successfully. So have some national favorites, including cashew (Latin America), paprika (Hungary), and fruit-flavored Jamaica (Mexico). Synthetic flavors are not limited to flavoring food; they are also added to mouthwashes, toothpastes, beverages, and other consumer products.

Only a small proportion of the chemical components occurring naturally in foods actually contributes to their flavor. To identify these critical components, scientists use a gas chromatograph to separate a food into its basic chemical constituents. Flavor experts, called flavorists, then attempt to isolate those chemicals that are essential to the distinctive flavor of a food. Mechanical techniques have been developed to capture the aromas of food as it is being prepared—such as the smell of baking bread—and distill the essential chemicals from these essences. Flavorists use their highly developed senses of taste and smell to attempt to produce acceptable flavorings that are chemically identical to, but purer than, flavors that are naturally present in unprocessed food.

Although American consumers claim to want "natural" flavors in their food, taste tests demonstrate that they often prefer their synthetically produced counterparts. Artificial flavors tend to be stronger and less subtle than natural flavors. For example, many Americans prefer a soft drink created with artificial flavors, such as orange soda, over an "all-natural" soda flavored with real oranges, which may taste weak in comparison. In fact, some flavorists worry that consumers will develop such a strong taste for artificial flavors that natural flavorings, usually more expensive than their artificial counterparts, will become scarce.

Researchers have not always been successful in their efforts to duplicate natural flavors. Some popular flavors, such as coffee, strawberry, and chocolate, have proven virtually impossible to reproduce. The difficulty in creating a flavor like chocolate, experts say, is its complexity—a mysterious combination of sweet and bitter that excites the taste buds in an unusual and satisfying way.

34. Which of the following best tells what this passage is about?

  E. the relationship between smell and taste
  F. the science of how taste buds work
  G. the analysis and creation of flavors
  H. the difficulty of producing artificial flavors

35. What is the principal goal of the scientific research described in the third paragraph?

  A. to predict consumer taste preferences in food
  B. to develop food with strong flavors
  C. to produce synthetic equivalents of natural food flavors
  D. to improve the natural flavors in unprocessed food

36. Which of the following can be concluded from the collection of aromas during food preparation?

  E. Creating artificial flavors from captured aromas is a difficult process.
  F. Certain chemical components of a food's flavor are present in its aroma.
  G. Most people cannot tell the difference between natural flavors and artificial flavors.
  H. The natural flavor of a food is usually enhanced during the cooking process.

37. Why does the author mention orange soda in the fourth paragraph?

  A. to suggest that consumer preferences for natural or artificial flavors vary
  B. to explain why natural flavors are more expensive than artificial substitutes
  C. to demonstrate that consumers sometimes prefer artificial flavors to natural flavors
  D. to give an example of a natural flavor that may become difficult to find in the future

38. The author describes the role that the sense of smell plays when experiencing a flavor (lines 6–13) in order to

  E. emphasize that it is easier for a person to sense the aroma of a flavor than its taste.
  F. highlight that the aroma of a flavor influences how a person perceives its taste.
  G. emphasize that synthetic flavors need to have both an aroma and a taste.
  H. highlight that synthetic flavors tend to have a stronger aroma than taste.

39. The author includes details about the uses for synthetic flavors in lines 25–28 in order to

  A. show that synthetic flavors are easy to create.
  B. demonstrate that many items are made with the same synthetic flavor.
  C. suggest that synthetic flavors are healthier than natural flavors.
  D. highlight that synthetic flavors are found in a variety of everyday items.

The African country of Zimbabwe took its name from the Shona word meaning "stone enclosures" or "venerated houses." In fact, today dozens of stone ruins are scattered
5 throughout Zimbabwe and other areas in southeastern Africa. One of these ruins, known as Great Zimbabwe, was once a fabled city that inspired tales that circulated throughout Europe. Where was this
10 remarkable city, and who had built it? For centuries the mystery occupied the minds of explorers and treasure seekers.

The first reports to Europeans of Great Zimbabwe were spread a thousand years ago
15 by Arab traders sailing between the Middle East and the east coast of Africa. They told of the fabulous wealth of a mysterious stone city in the African interior. In their tales, that city became associated with their
20 understanding of Middle Eastern history— the Queen of Sheba, King Solomon, and his legendary gold mines, long since lost to the world. By the sixteenth century, Portuguese explorers regularly visited East Africa,
25 searching for "King Solomon's gold," but they never found Great Zimbabwe. In 1552, a Portuguese historian, João de Barros, recorded a story told by the Arabs about a city with a "square fortress of masonry
30 within and without, built of stones of marvelous size, and there appears to be no mortar joining them."

In fact, Great Zimbabwe *was* a marvel. In one area, a massive wall, over thirty feet high
35 and twenty feet thick, created a great enclosure. Another area contained a fortress-like series of walls, corridors, and steps built into the bluff above. Throughout the city, each stone was precisely fitted to the others
40 without the use of mortar.

In the 1870s, a German geologist, Karl Mauch, was the first European to see Great Zimbabwe, by then in ruins. Mauch realized that he had "rediscovered" the fabled city
45 from de Barros's story. He jumped to the conclusion that Great Zimbabwe had been

built by the Queen of Sheba. British authorities sent a British journalist, Richard Hall, to Great Zimbabwe to investigate
50 Mauch's report. Archaeology was still in its infancy, and Hall, convinced that the structures had been built by ancient people from the Middle East, dug up and discarded archaeological deposits that would have
55 revealed much about the true history of Great Zimbabwe. Later European excavations destroyed even more valuable evidence.

In the twentieth century, after excavating
60 areas that had not been disturbed, David Randall-MacIver, a Scottish Egyptologist, and Gertrude Caton-Thompson, an English archaeologist, concluded that the ruins were unmistakably African in origin. Great
65 Zimbabwe was most likely built during the fourteenth or fifteenth century by the ancestors of the present-day Shona people. Recent carbon-14 dating supports their conclusion. Great Zimbabwe was once home
70 to an estimated 20,000 people, the center of a great Shona kingdom. Wealthy Shona kings traded their ivory and gold in coastal towns for other goods, thus accounting for the discovery of beads and other foreign wares in
75 the ruins.

One mystery of Great Zimbabwe had been solved. Another mystery remains: why was the settlement at Great Zimbabwe abandoned, leaving the magnificent stone
80 architecture to fall into ruins?

40. Which statement best describes the central idea of the passage?

 E. Great Zimbabwe was an enormous stone city thought to be home to some of the greatest treasure of ancient history.

 F. Mysteries related to Great Zimbabwe continue to interest historians and explorers even though archaeologists have confirmed its origins.

 G. The history of Great Zimbabwe was subject to much speculation until modern archaeologists definitively determined its origins.

 H. Early missteps in the study and excavation of the Great Zimbabwe ruins led to the loss of valuable evidence about the city.

41. What was the main way that Karl Mauch's conclusions about Great Zimbabwe (lines 45–47) affected later archaeological investigations?

 A. Archaeologists from all over Europe became interested in excavating the area.

 B. Archaeologists made assumptions about the history of the ruins before excavating.

 C. Archaeologists started to believe that many of the past accounts recorded about the ruins were true.

 D. Archaeologists realized it was unlikely that an ancient culture could build such a grand structure.

42. What was "one mystery of Great Zimbabwe" (line 76) that had been solved?

 E. when the settlement was abandoned and why

 F. why there was no ivory or gold found in the ruins

 G. why the ruins remained undiscovered until the 1870s

 H. who had built the settlement and when

43. Which of the following statements about the Shona people is best supported by the passage?

 A. They live along the east coast of Africa.

 B. They are descendants of the people who built Great Zimbabwe.

 C. They lived in the Middle East before settling in Africa.

 D. They were once ruled by King Solomon and the Queen of Sheba.

44. The conclusions of David Randall-MacIver and Gertrude Caton-Thompson were significant mostly because they

 E. proved that Great Zimbabwe was much older than previously thought.

 F. questioned why the Shona people left Great Zimbabwe.

 G. supported the idea that ancient Shona society was robust.

 H. revealed that Great Zimbabwe was created by the ancient Shona people.

45. Which of the following best describes the relationship of Portuguese explorers to Great Zimbabwe?

 A. They searched for it but were never able to find it.

 B. They hoped it was as grand as they had been told by traders.

 C. They knew it was unlikely they would find the stone city.

 D. They had to rely on information from others in order to search for it.

In many cultures, the ugly physical appearance of the bat has given it an unearned reputation as an evil and vicious bearer of diseases. Many people, for example,

5 believe that little brown bats carry rabies. In fact, they are no more likely to transmit the disease than other animals, such as dogs. Brown bats actually help prevent disease, not spread it. The basis of their diet is the

10 mosquito, an insect that transmits more diseases than all the bats in the world combined.

A group of bat species known as flying foxes or fruit bats serves another important

15 purpose as a critical link in the reproduction of many tropical trees and shrubs. In the tropical rain forests of Africa, Asia, and Australia, plants such as avocados, date trees, cashews, and mangoes rely in part on

20 flying foxes for pollination. One of Africa's most valuable hardwood trees, the iroko, is entirely dependent on this type of bat for pollination. Flying foxes feed on flowers, fruit, and nectar, flying from one plant to another

25 and pollinating the plants as they go, much as bees do in other parts of the world. Because they are sloppy eaters, flying foxes drop fruit as they go, dispersing the seeds. They can travel great distances and convey

30 pollen and seeds far from their origins, thereby maintaining the genetic biodiversity within a plant species.

Because of the importance of bats' role in pollination and seed distribution, scientists

35 consider them a keystone in the ecosystems of tropical rain forests. Without bats, many bat-pollinated plants—and the animals that depend on them for food and shelter—would be threatened to the point of extinction.

40 Areas outside the rain forests would be affected as well, since the rain forests' lush vegetation replenishes the oxygen in the global atmosphere.

Unfortunately, many people are determined

45 to get rid of bats. Flying foxes are at particular risk. In the wild, they feed on wild fruit, but when their rain forest habitat is reduced by conversion into farmland or residential areas, they occasionally raid

50 cultivated fruit trees, spoiling the crops. Several flying fox species have been hunted to extinction, while others are seriously endangered.

Conservation groups and government

55 agencies in many countries are attempting to change people's attitudes toward bats. When people learn that bats pollinate the trees and crops that provide their livelihood, they are more likely to appreciate and protect the bats

60 in their area. There are also effective, nonharmful ways to deal with troublesome bats. Orchard owners can cover their trees with netting to discourage the bats, and there are humane methods for moving bats from

65 places where they are not wanted. For the sake of the rain forests and for life-forms everywhere that depend on them, it is urgent that people apply a new twist to an old adage and realize that ugliness is only skin deep.

46. Which statement best reflects the central idea of this passage?

    E. Bats provide numerous benefits to the environment and should be protected.

    F. Bats are still considered pests even though people understand that bats are helpful.

    G. Bats help limit the spread of disease by eating insects that carry diseases.

    H. Bats are responsible for pollinating a variety of rain forest plants across great distances.

47. Which of the following best describes animal species that function as a "keystone" (line 35)?

    A. They can be threatened with extinction.

    B. They are a food source for other animals.

    C. They pollinate many different types of plants.

    D. They help maintain the balance of their environment.

48. Which statement best describes the author's opinion about bat conservation?

    E. Allowing bats to occasionally eat crops and fruit from cultivated trees is a good way to prevent bats from becoming endangered.

    F. Because bats can support the growth of many different species, they should be relocated to areas with struggling ecosystems.

    G. Although bats may seem to be a nuisance, it is vitally important that they are protected and managed in humane ways.

    H. Protecting the bat population takes priority over concerns about bats ruining cultivated trees and crops.

49. Which evidence best supports the claim that the bat is important to the survival of certain species?

    A. the details about how bats pollinate the iroko tree

    B. the information about how bats help maintain genetic diversity

    C. the details about how bats sometimes eat cultivated fruit trees

    D. the information about how bats consume mainly mosquitoes

50. In the third paragraph, the author includes the details about the bat's role as a keystone species in order to

    E. convey that bats help distribute seeds throughout the rain forest.

    F. show that bats provide food and shelter for other animals.

    G. emphasize that threats to bats would affect the rain forest ecosystem.

    H. highlight that bats help maintain the levels of oxygen in the atmosphere.

51. What does the author intend to convey by the statement "ugliness is only skin deep" (line 69)?

    A. Certain species of bats have a less appealing physical appearance than other species of bats.

    B. People should avoid making assumptions about bats based on the animals' physical appearance.

    C. People should avoid removing bats from certain areas because of the physical appearance of bats.

    D. Efforts to conserve bats are worthwhile even though people dislike the animals' physical appearance.

Imagine living in a society where ordinary people could be punished for what they choose to read and write. For much of the twentieth century, such a closed society existed in Russia and the rest of the Soviet Union. The Soviet government tried to dominate its citizens' activities and ideas by controlling the information that they received. Government censors examined books, films, and newscasts and banned anything they considered objectionable. They censored criticism of the Soviet government, news from the outside world, and anything that complimented Soviet enemies.

The Soviet government's strict censorship made life tremendously difficult for writers. Most worried that they were being watched by the government's secret police. Despite the harsh laws, small groups of writers dodged state censorship through an underground, or secret, publishing network that produced works called *samizdat*. The name samizdat came from the Russian words for "self" and "publish." For many writers, samizdat offered the only outlet for their intellectual and creative expression. To produce samizdat, an author passed a typed or handwritten text to a second person, who made a handwritten or typed copy. The original was returned to the author, while the copy was passed to other members of the network. The works were unsigned or signed with false names.

At first, samizdat focused mainly on literature, such as poetry and novels. By the late 1950s, samizdat circles were distributing political material, such as letters to the government, political essays, and trial transcripts. By the mid-1960s, the samizdat network produced sophisticated political news, debate, and analysis.

The great Russian novelist Boris Pasternak had his work published as samizdat. Like other writers, he feared that an appearance of disloyalty to the Soviet state would bring a knock at his door in the middle of the night. His classic novel *Doctor Zhivago* was smuggled out of the Soviet Union for publication in Western countries in 1956; in Russia, it appeared only as samizdat. Pasternak won the Nobel Prize in Literature in 1958, but the government forced him to refuse the prize. Soviet authorities also blocked publication of the work of Anna Akhmatova, one of Russia's greatest poets. Her work was banned until 1952 because censors thought she did not sufficiently praise the Soviet government. Akhmatova was kept out of public life and the official Writers' Union. She composed her poetry in private, and her works were available only as samizdat.

Through the 1960s and '70s, Russian writers used samizdat networks to circulate banned or politically risky material. By the late 1980s, computers became available in scientific research facilities, and underground writers began using the computers to store and circulate texts. Censorship was officially abolished in 1989, shortly before the breakup of the Soviet Union, leading to a publishing boom. Works by previously banned authors were published, and the samizdat networks quickly faded into history.

52. Which of the following best tells what this passage is about?

    E. the Russian writers Boris Pasternak and Anna Akhmatova
    F. the poetry published in the Soviet Union during the twentieth century
    G. censorship in the Soviet Union and the underground system that arose in response
    H. the reasons for banning writers who criticized the Soviet government

53. Which of the following is most likely an example of material circulated in the earliest phase of samizdat?

    A. a letter protesting a writer's imprisonment
    B. a short story
    C. a list of political prisoners
    D. an article from a foreign newspaper

54. The phrase "a knock at his door in the middle of the night" (lines 44–45) most likely refers to a visit by

    E. the secret police.
    F. a representative from a major publisher.
    G. a participant in the samizdat network.
    H. people from other countries.

55. Which event led to a change in how samizdat was created and shared?

    A. government authorities censoring Akhmatova's work
    B. the increase in the distribution of political essays
    C. Pasternak winning the Nobel Prize
    D. the rise in the use of computers and computer networks

56. What is the most likely reason that samizdat materials were unsigned or signed with false names?

    E. to allow the materials to be smuggled out of the country
    F. to protect the writer from punishment
    G. to avoid breaking censorship laws
    H. to differentiate between original and copied works

57. Why did samizdat networks quickly disappear in 1989?

    A. Samizdat networks were unnecessary after censorship was abolished.
    B. Samizdat networks became regular publishing companies.
    C. Samizdat networks were replaced by the use of computers.
    D. Samizdat networks went deeper underground than ever before.

PART 2 — MATHEMATICS

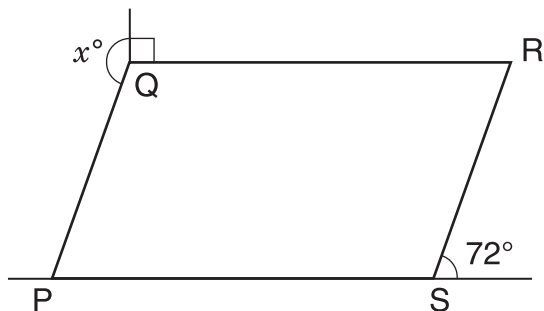*Suggested Time — 90 Minutes*

57 QUESTIONS

IMPORTANT NOTES

(1) Formulas and definitions of mathematical terms and symbols are **not** provided.

(2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.

(3) Assume that a diagram is in one plane unless the problem specifically states that it is not.

(4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.

(5) Reduce all fractions to lowest terms.

GRID-IN PROBLEMS

QUESTIONS 58–62

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. **DO NOT LEAVE A BOX BLANK IN THE MIDDLE OF AN ANSWER.** Under each box, fill in the circle that matches the number or symbol you wrote above. **DO NOT FILL IN A CIRCLE UNDER AN UNUSED BOX.**

58.

In the figure above, PQRS is a parallelogram. What is the value of x?

59. The owner of a tree farm plants pine trees and oak trees in a ratio of 8:3. How many oak trees are planted if 264 pine trees are planted?

---

60. For what value of w is $4w = 2w - 8$?

---

61. A survey asked students what pets they have. Based on the results, the following statements are all true.

- 20 students have cats.

- 23 students have dogs.

- 3 students have both dogs and cats.

- 5 students have no dogs or cats.

How many students were surveyed?

62. The sum of two consecutive integers is -15. If 1 is added to the smaller integer and 2 is subtracted from the larger integer, what is the **product** of the two resulting integers?

MULTIPLE CHOICE PROBLEMS
QUESTIONS 63–114

DIRECTIONS: Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

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63. The set of possible values of m is {5, 7, 9}. What is the set of possible values of k if $2k = m + 3$?

  A. {3, 4, 5}
  B. {4, 5, 6}
  C. {8, 10, 12}
  D. {10, 14, 18}

---

64. One bottle contains 500 milliliters of juice. How many **liters** of juice are there in 24 of these bottles?

  E. 12 L
  F. 120 L
  G. 1,200 L
  H. 12,000 L

---

65. In a certain school, course grades range from 0 to 100. Adrianna took 4 courses and her average course grade was 90. Roberto took 5 courses. If both students have the same sum of course grades, what was Roberto's average?

  A. 72
  B. 80
  C. 90
  D. 92

---

66. Jenny starts a game with twice as many marbles as Keiko. Jenny gives Keiko 5 marbles, but she still has 10 more than Keiko. How many marbles did Jenny have to start with?

  E. 25
  F. 30
  G. 35
  H. 40

---

67. In a scale diagram, 0.125 inch represents 125 feet. How many inches represent 1 foot?

  A. 0.001 in.
  B. 0.01 in.
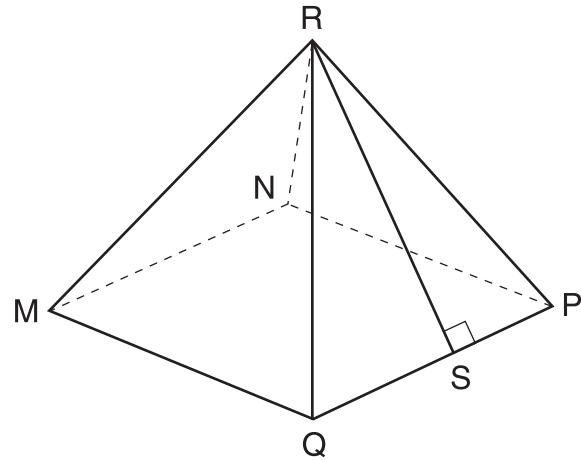 **C.** 0.1 in.
  D. 0.12 in.

68.

PEOPLE PER VEHICLE AT CHECKPOINT

Number of People in Vehicle	Percent of Vehicles
1	40%
2	35%
3	15%
4	7%
5 or more	3%

A researcher recorded the number of people in each vehicle that passed through a checkpoint. The table above shows the percent distribution for the 420 vehicles that passed through the checkpoint yesterday morning. How many of the 420 vehicles contained **at least** 3 people?
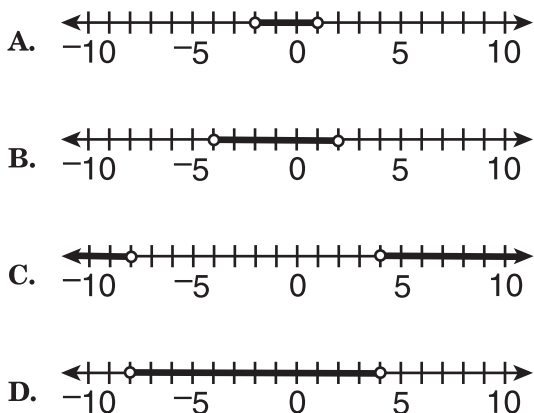
E. 42
F. 63
G. 105
H. 315

69.

In the pyramid above, each triangular face has the same area, and the base $MNPQ$ is a square that measures 8 centimeters on each side. If the length of $\overline{RS}$ = 6 centimeters, what is the surface area of the pyramid **excluding** the base?

A. 48 sq cm
B. 96 sq cm
C. 128 sq cm
D. 160 sq cm

70. The perimeter of a rectangle is 510 centimeters. The ratio of the length to the width is 3:2. What are the dimensions of this rectangle?

E. 150 cm by 105 cm
F. 153 cm by 102 cm
G. 158 cm by 97 cm
H. 165 cm by 90 cm

71. Which number line below shows the solution to the inequality $-4 < \frac{x}{2} < 2$?

A.

B.

C.

D.

72.

1 dollar = 7 lorgs
1 dollar = 0.5 dalt

Kevin has 140 lorgs and 16 dalts. If he exchanges the lorgs and dalts for dollars according to the rates above, how many dollars will he receive?

E. $28
F. $52
G. $182
H. $282

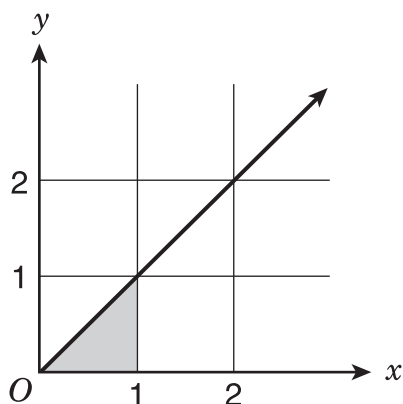**73.** A box of colored pencils contains exactly 6 red pencils. The probability of choosing a red pencil from the box is $\frac{2}{7}$. How many of the pencils in the box are **not** red?

A. 5
B. 15
C. 21
D. 30

74. The sum of the numbers x, y, and z is 50. The ratio of x to y is 1:4, and the ratio of y to z is 4:5. What is the value of y?

E. 4
F. 8
G. 10
H. 20

75.

What is the area of the shaded region in the graph above?

A. 0.25 square unit
B. 0.5 square unit
C. 1 square unit
D. 1.5 square units

76. In Centerville, 45% of the population is female, and 60% of the population commutes to work daily. Of the total Centerville population, 21% are females who commute to work daily. What percentage of the total Centerville population are males who do **not** commute to work daily?

E. 15%
F. 16%
G. 24%
H. 39%

77. Mrs. Cranston bought five bottles of water for $0.90 each and 8 pounds of meat. She paid a total of $26.90 for these items, not including tax. What was the price per pound of the meat?

    A. $2.80
    B. $3.25
    C. $14.40
    D. $22.40

78. In a sample of 10 cards, 4 are red and 6 are blue. If 2 cards are selected at random from the sample, one at a time without replacement, what is the probability that both cards are **not** blue?

    E. $\dfrac{2}{15}$

    F. $\dfrac{4}{25}$

    G. $\dfrac{3}{10}$

    H. $\dfrac{1}{3}$

79.
$$1 \text{ sind} = 4 \text{ lorgs}$$
$$2 \text{ plunks} = 5 \text{ dalts}$$
$$5 \text{ sinds} = 2 \text{ harps}$$
$$1 \text{ plunk} = 3 \text{ harps}$$

A nation has five types of coins: sinds, dalts, lorgs, harps, and plunks. The relationship between the coins is shown above. Which coin is most valuable?

    A. sind
    B. dalt
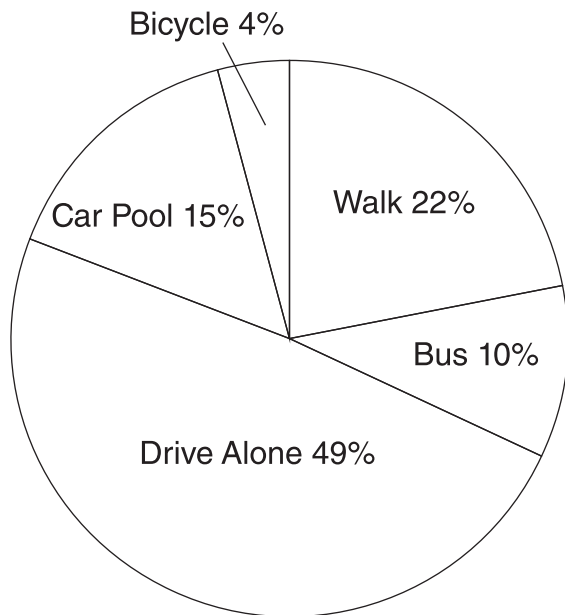   **C.** harp
    D. plunk

80.

SCORES ON MATH QUIZ

Score	Number of Students
85	4
75	4
65	2

What is the mean score of the 10 students in the table above?

    E. 22.5
    F. 75
    G. 77
    H. 85

81.

HOW PEOPLE GET TO WORK
IN CENTER CITY

Bicycle 4%

Total number of people
working in Center City = 15,000

How many more people in Center City walk to work than ride their bicycle to work?

A. 2,500
B. 2,700
C. 2,800
D. 3,000

82. Which of the following numbers has factors that include the smallest factor (other than 1) of 91?

E. 30
F. 35
G. 39
H. 44

83. In a scale drawing of a triangular banner, one side measures 16 centimeters and the other two sides each measure 12 centimeters. On the actual banner, these two sides each measure 36 feet. What is the length of the remaining side of the actual banner?

A. 16 ft
B. 32 ft
C. 40 ft
D. 48 ft

84. The faculty of a certain four-year college consists of 179 teachers. There are 663 first-year students. The student-to-faculty ratio for the entire college is 15 to 1. What is the total number of second-, third-, and fourth-year students?

E. 1,989
F. 2,022
G. 2,652
H. 2,685

85.
$$2\frac{1}{5} + 3\frac{3}{10} + 4\frac{2}{5} + 5\frac{1}{2}$$

What is the value of the expression shown above?

A. $14\frac{7}{20}$

B. $14\frac{2}{5}$

C. $15\frac{7}{20}$

D. $15\frac{2}{5}$

86. A car is traveling 55 miles per hour, and 1 mile = 5,280 feet. Which of the following calculations would give the car's speed in **feet per second**?

   E. $\dfrac{55 \cdot 5{,}280}{1}$

   F. $\dfrac{55 \cdot 5{,}280}{3{,}600}$

   G. $\dfrac{55 \cdot 3{,}600}{5{,}280}$

   H. $\dfrac{55 \cdot 5{,}280}{60}$

87. Today, Tien's age is $\dfrac{1}{4}$ of Jordan's age. In 2 years, Tien's age will be $\dfrac{1}{3}$ of Jordan's age. How old is Jordan today?

   A. 4 years old
   B. 6 years old
   C. 12 years old
   D. 16 years old

88. How many positive even factors of 48 are greater than 24 and less than 48?

   E. 0
   F. 1
   G. 2
   H. 12

89. The least of 5 consecutive integers is l, and the greatest is g. What is the value of $\dfrac{l+g}{2}$ in terms of l?

   A. $2l$

   B. $3l$

   C. $l+2$

   D. $l+5$

90. Johan leased a car for three years. He paid a one-time fee of $1,000, and an additional $300 per month for the full three years. At the end of the three years, what is the total amount Johan paid for leasing this car?

   E. $1,900
   F. $4,600
   G. $10,800
   H. $11,800

91. There are 6 different cookies on a plate. Aiden will choose 2 of these cookies to pack in his lunch. How many different pairs of 2 cookies can he choose from the 6?

   A. 12
   B. 15
   C. 30
   D. 36

92. For a presentation, Deion can create 5 slides in 20 minutes, working at a constant rate. Kyra can create 3 slides in 10 minutes, working at her own constant rate. What is the total number of slides the two of them can create in one hour?

   E. 16
   F. 30
   G. 33
   H. 55

93.

On the number line above, $LN = \dfrac{1}{8}$. Point M (not shown) is located between point L and point N. Which value below is a possible value for M?

A. 4.26
B. 4.31
C. 4.35
D. 4.58

94. An unmarked straight stick will be laid end over end to measure a distance of exactly 72 feet. The same stick will be used in the same way to measure a distance of exactly 30 feet. What is the length of the longest possible stick that can be used for both measurements?

E. 3 ft
F. 4 ft
G. 6 ft
H. 8 ft

95. Ryan must read 150 pages for school this weekend. It took him 30 minutes to read the first 20 pages. At this rate, how much **additional** time will it take him to finish the reading?

A. $2\dfrac{1}{6}$ hr

B. $3\dfrac{1}{4}$ hr

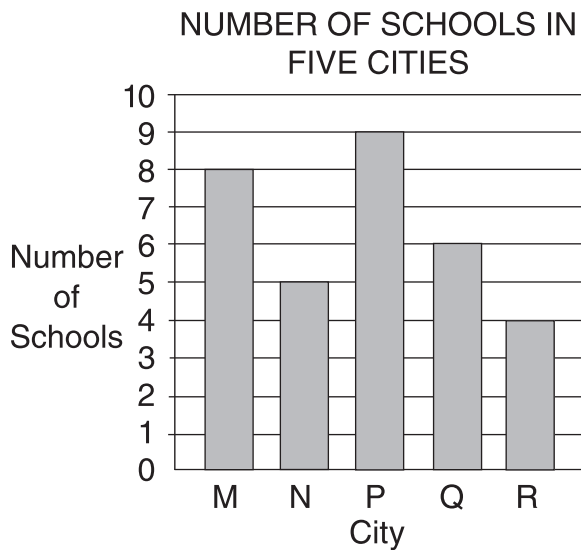**C.** $3\dfrac{3}{4}$ hr

D. $7\dfrac{1}{2}$ hr

96. Suppose $M = \dfrac{w}{x}$, $N = \dfrac{y}{z}$, and $w, x, y,$ and z do not equal 0. What is $\dfrac{M}{N}$ in terms of $w, x, y,$ and z ?

E. $\dfrac{wx}{yz}$

F. $\dfrac{wy}{xz}$

G. $\dfrac{wz}{xy}$

H. $\dfrac{xy}{wz}$

97. In the set of consecutive integers from 12 to 30, inclusive, there are four integers that are multiples of both 2 and 3. How many integers in this set are multiples of **neither** 2 nor 3?

A. 5
B. 6
C. 13
D. 15

98.

NUMBER OF SCHOOLS IN FIVE CITIES

The graph above shows the number of schools per city for five small cities. Cities M and N each have 500 students per school. City P has 400 students per school. Cities Q and R each have 700 students per school. Which of the five cities has the **greatest** number of students?

E. City M
F. City P
G. City Q
H. City R

99. A box contains 5 strawberry candies, 3 banana candies, and 2 orange candies. If Braden selects 2 candies at random from this box, without replacement, what is the probability that both candies are **not** banana?

A. $\dfrac{1}{15}$

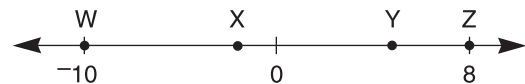B. $\dfrac{9}{100}$

C. $\dfrac{7}{15}$

D. $\dfrac{49}{100}$

100.
$$\frac{w}{x} = \frac{y}{z}$$

In the equation above, w, x, y, and z are positive numbers. Which of these is equal to z?

E. x

F. xy

G. $\dfrac{w}{xy}$

H. $\dfrac{xy}{w}$

101.

On the number line above, points W, X, Y, and Z are integers, and WX:XY:YZ = 4:2:3. What is the value of $\overline{WY}$?

A. 8
B. 11
C. 12
D. 18

102. A metal plate used in an electronic device must have a thickness of 0.02 inch, with an allowable error of 1 percent. What is the **greatest** allowable thickness of the metal plate?

E. 0.0002 in.
F. 0.02 in.
G. 0.0202 in.
H. 0.03 in.

103.

SCORES ON BIOLOGY TEST

Section	Lowest Score	Range
I	65	28
II	62	25
III	67	22

Mr. Blake's biology class is divided into three sections. The same test was given to each section. The table above shows both the lowest score and the range of scores on this test for each section. What is the **overall** range of all scores in all three sections?

A. 25
B. 27
C. 28
D. 31

104. If $3n$ is a positive even number, how many **odd** numbers are in the range from $3n$ up to and including $3n + 5$?

E. 2
F. 3
G. 4
H. 5

105.
$$\frac{10}{13} = 0.\overline{769230}$$

In the infinitely repeating decimal above, 7 is the first digit in the repeating pattern. What is the 391st digit?

A. 0
B. 3
C. 6
D. 7

106. A car travels at 4,400 feet per minute. The radius of each tire on the car is 1 foot. How many revolutions does one of these tires make in 1 minute? (Use the approximation $\frac{22}{7}$ for π.)

E. 700
F. 1,925
G. 13,828
H. 15,400

107. $100(2 + 0.1)^2 - 100 =$

A. 101
B. 200
C. 301
D. 341

108. A sports store has a container of handballs: 4 blue, 5 red, 8 yellow, 9 white, and 11 green. If one ball is picked from the container at random, what is the probability that it will be yellow?

E. $\frac{1}{37}$

F. $\frac{1}{8}$

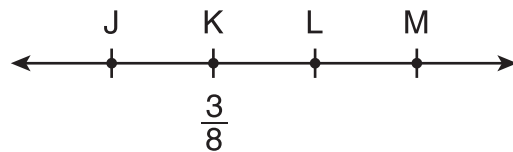G. $\frac{8}{37}$

H. $\frac{8}{29}$

109. Each week, Leon has fixed expenses of $1,250 at his furniture shop. It costs him $150 to make a chair in his shop, and he sells each chair for $275. What is Leon's **profit** if he makes and sells 25 chairs in 1 week?

    A. $1,875
    B. $2,500
    C. $3,125
    D. $4,375

---

110. Using the approximation 2.54 centimeters = 1 inch, how many centimeters are in 4 feet 7 inches?

    E. 21.65 cm
    F. 119.38 cm
    G. 121.92 cm
    H. 139.70 cm

111.

On the number line above, $JK = 3\frac{1}{2}$, $JM = 9\frac{3}{4}$, and $LM = 1\frac{1}{8}$. What is the position of point L ?

    A. $5\frac{1}{8}$

    B. $5\frac{1}{4}$

    C. $5\frac{1}{2}$

    D. $6\frac{1}{4}$

---

112. If $4x - 3y = 12$, what is x in terms of y ?

    E. $x = \frac{3}{4}y + 12$

    F. $x = -\frac{3}{4}y + 12$

    G. $x = \frac{3}{4}y + 3$

    H. $x = -\frac{3}{4}y + 3$

113.

SERVINGS OF FRUITS AND VEGETABLES

Number of Servings of Fruits and Vegetables	Number of Students
0	5
1	7
2	3
3	4
4	0
5	1

There are 20 students in a class. The frequency table above shows the number of students in this class who ate 0, 1, 2, 3, 4, or 5 servings of fruits and vegetables yesterday. What is the mean number of servings of fruits and vegetables eaten yesterday per student in this class?

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

B. 3

C. $3\frac{1}{3}$

D. 4

114. A paste is made by mixing the following ingredients by weight: 4 parts powder, 3 parts water, 2 parts resin, and 1 part hardener. One billboard requires 30 pounds of this paste. How many total pounds of resin are required for 4 billboards?

E. 6 lb
F. 8 lb
G. 24 lb
H. 48 lb

THIS IS THE END OF THE TEST.
IF TIME REMAINS, YOU MAY CHECK YOUR ANSWERS. BE SURE THAT THERE ARE NO STRAY MARKS, PARTIALLY FILLED ANSWER CIRCLES, OR INCOMPLETE ERASURES ON YOUR ANSWER SHEET. ■

REVISING/EDITING PART A

1. (**D**) The question asks for the most precise revision for the words **talked to some people who did the best in the contest**. Option A and Option C do not precisely state how many people the reporter interviewed. Option B specifies the number of people interviewed but uses the imprecise phrase "who did well." Option D is the only option that precisely states the reporter's action ("interviewed") as well as who exactly the reporter interviewed ("the top three contestants").

2. (**G**) The question asks for the identification of a sentence with an inappropriate shift in verb tense. Option E, Option F, and Option H identify sentences that use past tense. Sentence 3 (Option C) demonstrates an incorrect shift into the present tense with the clause "as natural gas becomes more common," which should be "as natural gas became more common."

3. (**C**) The sentence in the box needs a comma to separate items in a series. Option A would remove the necessary comma before the nonrestrictive clause "which is located on Midway Street." Option B is incorrect because while the phrase that ends with the word "volunteer" can stand on its own as an independent clause, a comma is not needed before the explanation of what the volunteers would help do. Option D would delete a necessary comma between two items in a series. Option C is the only option that would place a necessary comma to separate items "walking dogs" and "cleaning kennels" in the series.

4. (**E**) The question asks for the best way to combine the sentences to clarify the relationship between the ideas. Option F is incorrect because the conjunction "although" suggests that scientists were allowed to collect data even though there were flyby missions, which is inaccurate. In Option G, the phrase "which have been happening since 1973" is incorrectly modifying "the planet and its moons." In Option H, the conjunction "but" suggests an adverse relationship between ideas, which is also incorrect. Option E is the only option that accurately reflects the relationship between the ideas by using the nonrestrictive phrase "which allow scientists to collect data about the planet and its moons" to describe the purpose of the flyby missions.

5. (**C**) The question asks the student to identify a vague pronoun in a sentence in the box. Sentence 1 (Option A) correctly uses the plural pronouns "their"/"they" to refer to both Eliza and Brianna. Sentence 2 (Option B) uses the pronoun "they" to correctly refer to both girls again. Sentence 4 (Option D) uses the pronoun "they" to correctly refer to "both girls." Sentence 3 (Option C) is the only sentence where the pronoun is vague. The sentence uses the pronoun "she" near the beginning, but whether "she" refers to Eliza or Brianna is unclear.

6. (**E**) The sentence in the box needs a comma to separate coordinate adjectives. Option F incorrectly adds a comma between the subject and the verb. Option G incorrectly adds a comma between two adjectives, but they are not coordinate adjectives. Option H is incorrect because a comma is not needed to set off the phrase "to score 100 points in a single game." Option E is the only option that places a comma where it is needed, between the coordinate adjectives "agile" and "athletic."

REVISING/EDITING PART B

Unlock, Ride, Return

7. (**A**) The correct answer must state the topic of the passage and hint at some of the supporting ideas. Option B mentions the idea that bike sharing programs are successful because both residents and tourist can use them, but that detail is mentioned in only the second paragraph. Option C mentions that bike sharing provides a faster mode of transportation, but it is referring to a detail suggested in sentence 16. Option D might seem attractive because it states a specific benefit of bike sharing, but it does not encompass other key points of the passage. Option A is the only option that clearly states the topic of the passage and refers to multiple key points.

8. (**F**) Because it will be placed after sentence 6, the correct answer needs to provide appropriate details that help the reader understand sentences 5 and 6. Sentences 5 and 6 begin to explain how bike sharing programs work, so the correct answer should provide additional general details that help the reader picture how people use the program. The detail stated in Option E may be true, but the detail relates to where bike sharing stations are located, not to how a bike sharing program works. Similarly, Option H includes details about major United States cities that have bike sharing programs and does not provide more information about how a bike sharing program works. Option G might seem attractive because it provides very specific details about how the bike stations keep bicycles secure. However, this level of detail is too specific to help the reader understand the program as a whole. Only Option F includes details that give the reader a clear idea of how people use bike sharing programs.

9. (**D**) The correct answer needs to have the same relationship between ideas as the one implied in sentences 8 and 9. Context tells the reader that there is a causal relationship between city bikers' lack of responsibility and their preference for bike sharing. The subordinate clause in Option A, "Although they prefer bike sharing over ownership," presents an opposing idea, giving the impression that city bikers prefer bike sharing even though they are not responsible for storage and maintenance, which is an inaccurate way to connect these ideas. In Option B, the linking word "and" connects the two ideas but does not clarify that one idea is the cause of the other. Option C presents a causal relationship, but it reverses the relationship between the ideas. The use of "since" in Option C suggests that city bikers' preference for bike sharing is the reason they are not responsible for bike storage and maintenance. Only Option D accurately expresses the relationship that the original two sentences implied. The transition word "because" clarifies that avoiding the responsibility for storage and maintenance is the reason city bikers prefer bike sharing.

10. (**G**) The correct answer should use the most precise and specific details and language. Option E uses an imprecise word, "millions," which does not provide a specific number. Option F specifies "14 million," but it uses the imprecise "huge increase" rather than a specific number. Option H uses the imprecise phrase "several million" rather than the precise number of trips, and it uses the imprecise phrase "big increase" rather than the specific number for the increase. Option G is the only option that includes precise numbers and language.

11. (**B**) The correct answer must transition from the third paragraph and provide a topic sentence for the fourth paragraph. Option A presents information ("experts increasingly want to discuss") that was not addressed in the passage. Option C might seem attractive because it mentions information from earlier paragraphs about the popularity of bike sharing programs, but it does not accurately preview the fourth paragraph. Option D restates information from the third paragraph but does not relate to the information in the fourth paragraph. Only Option B includes a transition from the previous paragraph and an accurate topic sentence for the fourth paragraph.

12. (**G**) The correct answer must relate to the topic of the fourth paragraph: the relationship between bike sharing programs and improved air quality in a city. Option E states that improving air quality is the main reason cities establish bike sharing programs, but

this option is incorrect because the paragraph focuses on how improved air quality is an effect of people using bike sharing programs. Option F indicates that participating in a bike sharing program is the principal way travelers can improve air quality, but that does not accurately connect the ideas in the paragraph. Option H suggests that bike sharing programs in some cities are more effective at improving air quality than bike sharing programs in other cities, but this option is incorrect because it does not relate to the main topic of the paragraph: there is a relationship between a city's implementation of a bike sharing program and improved air quality in the city. Option G is correct because it makes a connection between the increasing use of bike sharing programs and the potential impact on air quality.

13. (**B**) The correct answer must be a sentence that does not relate to the topic of the third paragraph. Option A (sentence 12), Option C (sentence 15), and Option D (sentence 16) are relevant to the paragraph because they provide information about the bike sharing program in New York City. Option B (sentence 13) relates to a program in a city in China, which is not the focus of the third paragraph.

14. (**E**) The correct answer should provide a logical conclusion based on the details about the transportation and environmental benefits of bike sharing programs. Option F makes a prediction about small- and medium-sized cities that is not supported by the passage, which mentions only large cities. Option G compares bike sharing with other transportation methods, but this option is an incorrect conclusion because the passage focuses on the benefits of bike sharing programs, not comparing bike sharing to other modes of transportation. Option H states that bike sharing is useful for tourists, which does not provide a conclusion for the details about transportation and the environmental impact of bike sharing programs. Only Option E could follow sentence 19 by presenting the conclusion that bike sharing programs will become more routine because of the benefits outlined in the passage.

Pursuing a Hobby

15. (**A**) The question asks for a sentence that should follow sentence 3 and state the main claim of the passage. Option B suggests that people should think carefully about selecting a hobby to pursue, which may be true, but it is only a minor detail implied in the last paragraph. Option C claims that people should pursue hobbies because hobbies are a productive way to spend

free time. This idea is implied in sentence 18, but it is not the main claim of the passage. Option D addresses the idea that having a hobby should be enjoyable, which is addressed in sentence 1, but this is a general description of hobbies, not the main claim of the passage. Option A is the only option that logically follows the statement in sentence 3 and presents the main claim that people should make time to pursue a hobby because hobbies have a variety of benefits. This claim is developed in sentences 4, 9, 13, and 17.

16. (**G**) Sentence 5 states the aspects of everyday life that can cause stress. Sentence 6 lists several physical symptoms that can result from stress. Option E incorrectly suggests that sentence 6 is an example of sentence 5. Option F suggests that sentence 6 provides confirmation of the point made in sentence 5, which is incorrect. Option H suggests that sentence 6 is the addition of examples similar to those presented in sentence 5, which is also incorrect. Option G is the only option that provides a transition to show that the symptoms in sentence 6 can happen as a result of the stressors listed in sentence 5.

17. (**C**) The sentence in the box names some active hobbies and states that these hobbies release endorphins to promote positive feelings and override some effects of stress. Option A places this sentence between sentences 6 and 7, which are both sentences that deal with symptoms of stress and not the hobbies themselves. Option B places the sentence in the box between sentences 7 and 8. Sentence 8 begins a list of some hobbies and how they can give the mind a break from stress. Since the sentence in the box uses the phrase "can also provide," this sentence needs to go after sentence 8. The sentence in the box would not follow sentence 9 (Option D) because sentence 9 is used to end the discussion of how hobbies relieve stress. Option C states the only place where the ideas in the sentence fit into the paragraph.

18. (**F**) Sentence 16 uses vague and imprecise language that needs to be more specific ("do something," "get better," "go to places"). Only Option F provides specific details about the social activities a hobbyist might do ("enroll in a course," "attend a convention"). The language used in Option E ("learn more about," "go to events"), Option G ("try to find new information," "go to places"), and Option H ("want to expand his or her knowledge," "do an activity") does not offer more precision than the original sentence.

19. (**A**) The question asks for a sentence that follows sentence 17 and supports the ideas in the paragraph: hobbies can encourage positive social interaction. Pursuing a hobby with friends (Option B) may be enjoyable, but this does not explain the benefits of engaging in positive social interaction. Option C states that friends who enjoy one hobby may enjoy other hobbies, but this is not the idea that needs to be supported in sentence 17. Option D addresses the idea that forming relationships becomes more difficult as people grow up, which does not support the ideas in the paragraph. Option A is the only option that provides support for sentence 17 by making the point that having meaningful friendships stemming from interest in a hobby may be associated with a variety of positive outcomes.

20. (**H**) The question asks for a sentence that is irrelevant to the development of ideas in the third paragraph of the passage. Sentences 10 (Option E), 11 (Option F), and 13 (Option G) are essential to the paragraph in order to explain active leisure and flow. The idea in sentence 14 (Option H) relates to the hobbies of celebrities and businesspeople, which is not relevant to the description and benefits of engaging in active leisure.

READING COMPREHENSION

No Summer

21. (**B**) The passage is mostly about the strange, cold summer of 1816 and speculation around its cause, which is best stated in Option B. Option A is a detail in the passage about one theory regarding the cause of the weather. Option C is incorrect because the passage is about more than agriculture in New England. Option D is a detail in the passage mentioned only in the first paragraph.

22. (**E**) The second paragraph states that "farmers prepared to plow and plant" (lines 15–16), they "expected warm temperatures" (lines 16–17), and they were "optimistic" (line 18). This suggests that the farmers kept replanting their crops because they expected the weather to return to normal, which is reflected in Option E. Option F and Option H are incorrect because the cold weather and the snow actually worsened growing conditions. Option G is incorrect because the weather did not improve until the following year.

23. (**C**) The winter of 1816–1817 followed the meager harvest of the summer of 1816. With many crops "stunted or destroyed" (lines 26–27), one would expect food shortages the following winter, which is Option C. There is no evidence in the passage that people experienced new weather events (Option A) or warmer temperatures (Option B). Although some famers did replant their crops, there is no evidence in the passage that they struggled to adjust to a different time line for farming (Option D).

24. (**H**) The phrase "the global nature of weather" refers to how conditions in one part of the world can affect weather in another part of the world, which is Option H. Option E is incorrect because line 70 is about the effects of weather conditions around the world, not about making weather predictions. Option F is incorrect because it discusses the lasting impact on specific geographical areas, while the phrase "the global nature of weather" refers to events that affect the entire world. While weather events, like the unusually cold summer in New England in 1816, can be related to natural disasters such as a volcano eruption, there is no support for the idea that natural disasters tend to occur at the same time, which rules out Option G.

25. (**B**) The details about the eruption are included in the fourth paragraph. They highlight the severity of the eruption and how it clouded the atmosphere and eventually encircled the world (Option B). The passage does not support the idea that the effects are still present today (Option A) or that other weather events caused the volcano to erupt (Option D). While the details may include information about what happens during an eruption (Option C), that is not why the author includes those details.

26. (**H**) Researchers today believe that Bessel's theory is the most logical and probable (lines 67–70). His ideas are summarized in lines 55–57, and Option H restates his theory. Option E and Option F were thought to be other possible causes at the time. Option G was an effect of Mount Pinatubo erupting in 1991.

27. (**B**) The third paragraph describes how nineteenth-century religious and other leaders tried to account for the cooler weather in 1816. Some leaders thought it was "the end of the world" (line 42), "sunspot activity" (line 44), or a new invention (lines 44–46). This is best stated in Option B. The causes described in the third paragraph were not the most probable cause (Option A), as "the first

plausible explanation"—Bessel's—is described later in the passage. The ideas described in Option C and Option D are not included in the third paragraph.

Dickens

28. (**G**) The issues presented in Option E and Option H are only briefly mentioned or hinted at in the passage. Option F states an important detail about Dickens's childhood, but it is not a main topic. Option G correctly combines the information in the passage about Dickens's childhood and the novel *David Copperfield*.

29. (**A**) The author includes the details about Dickens's experiences as an adult in the fourth paragraph in order to highlight that his time spent in the factory continued to influence him as an adult, as evidenced in lines 43–44 ("As an adult, Dickens always remembered the shame and humiliation"), lines 46–47 ("he could not go near the sites of the factory and boardinghouse"), and lines 49–53 ("Dickens never told his wife and children about his childhood work experience"). This purpose is best stated in Option A. While Dickens was "miserable during the entire four months he spent working at the factory" (lines 26-27) and likely did not want to work in a factory ever again, the author does not include the details in the fourth paragraph to emphasize this idea, ruling out Option B. Option C is incorrect because the detail that Dickens did not share information about his childhood with others is used as a supporting sentence for the idea that childhood experiences affected his adult life. It is also reasonable to infer that Dickens did not want his children to suffer the way that he did, but the details in the fourth paragraph do not emphasize or support this inference, ruling out Option D.

30. (**H**) Although Dickens disliked his job, there is no reason to think he could not perform his duties (Option E). Option F and Option G might be true, but the details presented in the second and third paragraphs primarily support Option H, the idea that Dickens disliked working in the factory and preferred attending school ("forced to quit school," "relieved to be out of the factory," "The father, however, now sided with his son, and the boy was sent back to school").

31. (**B**) The correct answer is found in lines 10–13 and in the fifth paragraph. Dickens wrote *David Copperfield* because he was unable to complete his autobiography and writing the novel helped him deal with difficult childhood memories (Option B). Dickens's writings as an adult would not have helped pay his family's

debts (Option A). While it may be true that Dickens avoided telling his children about his job at the factory (Option C), that is not the reason Dickens wrote *David Copperfield*. Option D is incorrect because Dickens did not intend to share information about his own experiences.

32. (**F**) The passage says little about the relationship between Dickens and his mother, only that Dickens felt betrayed when his mother, anxious for the boy's wages, got his job back for him (lines 33–36). Option F best expresses this information. Option E suggests that they did not have a positive relationship, but there is no evidence in the passage to support this inference. Dickens may have hoped his mother would understand why he wanted to go to school (Option G), but this idea is not clearly expressed in the passage. Dickens's mother did negotiate with the factory boss on his behalf (Option H), but this action does not describe their relationship.

33. (**D**) The passage states, "The father, however, now sided with his son, and the boy was sent back to school" (lines 36–38). In other words, Dickens was able to return to school because his father supported the idea (Option D). The discussion between his mother and his boss (Option A) led to Dickens getting his factory job back. The argument between his father and his boss (Option B) led to Dickens's dismissal from his job, not his return to school. Getting fired from the factory (Option C) occurred before Dickens returned to school but was not the direct reason for it.

Flavors

34. (**G**) Option E and Option F are too specific: the passage mentions some scientific aspects of taste and smell, but it concentrates on the development of flavors. Option H is mentioned in only the last paragraph. Option G is a good summary of the passage. It incorporates the main topics—the scientific analysis of flavors and how flavors are created.

35. (**C**) The third paragraph describes a technique for separating a food into its basic chemical constituents. Option C best summarizes the goal of this research. Option A and Option D are not supported by the passage as goals of the research. Option B is incorrect because the goal of the research is to capture and reproduce the flavor, not to develop food.

36. (**F**) The process of collecting aromas during food preparation is described in the third paragraph. Option E is not supported because the process of capturing aromas has been successful and only certain flavors present difficulties. The idea that most people cannot tell the difference between natural and synthetic flavors (Option G) is not a conclusion that can be made from the collection of aromas during food preparation. Option H is incorrect because aromas are collected during the cooking process to isolate essential chemicals that make up flavor (lines 35–37), not to enhance the natural flavor. Option F is the best answer: the aroma of food as it is being prepared can be captured and distilled to synthesize the food's flavor (lines 35–41).

37. (**C**) Orange soda is mentioned in lines 52–57 to provide an example of a product that uses a synthetic flavor that some consumers prefer to its natural counterpart (Option C). The idea that consumer preferences for artificial or natural flavors vary could be true, but this is not suggested by the author's discussion of one flavor (orange soda), ruling out Option A. Option B is incorrect because even though the passage states that natural flavors may be more expensive than artificial flavors, the author does not use the details about orange soda to make this point. The author states that some natural flavors may become scarce in the future (lines 59–61), but this is not exemplified by the discussion of orange soda in lines 52–57, ruling out Option D.

38. (**F**) The author describes the role of the sense of smell to highlight that the aroma of a flavor, in addition to its taste, influences how a person experiences a flavor, as evidenced in lines 10–11 ("The sense of smell has a larger role in tasting flavors than most people realize"). This is best stated in Option F. Option E reflects the idea in lines 8–10, but the idea that it is easier for people to smell an aroma than to taste its flavor is not why the author includes the description about how smell impacts taste. Option G and Option H present inaccurate ideas regarding synthetic flavors and fail to explain why the author describes the role of the sense of smell at the beginning of the passage.

39. (**D**) The author describes the uses of synthetic flavors in items such as "mouthwashes, toothpastes, beverages" (lines 26–27) to demonstrate that synthetic flavors are found in many everyday household products. This is best stated in Option D. Option A may seem like an attractive option because the list of everyday items with synthetic flavors could give the impression that creating synthetic flavors is easy; however, while some synthetic flavors have

been successfully created (lines 17–20), efforts to duplicate other flavors have been unsuccessful (lines 62–71), ruling out Option A. The idea that the same synthetic flavor is used in many items (Option B) and the idea that synthetic flavors are healthier than natural flavors (Option C) cannot be concluded from the list of common products that use synthetic flavors in lines 26–28.

Great Zimbabwe

40. (**G**) Only Option C represents the central idea that is developed, supported, and explained throughout the passage. The idea that there was much speculation about Great Zimbabwe is explained in lines 9 and 10 as well as in the second paragraph, and the details about how modern archaeologists determined its origins are explained in the fifth paragraph. Option E is incorrect because it does not encompass the facts revealed about Great Zimbabwe in the fifth paragraph. Option F is incorrect because it mainly focuses on the idea that archaeologists are still interested in the mysteries of Great Zimbabwe, which is mentioned only in the sixth paragraph. Option H is incorrect because the fact that early excavations of Great Zimbabwe caused the destruction of valuable evidence is a detail from lines 50–58, and the option does not fully explain the central idea developed in the passage.

41. (**B**) Lines 45–47 explain that Mauch "jumped to the conclusion that Great Zimbabwe had been built by the Queen of Sheba." This affected later investigations of the ruins because archaeologists worked under the assumption that Mauch's conclusions were accurate, and the archaeologists discarded evidence that may have suggested otherwise, as detailed in lines 50–56. This is best stated in Option B. Archaeologists were interested in the area (Option A), but this was not the main effect of Mauch's conclusions, as described in the passage. People searched for Great Zimbabwe because they already believed the stories told by Arab traders and historians like de Barro were true (lines 23–26), not because of Mauch's conclusions, which rules out Option C. Although the city was considered impressive (lines 29–40; lines 69–75), Mauch's conclusions did not influence whether people believed an ancient culture could have built it, ruling out Option D.

42. (**H**) The fifth paragraph states that carbon-14 dating proved Randall-MacIver and Caton-Thompson's conclusions that Great Zimbabwe was built by ancestors of the Shona people during the fourteenth or fifteenth century (lines 64–69). Option E, "when the settlement

was abandoned and why," has not been solved (lines 77–80). The presence of ivory and gold (Option F) and the reason that Europeans did not discover Great Zimbabwe until the 1870s (Option G) are not presented as mysteries.

43. (**B**) The Shona people are discussed in the fifth paragraph. Ancient Shona people lived in the African interior, not on the coast, and the passage does not explain where Shona people live in the present, which eliminates Option A. Option C and Option D confuse the histories of the Shona people and ancient Middle Eastern people. Option B is the best answer; lines 64–67 state that Great Zimbabwe was most likely built by ancestors of the present-day Shona people.

44. (**H**) David Randall-MacIver and Gertrude Caton-Thompson's conclusions were significant because their excavation of the ruins revealed that Great Zimbabwe was most likely built by the Shona people (lines 64–67) and discredited the long-standing idea that the structure was Middle Eastern in origin. This is stated in Option H. Option E is incorrect because Randall-MacIver and Caton-Thompson's determined that the city was most likely built in the fourteenth or fifteenth century (line 66), which was later than earlier explorers had assumed. Lines 69–75 indicate that the Shona society was robust (Option G), and lines 77–80 pose the question of why the great city was abandoned (Option F), but these ideas are not the main reasons Randall-MacIver and Caton-Thompson's conclusions were significant.

45. (**A**) Option A is correct; the Portuguese searched for "King Solomon's gold," which they associated with Great Zimbabwe but they never found the city (lines 23–26). Option B and Option D may be true based on the details in the second paragraph, but they are not the best descriptions of the Portuguese explorers' overall relationship with Great Zimbabwe. Even though Portuguese explorers had little information about the precise location of Great Zimbabwe (lines 13–16), the passage does not support the idea that the explorers knew they would not find the stone city (Option C).

Bats

46. (**E**) Option E is correct because it states the main idea of the passage: bats provide benefits for the environment and need to be protected. These benefits are explained and supported in the second and third paragraphs, and the idea that they need to be protected is supported in the fourth and fifth paragraphs. Option

F is incorrect because it focuses on the idea that people consider bats pests and does not explain how bats are helpful. The idea that bats help prevent the spread of disease (Option G) and pollinate rain forest plants (Option H) are details about some of the benefits bats provide, not the central idea of the passage.

---

47. (**D**) The far-reaching impact of a keystone species is described in the third paragraph. The flying fox, a keystone species in the rain forest, pollinates plants and distributes seeds and thus helps provide food and shelter for many other plants and animals in its ecosystem. Rain forests in turn help maintain a balanced global atmosphere for living creatures everywhere. Option D best states that bats are important in maintaining a stable ecosystem because of the effects listed in lines 36–43. A keystone species can be threatened with extinction (Option A), but that does not explain the function of a keystone species. Option B and Option C are too limited in scope to represent the function of a keystone species.

---

48. (**G**) The author discusses bat conservation at the end of the passage. The author acknowledges that many people think bats are a problem but then stresses that bats should be carefully managed and protected, which is best stated in Option G. Option E is incorrect because the author does not advocate for bats eating crops and cultivated trees. Option F is incorrect because, while bats do support the growth and survival of many species, the author never suggests relocating them to areas with struggling ecosystems as a conservation method. Option H is incorrect because the author understands that farmers and orchard owners need their crops and trees to survive in order to earn a livelihood (lines 62–65).

---

49. (**A**) The iroko tree is mentioned in lines 20–23 as a valuable tree that depends entirely on flying foxes for pollination (Option A), and so without bats this plant would not exist. While genetic diversity can improve a plant's ability to survive, it is not necessary for survival, ruling out Option B. Lines 46–50 explain why bats sometimes eat cultivated fruit, but the result of this is that crops are ruined, ruling out Option C. While bats do eat mosquitoes (lines 9 and 10), this detail best supports the idea that bats help limit the spread of disease, which rules out Option D.

50. (**G**) The author describes the bat's role as a keystone species in order to emphasize the drastic effects that a sudden change in the bat population would have on the pollination of plants and trees (lines 36–37), the ability of certain animals to find shelter (lines 37–38), and the levels of oxygen in the atmosphere (lines 40–43). This is best stated in Option G, which encompasses the idea that if bats could not perform these natural activities, the rain forest would be threatened. The ideas in Option E, Option F, and Option H are explained in the third paragraph as natural activities that bats support, but these are individual details about what bats do. The statements do not explain the significance of the role of bats in the survival of an entire rain forest ecosystem.

---

51. (**B**) The phrase "ugliness is only skin deep" (line 69) is intended to mean that an unattractive outward appearance does not necessarily indicate inward ugliness. The intended meaning—that the ugly outward appearance of bats does not mean that they are bad—is best stated in Option B. While the passage describes different species of bats ("brown bat" in lines 5 and 8 and "flying foxes" in the second paragraph), the text focuses on their roles in the environment, not on a comparison of their appearance, which rules out Option A. Option C is incorrect; the passage states people try to remove bats because they ruin fruit trees and crops (lines 49–50), not because of their appearance. As mentioned in the fifth paragraph, conservation groups and government agencies are trying to overcome people's negative perception of bats by educating people about the benefits bats provide; however, Option D is incorrect because the passage does not state or imply that the physical appearance of bats influences efforts to conserve them.

Samizdat

52. (**G**) Option E mentions two important samizdat writers from the fourth paragraph but does not explain samizdat or the authors' relationship to it. Option F refers to all poetry published in the Soviet Union, not just samizdat poetry, so it is too broad. Option H is mentioned only in the first paragraph. Option G is a good description of the topic of the passage, describing Soviet censorship and the samizdat response.

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53. (**B**) The earliest phase of samizdat is described in lines 33 and 34: "At first, samizdat focused mainly on literature, such as poetry and novels." Only Option B, "a short story," fits in this category. Option A, Option C, and Option D are not representative of the earliest phase of samizdat.

54. (**E**) The phrase "a knock at his door in the middle of the night" refers to the secret police. Pasternak, like other samizdat writers, feared being caught by authorities and accused of writing and distributing samizdat (lines 15–18). Option E is correct. The passage does not indicate that Pasternak would be concerned about "a representative from a major publisher" (Option F), "a participant in the samizdat network" (Option G), or "people from other countries" (Option H) knocking on his door at night.

55. (**D**) Option D is the best answer because storing and circulating texts via computers marked a significant change from hand-copying or typing paper copies of samizdat texts (lines 64–68). Option A, Option B, and Option C represent events that occurred during the peak of samizdat circulation, but those events did not directly lead to significant changes in the samizdat distribution process.

56. (**F**) Lines 1–3 indicate that people could be punished for writing about certain topics. Lines 26–32 explain the steps samizdat authors and distributors used to ensure that the network of authors was protected, including having authors leave their work unsigned or using fake names. This is stated in Option F. Samizdat works, like Pasternak's Doctor Zhivago, were smuggled out of the country (lines 46–48), so using no names or fake names would not relate to this practice, ruling out Option E. Samizdat writers would be breaking censorship law regardless of whether they included their real names, which rules out Option G. While making copies of a work was part of the samizdat distribution process, the act of leaving work unsigned or writing under a false name would not differentiate between original and copied works, which rules out Option H.

57. (**A**) The answer is found in lines 68–73. The correct answer, Option A, makes the connection between the abolishment of censorship and subsequent freedom of the press, which eliminated the need for samizdat. The fifth paragraph explains that there was "a publishing boom" (lines 70–71) after censorship laws were abolished but does not suggest that samizdat networks ended because they became regular publishing companies, which rules out Option B. Option C is incorrect because the use of computers helped samizdat networks spread material (lines 65–68) while censorship laws were still in place. Option D is incorrect because going deeper underground would not be necessary after censorship was abolished.

58. (**162**) First, find the measure of angle PQR. The measure of angle PQR is equal to the measure of angle PSR.

$m\angle \text{PSR} = 180 - 72 = 108.$

So, the measure of angle PQR is also 108.

$108 + 90 + x = 360$

$198 + x = 360$

$x = 162$

---

59. (**99**) Let x be the number of oak trees when 264 pine trees are planted. Set up a proportion and solve for x:

$\dfrac{x}{264} = \dfrac{3}{8}$

$8x = 762$

$x = 99$

---

60. (**−4**) $4w = 2w - 8$

$2w = -8$

$w = -4$

---

61. (**45**) Let $x = $ number of students with only cats as pets.

Let $y = $ number of students with only dogs as pets.

Calculate x and y using the given information: There are 20 students who have cats, and of those 20 students, 3 have both cats and dogs. Thus, $x = 20 - 3 = 17$. There are 23 students who have dogs, and of those 23 students, 3 have both cats and dogs. Thus $y = 23 - 3 = 20$.

To find the total number of students surveyed, add the number of students who only have cats (x), the number of students who only have dogs (y), the number of students who have both (3), and the number of students who have neither (5): $3 + 5 + x + y = 8 + 17 + 20 = 45$

62. (**63**) If x is the smaller consecutive integer, then $x + 1$ is the larger consecutive integer. Use their sum (-15) to find x:

$x + (x + 1) = -15$

$2x + 1 = -15$

$2x = -16$

$x = -8$

The two consecutive integers are -8 and -7.

One is added to the smaller integer: $-8 + 1 = -7,$ and 2 is subtracted from the larger integer: $-7 - 2 = -9.$

Find the product: $-7 \times -9 = 63.$

---

63. (**B**) $2k = m + 3$ so $k = \dfrac{m+3}{2}.$

Substitute each value of m to find the values of k:

$k = \dfrac{5+3}{2} = \dfrac{8}{2} = 4$

$k = \dfrac{7+3}{2} = \dfrac{10}{2} = 5$

$k = \dfrac{9+3}{2} = \dfrac{12}{2} = 6$

The set k is $\{4, 5, 6\}.$

---

64. (**E**) First, convert 500 milliliters to liters by dividing by 1,000: $500 \div 1,000 = 0.500$

Now, multiply by 24 to find the solution: $0.500 \times 24 = 12\,\text{L}$

---

65. (**A**) The sum of Adrianna's course grades equals 4 times the average (mean) of her grades: $90 \times 4 = 360.$ Roberto has the same sum (360) as Adrianna. Find the mean of his course grades:

$360 \div 5 = 72$

66. (H) Set up some equations.

Jenny (J) has twice as many marbles as Keiko (K): $J = 2K$

Jenny gives Keiko 5 marbles, so now they each have: $J - 5$ and $K + 5$ marbles.

Jenny still has 10 more than Keiko:
$J - 5 = (K + 5) + 10$

To find how many marbles Jenny had to start with, solve $J = 2K$ for K and substitute that into the second equation:

In equation $J = 2K$, solve for K: $K = \dfrac{J}{2}$.

Substitute $\dfrac{J}{2}$ in for K.

$J - 5 = (K + 5) + 10$

$J - 5 = \left(\dfrac{J}{2} + 5\right) + 10$

$J - 5 = \dfrac{J}{2} + 15$

$J = \dfrac{J}{2} + 20$

$\dfrac{J}{2} = 20$

$J = 40$ marbles

---

67. (A) Let x be the number of inches representing 1 foot. Set up a proportion and solve for x:

$\dfrac{x}{1} = \dfrac{0.125}{125}$

$x = 0.001$ in.

---

68. (G) First, add the percentage of cars containing 3 people, 4 people, and 5 or more people:
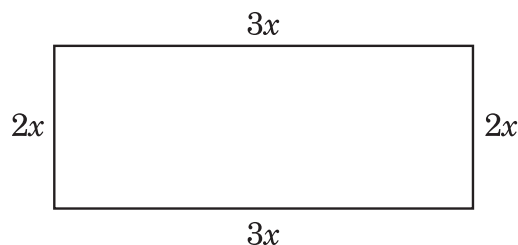
$15\% + 7\% + 3\% = 25\%$

Thus, 25% of the cars contained **at least** 3 people, so use that to calculate the number of cars:

$420 \times 0.25 = 105$ cars.

---

69. (B) Line segment $\overline{RS}$ is the altitude, or height, of triangle QRP. The length of QP is 8 cm. Use that information to find the area of triangle QRP: $A = \dfrac{1}{2}bh = \dfrac{1}{2}(8)(6) = 24$ sq cm.

There are 4 congruent triangles in the pyramid, so the surface area is $4 \times 24 = 96$ sq cm.

---

70. (F) Let $2x =$ the width and $3x =$ the length. Draw the rectangle to help visualize.

Since 2 times width $+ 2$ times length $=$ perimeter, we get

$2(2x) + 2(3x) = 510$

$4x + 6x = 510$

$10x = 510$

$x = 51$

$2x = 102\,\text{cm}$ and $3x = 153\,\text{cm}$

---

71. (D) Multiply each term by 2 to eliminate the fraction, and isolate x:

$-4(2) < \left(\dfrac{x}{2}\right)(2) < 2(2)$

$-8 < x < 4$

Therefore, x must be between -8 and 4.

72. (F) Use proportions to make the conversions:

Lorgs to dollars:

$$\frac{140}{x} = \frac{7}{1}$$

$$7x = 140$$

$$x = \$20$$

Dalts to dollars:

$$\frac{16}{x} = \frac{0.5}{1}$$

$$0.5x = 16$$

$$x = \$32$$

Total dollars $= 20 + 32 = \$52$

---

73. (B) Let x be the total number of colored pencils in the box. Set up a proportion to find x:

$$\frac{2}{7} = \frac{6}{x}$$

$$2x = 42$$

$$x = 21$$

If there are 6 red pencils, then the number of pencils that are not read is $21 - 6 = 15$.

74. (H) Since both ratios have y in common, solve for x and z in terms of y in both equations.

Using $x{:}y = 1{:}4$, solve for x in terms of y.

$$\frac{x}{y} = \frac{1}{4}$$

$$x = \frac{1}{4}y$$

Using the ratio $y{:}z = 4{:}5$, solve for z in terms of y:

$$\frac{y}{z} = \frac{4}{5}$$

$$z = \frac{5}{4}y$$

The question states $x + y + z = 50$. Substitute from the two equations above and solve for y.

$$\frac{1}{4}y + y + \frac{5}{4}y = 50$$

$$\frac{10}{4}y = 50$$

$$10y = 200$$

$$y = 20$$

---

75. (B) The shaded region is a right triangle. Each leg is 1 unit in length. So the area is

$$A = \frac{1}{2}bh = \frac{1}{2}(1)(1) = \frac{1}{2} \text{ or } 0.5 \text{ sq unit}$$

---

76. (F) Create a table with the information provided in the problem and use subtraction to fill in the rest of the table:

	Female	Male	TOTAL
Commutes to work	21%	**39%** (60 – 21)	60%
Does not commute to work	**24%** (45 – 21)	**16%** (40 – 24)	**40%** (100 – 60)
TOTAL	45%		100%

16% of the population is male and does not commute to work.

77. (A) Let x be the price per pound for the meat. Set up an equation to show what Mrs. Cranston spent:

$5(0.90) + 8x = 26.90$

$4.50 + 8x = 26.90$

$8x = 22.40$

$x = 2.80$

The price per pound for the meat is $2.80.

78. (E) The probability that both cards are not blue is the same as the probability that both cards **are** red. There are 4 red cards out of the 10, so the probability of the first card being red is $\frac{4}{10}$. Now there are 9 cards left, and 3 of those are red, so the probability of the second card being red is $\frac{3}{9}$. Multiply the two probabilities to find the probability that both cards are red (not blue):

$\frac{4}{10} \times \frac{3}{9} = \frac{12}{90} = \frac{2}{15}$

79. (D) 1 sind $= 4$ lorgs, so 1 sind > 1 lorg.

2 harps $= 5$ sinds, so 1 harp > 1 sind.

1 plunk $= 3$ harps, so 1 plunk > 1 harp, meaning that 1 plunk > 1 sind and 1 lorg.

2 plunks $= 5$ dalts, so 1 plunk > 1 dalt.

Therefore, the plunk is the most valuable.

80. (G) For each row, multiply the number of students by the score. Then add those together and divide by the total number of students to find the mean (average) of the 10 students.

$\frac{85(4)+75(4)+65(2)}{10} = \frac{340+300+130}{10}$

$= \frac{770}{10} = 77$

81. (B) According to the chart, 22% of people walk to work and 4% ride a bicycle. Subtract to find the percentage of how many more people walk than bicycle:

$22\% - 4\% = 18\%$

To find the exact number of people, multiply 18% (0.18) by the number of people working in Center City (15,000):

$15,000 \times 0.18 = 2,700$

82. (F) To find the smallest factor of 91, list the factors: 1, 7, 13, and 91.

The smallest factor (other than 1) is 7.

Of the options listed (30, 35, 39, and 44), only 35 is a multiple of 7.

83. (D) Let x be the remaining side of the actual banner. Set up a proportion:

$\frac{x}{16} = \frac{36}{12}$

$x = 48 \, \text{ft}$

84. (F) Let x be the number of second-, third-, and fourth-year students. Then the total number of students in the college is $663 + x$. Set up a proportion and solve for x:

$\frac{15}{1} = \frac{663+x}{179}$

$663 + x = 179(15)$

$663 + x = 2,685$

$x = 2,022$

85. (D) $2\frac{1}{5} + 3\frac{3}{10} + 4\frac{2}{5} + 5\frac{1}{2}$

Convert all the fractions to a common denominator (10):

$2\frac{2}{10} + 3\frac{3}{10} + 4\frac{4}{10} + 5\frac{5}{10}$

$= (2 + 3 + 4 + 5) + \left(\frac{2+3+4+5}{10}\right)$

$= 14 + 1\frac{4}{10} = 15\frac{2}{5}$

86. (F) Divide the rate by the number of seconds in an hour. (Since there are 60 minutes in an hour and 60 seconds in a minute, multiply $60 \times 60 = 3{,}600$ seconds in an hour):

$$\frac{55}{3{,}600} \text{ miles per second}$$

Multiply by the number of feet in a mile (5,280):

$$\frac{55 \cdot 5{,}280}{3{,}600} \text{ feet per second}$$

87. (D) First, set up an equation to express Tien's age (T) and Jordan's age (J) today:

$$T = \frac{1}{4}J$$

Two years from now, Tien's age will be $T + 2$, and Jordan's age will be $J + 2$. Set up an equation about the relationship between Tien's age and Jordan's age in two years:

$$T + 2 = \frac{1}{3}(J + 2)$$

Solve the above equation for T:

$$T = \frac{1}{3}(J + 2) - 2$$

Now set the two equations equal to each other and solve for J:

$$\frac{1}{4}J = \frac{1}{3}(J + 2) - 2$$

$$\frac{1}{4}J = \frac{1}{3}J - \frac{4}{3}$$

$$-\frac{1}{12}J = -\frac{4}{3}$$

$$J = -\frac{4}{3}\left(-\frac{12}{1}\right)$$

$$J = 16$$

88. (E) List the factors of 48:

1 and 48, 2 and 24, 3 and 16, 4 and 12, 6 and 8

There are no factors greater than 24 and less than 48.

89. (C) The first integer is l, so the second is $l + 1$, the third is $l + 2$, then $l + 3$, and finally $l + 4$. Since g is the fifth and greatest of the integers, $g = l + 4$.

Substitute $l + 4$ for g and simplify:

$$\frac{l+g}{2} = \frac{l+l+4}{2} = \frac{2l+4}{2} = l + 2$$

90. (H) Three years is 36 months (12×3). Set up an expression to find the total amount Johan paid:

$$1{,}000 + 300(36) = \$11{,}800$$

91. (B) Create a list of the possible pairs. Let the cookies be named A, B, C, D, E, and F.

AB, AC, AD, AE, AF
BC, BD, BE, BF
CD, CE, CF
DE, DF
EF

There are a total of 15 possible pairs of cookies that Aiden can choose.

92. (G) Set up proportions to figure out how many slides Deion and Kyra can create in 1 hour:

Deion

$$\frac{5}{20} = \frac{x}{60}$$

$$20x = 300$$

$$x = 15$$

Deion can create 15 slides in 1 hour.

Kyra

$$\frac{3}{10} = \frac{x}{60}$$

$$10x = 180$$

$$x = 18$$

Kyra can create 18 slides in 1 hour.

Add Deion and Kyra to figure out how many slides they can create together in 1 hour:
$15 + 18 = 33$.

93. (**C**) Since $LN = \frac{1}{8}$, point N is located at $4\frac{5}{16} + \frac{1}{8} = 4\frac{7}{16}$. So M must be between point L, $4\frac{5}{16}$, and point N, $4\frac{7}{16}$. Point L can also be written as 4.3125, and point N can be written as 4.4375. The only option given that lies between those two points is 4.35.

94. (**G**) The length of the stick must be the greatest common factor of 72 and 30. The factors of 30 are 1, 2, 3, 5, 6, 10, 15, and 30. Of those, only 1, 2, 3, and 6 are also factors of 72. The greatest of these is 6.

95. (**B**) Ryan has 130 pages left to read $(150 - 20)$. He read 20 pages in 30 minutes, which means he read at a rate of 40 pages per 1 hour. To find out how much longer it will take him to finish the assignment, divide the total number of pages remaining (130) by the number of pages he is able to read per hour (40):

$$\frac{130}{40} = 3\frac{1}{4}$$

96. (**G**) It is easier to rewrite $\frac{M}{N}$ as $M \div N$ since they are both fractions.

$$M \div N = \frac{w}{x} \div \frac{y}{z} = \frac{w}{x} \cdot \frac{z}{y} = \frac{wz}{xy}$$

97. (**B**) The question asks for integers from 12 to 30 that are not divisible by 2 or 3.

The set of consecutive integers is {12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30}.

Since all even numbers are divisible by 2, eliminate all even numbers, leaving the odd numbers in the set: {13, 15, 17, 19, 21, 23, 25, 27, 29}.

Eliminate those integers that are multiples of 3 (15, 21, and 27). The remaining integers are: {13, 17, 19, 23, 25, 29}. Therefore, there are 6 numbers in the set that are multiples of **neither** 2 nor 3.

98. (**G**) Take each city's number of schools and multiply by the number of students. It is not necessary to calculate all 5 of these. Cities M and N have the same number of students, so just calculate the number of students in City M because it has more schools than City N. The same goes for Q and R — only Q needs to be calculated because it has more schools than R.

$$M = 8 \times 500 = 4{,}000$$

$$P = 9 \times 400 = 3{,}600$$

$$Q = 6 \times 700 = 4{,}200$$

City Q has the greatest number of students.

99. (**C**) The total number of candies in the box is $5 + 3 + 2 = 10$. The number of candies that are not banana is $5 + 2 = 7$.

The probability of the first candy not being banana is $\frac{7}{10}$. Now, out of 9 candies, there are 6 candies left that are not banana.

The probability of the second candy not being banana is. $\frac{6}{9}$. Multiply these two probabilities to get the solution:

$$\frac{7}{10} \times \frac{6}{9} = \frac{42}{90} = \frac{7}{15}$$

100. (**H**) Solve the equation for z:

$$\frac{w}{x} = \frac{y}{z}$$

$$wz = xy$$

$$z = \frac{xy}{w}$$

101. (**C**) Convert the ratios into fractions of WZ. Use the sum of the ratios for the denominator.

WX:XY:YZ = 4:2:3

$$WX = \frac{4}{4+2+3} = \frac{4}{9}$$

$$XY = \frac{2}{4+2+3} = \frac{2}{9}$$

The part of WZ that is WY is the sum of those fractions:

$$WY = \frac{4}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3}$$

Find the length of WZ: $WZ = 8 - (-10) = 18$

The value of WY is $\frac{2}{3}(18) = 12$.

102. (**G**) Find 1% of 0.02: $0.02 \times \frac{1}{100} = 0.0002$

The greatest allowable thickness would be $0.02 + 0.0002 = 0.0202$ inch.

103. (**D**) First, calculate the highest score for each section by adding the lowest score to the range:

Section I: $65 + 28 = 93$

Section II: $62 + 25 = 87$

Section III: $67 + 22 = 89$

The overall highest score is 93, and the overall lowest score is 62. Thus the overall range is $93 - 62 = 31$.

104. (**F**) Since $3n$ is even, then $3n + 1$ must be odd. Thus $3n + 3$ and $3n + 5$ are also odd. So there are a total of 3 numbers in this range that are odd.

105. (**D**) There are 6 digits in the repeating decimal (769230), so 7 would be the first, seventh, thirteenth digit and so on. To find the 391st digit, divide 391 by 6.

$391 \div 6 = 65 \, R1$

Since the remainder is 1, that means the 391st digit is the same as the 1st digit, which is 7.

106. (**E**) One revolution is equal to the circumference of the tire:

$$C = 2\pi r = 2(1)\left(\frac{22}{7}\right) = \frac{44}{7} \, \text{ft}$$

The car travels at 4,400 ft per minute. To calculate the number of revolutions, divide the speed by the circumference:

$$4,400 \div \frac{44}{7} = 4,400 \times \frac{7}{44} = 700 \text{ revolutions.}$$

107. (**D**) $100(2 + 0.1)^2 - 100 = 100(2.1^2) - 100$
$= 100(4.41) - 100 = 441 - 100 = 341$

108. (**G**) The total number of handballs in the container is $4 + 5 + 8 + 9 + 11 = 37$.

Since there are 8 yellow handballs, the probability of selecting a yellow handball is $\frac{8}{37}$.

109. (**A**) Each chair costs Leon $150 to make, and he sells the chair for $275. His profit is found by subtracting the cost from the price:

$\$275 - \$150 = \$125$ per chair

If Leon makes and sells 25 chairs in a week, his initial profit is $25 \times \$125 = \$3,125$. However, Leon has additional fixed expenses of $1,250 per week, so this cost must also be subtracted to arrive at the profit. His final profit is $\$3,125 - \$1,250 = \$1,875$.

110. (**H**) Convert 4 ft 7 in. to inches.

Since $12 \text{ in.} = 1 \text{ ft}$:

$4(12) + 7 = 55$ inches

Multiply that by the conversion

$254 \text{ cm} = 1 \text{ in.}$
$55 \times 2.54 = 139.70 \text{ cm}$

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111. (**C**) First, use $JK = 3\frac{1}{2}$ to find the location of J:

$\frac{3}{8} - J = 3\frac{1}{2}$

$J = \frac{3}{8} - 3\frac{1}{2} = -3\frac{1}{8}$

Now, use $JM = 9\frac{3}{4}$ to find the location of M:

$M - \left(-3\frac{1}{8}\right) = 9\frac{3}{4}$

$M + 3\frac{1}{8} = 9\frac{3}{4}$

$M = 9\frac{3}{4} - 3\frac{1}{8} = 6\frac{5}{8}$

Finally, use $LM = 1\frac{1}{8}$ to find the location of L:

$6\frac{5}{8} - L = 1\frac{1}{8}$

$L = 6\frac{5}{8} - 1\frac{1}{8} = 5\frac{4}{8} = 5\frac{1}{2}$

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112. (**G**) $4x - 3y = 12$

$4x = 3y + 12$

$x = \frac{3}{4}y + \frac{12}{4}$

$x = \frac{3}{4}y + 3$

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113. (**A**) First, determine the total number of servings of fruits and vegetables that the students ate by multiplying the number of servings by the number of students in each row of the table. Then add that column to get the total number of servings:

Number of Servings of Fruits and Vegetables	Number of Students	Number of Servings × Number of Students
0	5	0
1	7	7
2	3	6
3	4	12
4	0	0
5	1	5

Total: 30

Calculate the mean by dividing the total number of servings of fruits and vegetables by the total number of students:

$\frac{30}{20} = 1\frac{1}{2}$

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114. (**G**) The ratio is 4:3:2:1, so the total parts is 10.

Since there are two parts resin, the fraction of resin is $\frac{2}{10} = \frac{1}{5}$.

So the amount of resin in 30 lb of paste (for 1 billboard) is $\frac{1}{5} \times 30 = 6$ lb. For 4 billboards, that would be $6 \times 4 = 24$ lb.

Answer Key for Sample Form A

1. D	14. E	27. B	40. G	53. B	66. H	79. D	92. G	105. D
2. G	15. A	28. G	41. B	54. E	67. A	80. G	93. C	106. E
3. C	16. G	29. A	42. H	55. D	68. G	81. B	94. G	107. D
4. E	17. C	30. H	43. B	56. F	69. B	82. F	95. B	108. G
5. C	18. F	31. B	44. H	57. A	70. F	83. D	96. G	109. A
6. E	19. A	32. F	45. A	58. 162	71. D	84. F	97. B	110. H
7. A	20. H	33. D	46. E	59. 99	72. F	85. D	98. G	111. C
8. F	21. B	34. G	47. D	60. –4	73. B	86. F	99. C	112. G
9. D	22. E	35. C	48. G	61. 45	74. H	87. D	100. H	113. A
10. G	23. C	36. F	49. A	62. 63	75. B	88. E	101. C	114. G
11. B	24. H	37. C	50. G	63. B	76. F	89. C	102. G	
12. G	25. B	38. F	51. B	64. E	77. A	90. H	103. D	
13. B	26. H	39. D	52. G	65. A	78. E	91. B	104. F	