ISEE PRACTICE

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- Middle Level – Reading Comprehension (p 140-152)
- Upper Level – Mathematics Achievement (p 250-259)

Version 1.0

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Section 2
Quantitative Reasoning

38 Questions  Time: 35 minutes

Each question is followed by four suggested answers. Read each question and then decide which one of the four suggested answers is best.

Find the row of spaces on your answer document that has the same number as the question. In this row, mark the space having the same letter as the answer you have chosen. You may write in your test booklet.

EXAMPLE 1:
What is the value of the expression \((4 + 6) ÷ 2\)?

(A) 2
(B) 4
(C) 5
(D) 7

The correct answer is 5, so circle C is darkened.

EXAMPLE 2:
A square has an area of 25cm\(^2\). What is the length of one of its sides?

(A) 1 cm
(B) 5 cm
(C) 10 cm
(D) 25 cm

STOP. Do not go on until told to do so.
1. The large square shown below has been divided into smaller squares.

![Square Diagram]

What fraction of the large square is shaded?

(A) \( \frac{5}{5} \)

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

(C) \( \frac{1}{3} \)

(D) \( \frac{1}{5} \)

2. Which expression is equivalent to the expression \((2 + 3) \div 4\)?

(A) \( 5 \times 4 \)

(B) \( 5 \times 4 \)

(C) \( \frac{2}{3} + 4 \)

(D) \( 5 \times \frac{1}{4} \)

3. Four students were asked to walk, jog, and sprint around a track. Every two minutes, their speeds were recorded in the table below.

<table>
<thead>
<tr>
<th>Times</th>
<th>Walking Student</th>
<th>Jogging Student</th>
<th>Sprinting Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 min</td>
<td>5.00 km/hr</td>
<td>11.50 km/hr</td>
<td>20.00 km/hr</td>
</tr>
<tr>
<td>4 min</td>
<td>5.00 km/hr</td>
<td>11.00 km/hr</td>
<td>16.00 km/hr</td>
</tr>
<tr>
<td>6 min</td>
<td>5.00 km/hr</td>
<td>10.50 km/hr</td>
<td>14.00 km/hr</td>
</tr>
<tr>
<td>8 min</td>
<td>5.00 km/hr</td>
<td>10.00 km/hr</td>
<td>13.00 km/hr</td>
</tr>
</tbody>
</table>

According to the pattern in this table, what would be the predicted speed of the sprinting student at 10 minutes?

(A) 14.00 km/hr

(B) 12.50 km/hr

(C) 10.00 km/hr

(D) 8.50 km/hr
4. Which story best suits the equation 21 ÷ 7 = 3?
(A) Susie has 21 pieces of gum that she wants to share equally between her 7 friends. How many pieces of gum does she give each friend?
(B) Susie had 21 pieces of gum and ate 7. How many pieces of gum did she have left?
(C) Susie has 21 packs of gum, each with 7 pieces. How many pieces of gum does Susie have?
(D) Susie has 21 pieces of gum and gives 3 packs of gum to her friend. How many packs of gum does Susie have left?

5. Use the number line to answer the question.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0</td>
<td></td>
<td>4.4</td>
</tr>
</tbody>
</table>

What values are the arrows pointing to?
(A) 2.3, 2.4
(B) 2.8, 3.2
(C) 3.2, 3.6
(D) 4.0, 4.1

6. Which is the smallest fraction?
(A) \( \frac{2}{3} \)
(B) \( \frac{14}{30} \)
(C) \( \frac{4}{7} \)
(D) \( \frac{5}{10} \)

7. Which equation can be read as "4 less than half a number is equal to 2 more than the number?" Let \( a \) represent the unknown number.
(A) \( (a - 4) \times \frac{1}{2} = 2 + a \)
(B) \( a + \frac{1}{2} - 4 = a - 2 \)
(C) \( a + 2 + 4 = 2 - a \)
(D) \( \frac{a}{2} - 4 = a + 2 \)

8. Use the pattern to help answer the question.

\[ XXO, XXXO, XXXXO, ... \]

Which comes next?
(A) \( X X X X X X X O \)
(B) \( X X X X X O \)
(C) \( X X X X X \)
(D) \( X X X X X O \)

9. Andrea and Zach walk home together after school at a constant speed of 13 kilometers per hour. Zach's house is three times farther from school than Andrea's house. If it takes Zach 33 minutes to walk home, how long does it take Andrea to walk home?
(A) 11 minutes
(B) 13 minutes
(C) minutes
(D) 66 minutes

10. Jeff is thinking of a prime number between 1 and 20. Jeff says that the number is greater than 11 and less than 17. What number is Jeff thinking of?
(A) 11
(B) 12
(C) 13
(D) 15
11. A survey of 32 artists' favorite colors is displayed in the circle graph below.

Approximately what fraction of the artists chose blue as their favorite color?
(A) $\frac{1}{8}$
(B) $\frac{1}{4}$
(C) $\frac{2}{7}$
(D) $\frac{3}{8}$

12. The triangle below has an area of $A$ inches. If the formula for the area of a triangle is $area = \frac{1}{2} \text{base} \times \text{height}$, which equation would tell you the length of the triangle's base in inches?

(A) $\text{base} = \frac{A}{2}$
(B) $\text{base} = A \times 2$
(C) $\text{base} = A \times 2 - 4$
(D) $\text{base} = A + 4 + 4$

13. Use the equations to answer the question.

$$4a = 8$$
$$2 + b = 3$$

What is the sum of $a$ and $b$?

(A) 1
(B) 2
(C) 3
(D) 6
14. Use the diagram to answer the question.

Which piece would complete the diagram to make a square?

(A)  

(B)  

(C)  

(D)  

15. Use the following equation to answer the question.

\[ p \times 15 = q \]

By which number can \( q \) be divided without leaving a remainder?

(A) 2  
(B) 3  
(C) 4  
(D) 10

16. Lucy has a bag full of marbles of various colors. The probability of choosing a red marble is 5 out of 12. Which combination of marbles is possible?

(A) 5 red marbles and 12 others  
(B) 15 red marbles and 36 others  
(C) 24 red marbles and 10 others  
(D) 20 red marbles and 28 others

17. For which pair of symbols below do both symbols have the same number of lines of symmetry?

(A) \( \times \) \( 
\)

(B) \( \bigcirc \) \( \bigcirc \)

(C) \( \star \) \( \star \)

(D) \( \triangle \) \( \checkmark \)

18. Use the Venn diagram to answer the question.

What candy could be found in the center of the Venn diagram?

(A) A sugary lollipop  
(B) A sour jelly bean  
(C) A sugary jelly bean  
(D) A sour piece of gum

Go on to the next page

Ivy Global
19. The figure below shows Julie’s juice box after she drank some of the juice.

If Julie has 150 mL of juice left, then how much juice did Julie drink?
(A) 250 mL
(B) 200 mL
(C) 150 mL
(D) 100 mL

20. Use the table to determine the rule.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>♠</td>
<td>♦</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td>26</td>
<td>75</td>
</tr>
</tbody>
</table>

What is the rule for the function?
(A) ♠ + 3 − 3 = ♦
(B) 3♠ − 3 = ♦
(C) × 2 + 7 = ♦
(D) 4♠ − 1 = ♦

21. Rachel has four bags of candy. Two of the bags weigh 3 1/2 lb, one bag weighs 4 lb, and one bag weighs 5 lb. What is the mean weight of all four bags?
(A) 4 lb
(B) 4 1/4 lb
(C) 4 3/8 lb
(D) 4 1/2 lb

22. The perimeter of a square is 16w. What is the length of one side?
(A) 4
(B) 8
(C) 4w
(D) 8w

23. The length of 𝐴𝐵 is 𝑥, the length of 𝐵𝐶 is 𝑦, and the length of 𝐵𝐷 is 𝑧.

What is the length of 𝐴𝐷?
(A) 𝑥 + 𝑦 + 𝑧
(B) 𝑥 − 𝑦 + 𝑧
(C) 𝑦𝑧
(D) 𝑥 + 𝑧

24. Use the two equations below to answer the question:

3 ● + 2 ⊙ = 18
⊙ = 3

What is the value of ●?
(A) 2
(B) 3
(C) 4
(D) 5

Go on to the next page
25. Use the figure below to answer the question.

If the length and the width of the figure were both increased by two units, what would be the new perimeter of the figure?
(A) 22 units
(B) 26 units
(C) 28 units
(D) 42 units

26. What is the value of $b$ in the expression below?
\[ \frac{16 \times 48}{24} = b \]
(A) 2
(B) 4
(C) 6
(D) 8

27. Leslie bought 416 erasers for $0.27 each. Which expression gives the best estimate of the total amount of money she spent?
(A) 42 ÷ 3
(B) 41 × 27
(C) 400 × 0.3
(D) 300 × 2.7

28. 8 small boxes, shown as a shaded box in the figure below, can fit into a larger rectangular box.

The volume of the large rectangular box is 16 units$^3$. What is the volume of each small box?
(A) 1 units$^3$
(B) 2 units$^3$
(C) 4 units$^3$
(D) 64 units$^3$

29. Sam has a bag with 18 pieces of chocolate, gummies, and mints. There are three times as many chocolates as there are gummies, and twice as many gummies as there are mints. How many mints does Sam have?
(A) 6
(B) 4
(C) 2
(D) 1
30. Rushen had three bottles of soda. Each bottle contained two liters of soda, and she divided the soda equally into 20 glasses for her friends. How much soda did she pour into each glass?

(A) $\frac{1}{10}$ L
(B) $\frac{3}{10}$ L
(C) $\frac{1}{2}$ L
(D) 6 L

31. Kim's house is 11 km from Joe's house. On the map, this distance is represented by 5.75 cm. How many kilometers does 66 cm represent?

(A) 30 km
(B) 34.5 km
(C) 40.75 km
(D) 52 km

32. Use the figure shown to answer the question.

Lucy wants to use the figure above to draw different quadrilaterals. She can only trace the straight lines connecting the points A, B, C, D, E, and F. How many quadrilaterals can she draw?

(A) 0
(B) 3
(C) 4
(D) 6

33. Alex did the problem shown with his calculator.

\[
\begin{array}{c}
27 \times 189 \\
59
\end{array}
\]

What is a reasonable estimation for his answer?

(A) between 50 and 150
(B) between 150 and 250
(C) between 500 and 1,500
(D) between 1,500 and 2,500

34. How many small unit squares would you need to build a larger square where each side has a length of 3 unit squares?

(A) 3
(B) 8
(C) 9
(D) 12

35. Use the number line shown to answer the question.

The value of B is the difference between another number and A. What is the other number?

(A) 28
(B) 20
(C) 8
(D) 2
36. Five students timed how long it takes them to walk to school and recorded the data in the graph shown below.

Which of the following statements is correct?
(A) The mean (average) walking time is between 25 and 35 minutes
(B) It takes Andrea twice as long to walk to school as it does Kevin.
(C) The range of the data is greater than the number of minutes it takes Andrea to walk to school.
(D) It takes Daniel longer to walk to school than all of the other students combined.

37. The perimeter of the shape below is 16.5 inches.

What is the length of the missing side?
(A) 6 in.
(B) 4.5 in.
(C) 3.5 in.
(D) 2 in.

38. Eloise flips a two-sided coin 100 times. The coin has an equal probability of landing on the “heads” side or landing on the “tails” side, and Eloise records which side it lands on after each flip. Which of the following most likely resembles Eloise’s results?
(A) 94 heads, 6 tails
(B) 100 heads, 100 tails
(C) 47 heads, 53 tails
(D) 0 heads, 100 tails
This section contains six short reading passages. Each passage is followed by six questions based on its content. Answer the questions following each passage on the basis of what is stated or implied in that passage. You may write in your test booklet.
A green leaf is green because of the presence of a pigment known as chlorophyll, but chlorophyll is not the only pigment in a leaf. Leaves also contain yellow and orange pigments that are present in the leaf throughout its life, and red and purple pigments that develop under certain conditions in the late summer. However, as long as the leaf has plenty of chlorophyll, green will be the dominant color.

Chlorophyll has a vital function: it captures solar rays and utilizes the resulting energy to manufacture the plant's food through a process called photosynthesis, which can also be observed in algae. The simple sugars that are produced during this process from water and carbon dioxide gas are the sole source of the carbohydrates the plant needs for growth and development.

Throughout the spring and summer, the plant continually replenishes the chlorophyll in its leaves so that they can keep producing its food. In late summer, as daylight hours shorten and temperatures cool, the veins that carry fluids into and out of the leaf are gradually closed off as a layer of special cork cells forms at the base of each leaf. As this cork layer develops, the flow of chlorophyll into the leaf decreases, slowly at first, and then rapidly. Eventually, the flow of the replacement chlorophyll cannot keep pace with the rate at which the chlorophyll is used up, and the leaf begins to change colors. Without the chlorophyll there to mask them, the yellow, orange, red, and purple colors of the other leaf pigments begin to show through. The colors revealed by the absence of chlorophyll can be vibrant and beautiful, though they only last for a few weeks in the fall. Certain areas, like southern Canada and the eastern United States, are even internationally famous for the brilliance of their "fall foliage." These areas and others often attract tourists called "leaf peepers" who travel great distances for a chance to see the changing leaves.
1. According to the passage, a leaf’s supply of chlorophyll is replenished by
   (A) the formation of cork cells at the base of each leaf.
   (B) water condensation from the atmosphere.
   (C) veins that transport fluids into each leaf.
   (D) the production of carbohydrates.

2. As it is used in line 11, “vital” most nearly means
   (A) critical.
   (B) energetic.
   (C) active.
   (D) refreshing.

3. Red, yellow, and purple leaf pigments reveal themselves
   (A) during the process of photosynthesis.
   (B) when a leaf has less chlorophyll.
   (C) on cloudy days.
   (D) when a leaf has more chlorophyll.

4. Which question could be answered by information given in the passage?
   (A) What causes the seasons to change?
   (B) Why are leaves green, and why do they change color?
   (C) Why are some trees always green?
   (D) Why do plant leaves contain yellow and orange pigments?

5. The function of the second paragraph (lines 11–19) is to
   (A) explain why leaves are green.
   (B) provide evidence that contradicts the first paragraph.
   (C) describe the role of chlorophyll in plants.
   (D) summarize the main idea of the passage.

6. It can be inferred from the passage that the more chlorophyll a leaf has
   (A) the greener it will be.
   (B) the less green it will be.
   (C) the less food it can produce.
   (D) the colder it will be.
Nicknamed the “City of Angels,” Los Angeles is a global city, known for its strengths in business, entertainment, media, technology, and sports. The city is home to renowned cultural institutions like the Hollywood Bowl and Getty Center, and is one of the most substantial economies within the United States.

But this paradise is not without its problems: owing to its geography, and heavy traffic, Los Angeles suffers from debilitating air pollution in the form of smog. The Los Angeles Basin is susceptible to atmospheric inversion, meaning the air closest to the earth’s surface is colder than the air above. This phenomenon traps the cooler air and the exhaust from road vehicles, airplanes, and other sources close to the ground. Further, unlike other large cities that rely on rain to clear smog, Los Angeles gets only 15 inches of rain each year, allowing pollution to accumulate over many consecutive days. These factors make smog a pressing issue for the city, and the 2006 and 2007 annual reports of the American Lung Association ranked the city as the most polluted in the country.

To tackle this issue, Los Angeles decided to take a legal approach. In 2008 a law was passed allowing the city to collect fees from those using its port for shipping, with the funds raised directed to local air quality projects. The state of California also updated its emission standards in 2012, making them the strictest in the country. As a result, the number of severe smog alerts in Los Angeles has declined from over 100 per year in the 1970s to almost zero in recent years. Smog is expected to continue to drop in the coming years due to new technologies like electric and hybrid cars.

Despite these improvements, much work remains to be done. Indeed, in 2013 Los Angeles was still ranked as having the nation’s worst smog. One opportunity that the city should consider is working to improve its public transit system. While Los Angeles already has an extensive bus network, which is the second busiest in the country, only about 10% of the city’s residents make use of it. By contrast, other large American cities sometimes see a quarter or more of their inhabitants opting for buses, subways, and trains; in recent years over 50% of New York City residents used such methods to travel to work. Encouraging more citizens to utilize public transportation rather than taking their own cars could be the final piece of the pollution puzzle that gives Los Angeles the cleaner air it craves.
7. The main purpose of this passage is to
   (A) describe the history of innovation in Los Angeles.
   (B) explain the concept of atmospheric inversion.
   (C) discuss the problem of smog in Los Angeles and some possible solutions.
   (D) argue for better public transit in Los Angeles.

8. Which best describes the way the passage is organized?
   (A) A series of contradictory solutions are presented.
   (B) A problem and early solutions are described, and a further proposal is discussed.
   (C) A popular view is presented and then challenged by scientific evidence.
   (D) A problem is introduced and then analyzed.

9. In line 21 “pressing” most nearly means
   (A) serious.
   (B) forceful.
   (C) chronic.
   (D) constricted.

10. The author is most likely to agree with which one of the following statements?
    (A) The measures Los Angeles has already taken to limit smog have been helpful but insufficient.
    (B) So far Los Angeles has done nothing to fight smog.
    (C) Even without further action, the current levels of smog in Los Angeles are acceptable.
    (D) Improving public transit is the only way to further reduce smog in Los Angeles.

11. According to the passage, besides geography, the largest cause of smog and pollution in Los Angeles is
    (A) industry.
    (B) entertainment.
    (C) climate.
    (D) transportation.

12. It can be inferred from the passage that electric and hybrid cars
    (A) produce more pollution than traditional cars.
    (B) cannot be used in the Los Angeles basin.
    (C) will encourage more citizens to utilize public transportation.
    (D) produce less pollution than traditional cars.
To buy a horse was my greatest ambition. My father died; and as misfortunes seldom come singly, the horse on which my family depended to till our scanty fields died shortly after its owner. Whenever the spring arrived, our one chance to plant a crop was to hire a mule from our nearest neighbor, the tanner. I was the eldest son, and my mother had only my work to offer in payment. The tanner always greeted this proposition coldly. The mule was needed to haul up piles of bark from the depths of the woods to the tanyard. Then, too, he had his own crops to plant. Although the mule was a multifarious animal that ploughed and worked in the bark-mill, and hauled bark from the woods, and took long journeys with the wagon or under the saddle, it was impossible for her to be in all the places in which she was urgently needed at the same time. Therefore, to hire her out hardly seemed to benefit her master. Nevertheless, this bargain was struck every spring. My poverty-stricken mother always congratulated herself upon it, and it never occurred to her that the amount of work that I did in the tanyard was more than enough payment for the few days that the tanner’s mule ploughed our little fields. I, however, was beginning to see that a boy to drive that mule around the bark-mill was as essential as the mule himself. As Providence had failed to furnish the tanner with a son for this purpose—his family consisting of several small daughters—I supplied a long-felt want. I appreciated that my mother was overreached, yet I could not see that she could do otherwise. I sighed for independence, for a larger opportunity. As I drove the mule round the limited circuit, my mind was far away. I anxiously canvassed the future. I cherished fiery, ambitious schemes—but always with a sense of their futility. With my time thus mortgaged, I thought that my help to my mother was far less than it might be. But until I could have a horse of my own, there was no hope—no progress. And for this I planned, and dreamed, and saved.
13. When did the family's horse die?
   (A) in the spring.
   (B) before the father died.
   (C) after the father died.
   (D) while it was plowing the field.

14. What deal was struck every spring?
   (A) The tanner gave the narrator's family some bark, and the narrator's mother lent him their horse.
   (B) The narrator drove the tanner's wagon, and the tanner helped the narrator's mother in the field.
   (C) The narrator gave the tanner his crops, and the tanner gave the narrator a horse.
   (D) The tanner lent the narrator's mother his mule, and the narrator did work for the tanner.

15. What is the most likely reason that the narrator's family always struck this deal in the spring?
   (A) The spring was the time of the year when they needed to till their fields to plant a crop.
   (B) Their old horse died in the spring.
   (C) The spring was the time of the year when the tanner didn't need to use the mule.
   (D) It was too cold to walk to the tanner's house during any other time of the year.

16. The passage answers all of the following questions EXCEPT which one?
   (A) Did the narrator have an older brother?
   (B) What did the narrator's family need the mule for?
   (C) What did the narrator want more than anything?
   (D) How many siblings did the narrator have?

17. In line 31 the word "furnish" most nearly means
   (A) provide.
   (B) appoint.
   (C) include.
   (D) trade.

18. Which phrase means most nearly the same as “this bargain was struck” (lines 21-22)?
   (A) this deal was made.
   (B) we hit upon an idea.
   (C) the bargain was rejected.
   (D) we were astonished at the bargain.
Questions 19–24

1. Proudly raising four fingers—representing the four stripes of the Catalan flag—the enxaneta is greeted by uproarious applause, which he or she can usually enjoy only for a moment before scrambling down the other side of the human tower known as a castell.

2. “Castell” is the Catalan word for, as an English-speaker might guess, “castle.” Castells are a Catalan tradition dating back to the 18th century, when they were first built during local festivals in the city of Valls. Today, castell teams—or colles—build elaborate human towers during festivals throughout Catalonia, as well as in competition.

3. While castell teams were traditionally all-male, today’s colles are as diverse as the communities they come from, uniting men and women of all ages in a feat that is bigger than themselves. Each level of the castell is formed by two to five people standing on the shoulders of those in the level below. The enxaneta is the brave soul, almost always a child, who climbs to the top of a castell to mark its completion.

4. Then begins the treacherous process of dismantling the many levels (as many as ten) of castellers who make up the tower. This is the most treacherous stage of the activity, when participants are most likely to fall. But the danger is not quite as great as it might seem—hundreds of supporters form a pinya, or base, for the castell, cushioning the fall of the castellers in case of collapse. In a demonstration of the sportsmanship found among castellers, when not competing even members of rival colles will assist in forming a pinya for another team that is attempting to build a particularly difficult structure.

5. The traditional outfit for castellers usually consists of a pair of white trousers and a colorful shirt, often bearing the crest or emblem of the casteller’s team. The castellers generally do not wear protective equipment, with the exception of a sash, which provides support for the lower back. Indeed, castellers typically do not even wear shoes, which could injure the people on the lower levels of the Castell, and can actually make it harder to balance.
19. Which of the following statements would the author most likely NOT agree with?
(A) The completion of a castell is an exciting moment for the audience.
(B) Today’s castell teams are better than those of the 18th century.
(C) Building a castell is an impressive achievement.
(D) Castellers are actually safer than their audience might imagine.

20. Which best expresses the main point of the passage?
(A) Building castells started in the 18th century all over Catalonia as an activity that brought men and women together.
(B) Castells were first built by all-male teams in 18th century Valls; today, men, women, and children build them together all over Catalonia.
(C) Castells were once popular throughout Catalonia but today are mainly built by the inhabitants of Valls.
(D) Building castells is a new sport that was designed to heal social rifts by uniting diverse groups in pursuit of a common goal.

21. The attitude of the author towards castells is best described as
(A) alarmed.
(B) critical.
(C) disbelieving.
(D) admiring.

22. According to the passage, what is the role of the pinya (lines 29-33)?
(A) The pinya is a crowd of fans that will cheer the castellers even if they fail.
(B) If the castellers lose their balance and fall, the supporters in the pinya will help them back onto their feet.
(C) If the castellers lose their balance and fall, they will fall safely onto the pinya instead of hitting the ground.
(D) The pinya is the child who goes to the top of the castell to signal its completion.

23. Which best describes the organization of the passage?
(A) A specific event is introduced, and then its history and process are described.
(B) A hypothesis is presented and arguments to support it are provided.
(C) A specific event is introduced and then criticized.
(D) An opinion is presented, followed by facts to support that opinion.

24. In line 13 the word “elaborate” most nearly means
(A) complex.
(B) frilly.
(C) modest.
(D) compact.
The following is an excerpt from a speech by Lyndon B. Johnson, delivered in 1964.

A third place to build the Great Society is in the classrooms of America. There your children's lives will be shaped. Our society will not be great until every young mind is set free to scan the farthest reaches of thought and imagination. We are still far from that goal. Today, 8 million adult Americans, more than the entire population of Michigan, have not finished 5 years of school. Nearly 20 million have not finished 8 years of school. Nearly 54 million -- more than one quarter of all America -- have not even finished high school. Each year more than 100,000 high school graduates, with proved ability, do not enter college because they cannot afford it. And if we cannot educate today's youth, what will we do in 1970 when elementary school enrollment will be 5 million greater than 1960?

In many places, classrooms are overcrowded and curricula are outdated. Most of our qualified teachers are underpaid, and many of our paid teachers are unqualified. So we must give every child a place to sit and a teacher to learn from. Poverty must not be a bar to learning, and learning must offer an escape from poverty.

But more classrooms and more teachers are not enough. We must seek an educational system which grows in excellence as it grows in size. This means better training for our teachers. It means preparing youth to enjoy their hours of leisure as well as their hours of labor. It means exploring new techniques of teaching, to find new ways to stimulate the love of learning and the capacity for creation.
25. The passage above mainly focuses on
   (A) arguing for improvements in the educational system.
   (B) outlining the problems with education.
   (C) encouraging more people to stay in school and further their education.
   (D) addressing the issues of poverty by subsidizing education.

26. Which word best describes the speaker’s tone when describing steps that should be taken to improve the system of education?
   (A) ambivalent
   (B) petulant
   (C) discouraged
   (D) emphatic

27. The second paragraph (lines 13-18) suggests that the speaker believes that
   (A) the cost of college helps to limit demand to just those students who will benefit the most.
   (B) college education should be made more affordable to capable students.
   (C) every citizen should be given a free college education.
   (D) college is expensive mainly because there are too many capable students.

28. When the speaker says that “we must give every child a place to sit” (line 23), he is making reference to
   (A) the large number of adults who have not graduated from high school.
   (B) the problem of overcrowded classrooms.
   (C) the outdated curricula still being used in schools.
   (D) the lack of schools in rural areas.

29. The passage suggests that a high quality education will help some students
   (A) grow up to escape the poverty of their childhood.
   (B) afford the cost of college tuition.
   (C) spend more of their time on leisure.
   (D) spend more of their time at work.

30. What best describes the speaker’s tone when discussing the current state of the education system?
   (A) supportive
   (B) disinterested
   (C) neutral
   (D) critical
Questions 31–36

1 Carrots contain vitamin A. A lack of vitamin A can cause poor vision, including poor night vision. In cases where poor vision is the result of a vitamin deficiency, vision can be restored by adding the vitamin back into the diet. One way to do this is by eating plenty of carrots. Some people, however, believe that the relationship between carrots and vision goes even further, arguing that eating large quantities of carrots will improve vision beyond normal limits and allow one to see in the dark.

This misconception developed in part from stories of British gunners in World War II, who were able to shoot down German planes in the darkness of night. The British gunners were able to shoot down German planes thanks to advances in radar technology, which used radio waves to detect metallic objects like the German planes and accurately target them even in the dark. But the British Government circulated a rumor that it was a diet which included unusually large amounts of carrots that enabled their pilots to see German planes in the dark. This propaganda helped to conceal the recent advances in technology from the Germans by providing a plausible alternative explanation for the success of British gunners. Since German folktales already included such stories about carrots, the story was quite believable to the Germans.

This propaganda also helped to achieve another important goal for the British by increasing British carrot consumption. During the war, ships importing food to Brittan were often sunk, and there were constant shortages of essential foodstuffs – but there was actually a surplus of carrots. By increasing demand for the vegetable with creative stories about its health benefits, the British government was able to encourage the population to consume more of it, thereby relieving strain on the rest of the food supply. Propaganda about carrots also played a role in the “Dig for Victory” campaign, which was designed to encourage Britons to plant gardens and grow their own food locally. The campaign was widely successful, and carrots became an important part of British gardens.
31. It can be inferred from the passage that
   (A) British propaganda was more effective against the British than the Germans.
   (B) many Britons planted gardens during the war.
   (C) carrots actually aren't a healthy food after all.
   (D) animals that have good night vision eat a lot of carrots

32. According to the passage, what role did the British Air Force play in the belief that carrots can provide the ability to see in the dark?
   (A) The British Air Force intentionally spread this rumor to misinform the Germans.
   (B) The British Air Force tried to stop this rumor from reaching the Germans.
   (C) The British Air Force told this rumor to their pilots in order to justify the carrots in their rations.
   (D) When the British Air Force heard this rumor, they encouraged their pilots to eat carrots.

33. According to the passage, the British gunners were actually able to shoot down German planes at night because
   (A) the British ate carrots to improve their night vision.
   (B) the light emitted by the German planes made them easy to see.
   (C) the British had naturally better eyesight than the Germans.
   (D) the British used radar technology to find the planes.

34. The main purpose of this passage is to
   (A) give evidence of how carrots can help you see in the dark.
   (B) document German folk stories about carrots.
   (C) discuss the historical importance of carrots in Britain during World War II.
   (D) provide an explanation of World War II-era radar technology.

35. In line 13, the word “misconception” most nearly means
   (A) belief.
   (B) vicious rumor.
   (C) propaganda.
   (D) faulty idea.

36. The passage suggests that propaganda
   (A) had no effect on World War II.
   (B) played an important role in accomplishing certain goals for the British.
   (C) deceived many people and promoted ill will.
   (D) reduced the consumption of carrots in Great Britain.
Each question is followed by four suggested answers. Read each question and then decide which one of the four suggested answers is best.

Find the row of spaces on your answer document that has the same number as the question. In this row, mark the space having the same letter as the answer you have chosen. You may write in your test booklet.

SAMPLE QUESTION:
If \(a = 3\), what is the value \(a^2 + (3 \times 4) \div 6\)?

(A) 3.5
(B) 11
(C) 14.5
(D) 20

The correct answer is 11, so circle B is darkened.
1. Which number has the most unique prime factors?
   (A) 15
   (B) 17
   (C) 27
   (D) 43

2. If $y = 2$ and $\frac{xy}{x-y^2} = 0$, then which of the following could be a value of $x$?
   (A) $y^2$
   (B) $2y$
   (C) $2 - y$
   (D) $y^2 - 2$

3. How many millimeters are in 0.345km?
   (A) 345 mm
   (B) $3.45 \times 10^3$ mm
   (C) $3.45 \times 10^5$ mm
   (D) $3.45 \times 10^6$ mm

4. $\sqrt{-36} =$
   (A) $6i$
   (B) $-6i$
   (C) 6
   (D) $-6$

5. There are 3 blue marbles, 5 red marbles, and 7 yellow marbles. Shania is randomly removing marbles from the bag and giving them to her brother. What is the probability that she gives her brother first a blue marble and then a red marble?
   (A) $\frac{1}{15}$
   (B) $\frac{1}{14}$
   (C) $\frac{1}{7}$
   (D) $\frac{8}{15}$

6. At Frank’s bakery, a batch of cupcakes requires 12 eggs and 32 cups of flour. If Frank wants to scale down this recipe and make cupcakes at home with 3 eggs, how many cups of flour should he use?
   (A) 4
   (B) 8
   (C) $\frac{32}{3}$
   (D) 20

7. One-fifth of 1.6 plus one-tenth of 3.2 equals
   (A) 0.32.
   (B) 0.64.
   (C) 1.28.
   (D) 4.8.

8. The formula for the volume of a sphere is $V = \frac{4}{3} \pi r^3$. Sphere $A$ has a radius of 2cm and Sphere $B$ has a radius of 4cm. How many times greater is the volume of Sphere $B$ than the volume of Sphere $A$?
   (A) 2
   (B) $\frac{16}{3}$
   (C) 8
   (D) $\frac{32}{3}$

9. Jen’s office is 30km away from her house. On the way to the office, she drove at an average speed of 90km/hour. On the way home, she drove at an average speed of 60km/hour. How long was her entire roundtrip, in minutes?
   (A) 150
   (B) 90
   (C) 75
   (D) 50

Go on to the next page ★
10. The students at Sandbanks Elementary School were asked about their favorite sports.

![Students' Favorite Sports](chart)

If 91 students picked hockey, approximately how many students are there at the school?

(A) 182  
(B) 320  
(C) 360  
(D) 400

11. Julio recorded the heights of several plants in his garden in inches: 2, 3, 5, 7, and 8. What is the product of the average and the range of this list of numbers?

(A) 30  
(B) 40  
(C) 50  
(D) 60

12. A diner offers a lunch combo: customers can choose one of 4 different sandwiches, one of 3 different soups, and either coffee or tea. How many different lunch combinations are possible?

(A) 9  
(B) 12  
(C) 14  
(D) 24

13. David has taken four tests so far in his math class. His scores were 80, 85, 78, and 90. What does David need to get on his fifth test in order to bring his average up to an 86?

(A) 86  
(B) 94  
(C) 95  
(D) 97

14. Which expression is equivalent to the expression \(x(x - 1) - x + 1\)?

(A) 0  
(B) \((x - 1)^2\)  
(C) \(x^2 - x + 1\)  
(D) \(x^2 + 1\)

Go on to the next page
15. The figure below shows a square with side lengths of $\sqrt{2}$ cm that has been inscribed in a circle. What is the area of the shaded region?

- **A** $\frac{\pi}{2} - 2$ cm$^2$
- **B** $\pi - 1$ cm$^2$
- **C** $\frac{\pi}{2}$ cm$^2$
- **D** $\frac{\pi}{2} + 1$ cm$^2$

16. A sequence is shown below. What is the 7th term in this sequence?

\[ \frac{1}{2}, \frac{1}{4}, -1, 2, -4, ... \]

- **A** $-16$
- **B** $6$
- **C** $8$
- **D** $16$

17. Use these two functions to answer this question.

\[ j(x) = 10x - 3 \]
\[ k(x) = 3 \]

At which point do these two functions intersect?

- **A** $(3, 3)$
- **B** $(3, \frac{6}{10})$
- **C** $(\frac{3}{10}, 3)$
- **D** $(10, 3)$

18. The solution set of which inequality is graphed below?

- **A** $|x + 1| \geq 2$
- **B** $|x - 1| \geq 2$
- **C** $|x + 1| > 2$
- **D** $|x + 1| \leq 2$
19. The stem-and-leaf plot below represents the ages of people at an office.

<table>
<thead>
<tr>
<th>Stem</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>7 8</td>
</tr>
<tr>
<td>3</td>
<td>0 2 3 6</td>
</tr>
<tr>
<td>4</td>
<td>1 1 5 6 7 8</td>
</tr>
<tr>
<td>5</td>
<td>2 3 4 7 9 9</td>
</tr>
<tr>
<td>6</td>
<td>1 2 6 9</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>2 represents a 52 year old</td>
</tr>
</tbody>
</table>

What is the median age?
(A) 41
(B) 47
(C) 48
(D) 52

20. The points (−5, 4) and (7, 12) lie on a diameter of a circle. What are the coordinates of the center of this circle?
(A) (2, 16)
(B) (6, 16)
(C) (1, 8)
(D) (6, 8)

21. What is the y-intercept of \( y = 3x - 5 \)?
(A) \( \frac{5}{3} \)
(B) 3
(C) 5
(D) −5

22. Angles A and B are complementary. If the measure of angle A is 30°, what is the measure of angle B?
(A) 30°
(B) 60°
(C) 90°
(D) 150°

23. If \( \frac{1600}{x} = 32 \), what is the value of x?
(A) 5
(B) 20
(C) 50
(D) 500

24. Which expression is equivalent to \( \sqrt[5]{x^{10}} \)?
(A) \( x^4 \)
(B) \( x^{10} \)
(C) \( x^{15} \)
(D) \( x^{25} \)

25. What is the sum of angles A, B, and C in the diagram below?
(A) 180°
(B) 280°
(C) 300°
(D) 320°
26. If \( f(x) = 4x - 3 \), what is the value of \( f(7) \)?
(A) 4
(B) 25
(C) 27
(D) 28

27. What is the product of 243 and 9?
(A) 2185
(B) 2186
(C) 2187
(D) 2188

28. The probability that Meghan scores a goal in soccer is 75%. If she tries 48 times to score a goal, how many times is she expected to miss?
(A) 4
(B) 12
(C) 20
(D) 36

29. Two runners who run at exactly the same speed run laps around a track, shown below.

If the radius of the outer circle is twice the radius of the inner circle, how many laps will the runner on the outside run in the time that it takes the runner on the inside to run 10 laps?
(A) 2.5
(B) 5
(C) 15
(D) 20

30. The table below comes from an equation for a graph.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>9</td>
</tr>
</tbody>
</table>

What is a possible equation for the graph?
(A) \( y = x + 1 \)
(B) \( y = x^3 \)
(C) \( y = x^3 + 1 \)
(D) \( y = 3x + 1 \)

31. The country of Westerovia has an alternate system for money. In this system, 1 coin is equal to 12 papers, 1 paper is equal to 4 beads, and 17 beads are equal to 1 jewel. Which expression represents the number of coins that equals the value of 5 jewels?
(A) \( 5 \times 12 \times 4 \times 17 \)
(B) \( 17 \times 4 \times 12 \)
(C) \( 5 \times 17 \times 4 \times 12 \)
(D) \( \frac{5 \times 4 \times 12}{17} \)

32. At 10:00AM, a ship is 50km away from the mainland. If it continues sailing in the same direction away from the mainland at 30km/hour, which expression represents its distance from the mainland \((D)\) in terms of the number of hours past 10:00AM \(t)\)?
(A) \( D = 50t + 30 \)
(B) \( D = 10t + 50 \)
(C) \( D = 10t + 30 \)
(D) \( D = 30t + 50 \)
33. What is the solution set for this inequality?

\[-7 < -4x + 1 < 13\]

(A) \(-3 < x < -2\)
(B) \(-3 < x < \frac{3}{2}\)
(C) \(-3 < x < 2\)
(D) \(2 < x < 6\)

34. Joe and Tyson work on an assembly line at a factory doing quality control. Joe samples \(\frac{7}{9}\) of the pens and Tyson samples \(\frac{7}{8}\) of the pens. Out of a batch of 72 pens, what is the least number of pens that will be checked by both workers?

(A) 16
(B) 47
(C) 56
(D) 63

35. Which is the most reasonable unit to measure the weight of an eraser?

(A) liters
(B) milligrams
(C) grams
(D) kilograms

36. Which numerical expression does NOT represent an integer?

\(\sqrt{\frac{12}{3}}\)
\(\sqrt{5} + \sqrt{16}\)
\((\sqrt{9})^2 + (\sqrt{2})^2\)
\((\sqrt{9} + \sqrt{2})^2\)

37. The figure below represents a cake that Luke wants to bake. The formula used to find the volume of a cylinder is \(V = \pi r^2 h\), where \(r\) is the radius of the cylinder and \(h\) is the height of the cylinder.

If Luke wants the cake to have a diameter of 10 inches and a height of 3 inches, what will the volume of his cake be?

(A) 45\(\pi\) inches\(^3\)
(B) 60\(\pi\) inches\(^3\)
(C) 75\(\pi\) inches\(^3\)
(D) 90\(\pi\) inches\(^3\)

38. Lucas washes the dishes at a rate of fifteen dishes every ten minutes. Harry can only dry the dishes at a rate of fifteen dishes every half hour. If Lucas spends fifty minutes washing the dishes, how long does it take Harry to dry them?

(A) 5 hours and 45 minutes
(B) 3 hours and 20 minutes
(C) 2 hours and 20 minutes
(D) 1 hour and 30 minutes
39. Three vertices of a kite are plotted on the graph below.

At which point should the fourth vertex be plotted to complete the kite?
(A) (−2, −2)
(B) (−2, 4)
(C) (−2, 2)
(D) (2, −2)

40. Corwin used 5 cups of pecans to bake a pie. Each cup of pecans holds about 20 individual nuts. If he is going to split his pie evenly among 8 of his friends, approximately how many pecans will each person get to eat?
(A) 12.5
(B) 10
(C) 2.5
(D) $\frac{5}{8}$

41. The formula for the volume of a cone is $V = \frac{1}{3} \pi r^2 h$, where $r$ is the cone's radius and $h$ is the cone's height.

The cone shown above has a height of 5 in. and a radius of $\sqrt{3}$ in. What is the cone's volume?
(A) $\sqrt{3}\pi$ in$^2$
(B) $3\pi$ in$^2$
(C) $5\pi$ in$^2$
(D) $15\pi$ in$^2$
42. If \( 3(y - 9^m) = 3y - 9 \), what is the value of \( m \)?
   (A) 3
   (B) \( \sqrt{3} \)
   (C) \( \frac{1}{2} \)
   (D) 0

43. In the figure below, two congruent regular pentagons have been joined at the base.

If the perimeter of the entire figure is 40, what is the length of one of the pentagons’ sides?
   (A) 2
   (B) 5
   (C) 8
   (D) 16

44. The graph below shows the population size and land area of three different towns.

   The population density of a town is measured by dividing the town population by the total land size. What is the ratio of the population density of Town A to the population density of Town C?
   (A) 3 to 8
   (B) 1 to 2
   (C) 3 to 4
   (D) 4 to 5
45. If \( w \) is a positive integer, which expression is equivalent to the expression \( \sqrt{81x^{4w}} - 16y^2 \)?

(A) \((3x^w - 4y)(3x^w + 4y)\)
(B) \((9x^w - 8y)(9x^w + 8y)\)
(C) \((3x^{2w} - 4y^2)(3x^{2w} + 4y^2)\)
(D) \((81x^{4w} - 4y^2)(81x^{4w} + 4y^2)\)

46. If \( A = \begin{bmatrix} 2 & 8 \\ -3 & 7 \end{bmatrix} \) and \( B = \begin{bmatrix} 5 & -10 \\ 13 & -11 \end{bmatrix} \), what is \( A + B \)?

(A) \( \begin{bmatrix} 10 & -80 \\ -39 & 77 \end{bmatrix} \)
(B) \( \begin{bmatrix} 7 & -2 \\ 10 & 4 \end{bmatrix} \)
(C) \( \begin{bmatrix} -3 & 18 \\ -16 & 4 \end{bmatrix} \)
(D) \( \begin{bmatrix} 7 & -2 \\ 10 & -4 \end{bmatrix} \)

47. Use the triangle below to answer this question.

The value of which expression is equal to the length of side \( s \)?

(A) \( \frac{17\tan(x)}{5} \)
(B) \( 17\sin(x) \)
(C) \( 17\cos(x) \)
(D) \( \frac{17}{2}\sin(x) \)
To purchase this book, please visit isee.ivyglobal.com.