

Solve each problem and select the best answer from the choices.

Important Notes:

1. No formulas or definitions of mathematical terms are provided.
2. Diagrams other than graphs are not necessarily drawn to scale.
3. Assume diagrams are in one plane, unless otherwise noted.
4. Graphs are drawn to scale. For example, lines that appear parallel on a graph are parallel.
5. Reduce all answers to simplest form.

1. How many 5-digit numbers can be created using the digits 0, 1, 2, 3, and 4 without repeating any digits within that 5-digit number?

2. $\frac{160+x}{13} = 13$

What is the value of x in the equation show above?

3. $|(-3) + 5 - (-2)| - |4 - 5.2|$

4. Marcus has completed 12 of his math problems for homework. This is 40% of the total number of math problems he has for homework. How many math problems are left to do?

5. Crystal walked 3 miles east and 4 miles south. What is the straight-line distance, in miles, from where she started walking to where she finished walking?

6. If $x = -3$ and $y = 4$, what is the value of xy^2

- A. -144
- B. -48
- C. 48
- D. 144

7. A bag contains three distinct colors of marbles. If there are 3 red marbles, 7 blue marbles and 4 white marbles, what is the probability that a marble chosen at random is **not** red?

- A. $3/14$
- B. $3/11$
- C. $11/14$
- D. $11/3$

8. Michelle scored 84, 77 and 91 on her chemistry exams. What is the lowest score she needs on her fourth and final exam to receive an average of 85 if all the exams are weighted equally?

- A. 85
- B. 87
- C. 88
- D. 90

9. On a number line, what is the midpoint of a line segment beginning at -4 and ending at $2\frac{3}{4}$?

- A. $-\frac{5}{8}$
- B. $-\frac{3}{4}$
- C. $\frac{3}{4}$
- D. $\frac{5}{8}$

10. Victor works 5.5 hours a day, 4 days a week. He is paid \$9.25 per hour. How much is his weekly pay?

- A. \$50.88
- B. \$183.55
- C. \$203.50
- D. \$241.10

11. Express $4,231 \times 1,000$ in scientific notation.

- A. 4.231×10^6
- B. 42.31×10^5
- C. 4.231×10^5
- D. 4231×10^3

12. What is the value of x in the equation $5x - 7 = y$, if $y = 8$?

- A. -1
- B. 2
- C. 3
- D. 8

13. What is the prime factorization of 459?

- A. $3^3 \times 17$
- B. $3^3 \times 13$
- C. $3^3 \times 11$
- D. $2^2 \times 3^2 \times 13$

14. If $5x + 12 = 17 - 4\left(\frac{x}{2} + 1\right)$, what is the value of x ?

- A. $\frac{1}{7}$
- B. $\frac{1}{3}$
- C. $\frac{6}{7}$
- D. $1\frac{2}{7}$

15. There are 270 students at Castleton Middle School. If there are 120 male students, what is the ratio of male students to female students?

- A. 4 : 5
- B. 5 : 4
- C. 3 : 4
- D. 5 : 6

16. Jim must make a 5-digit password for his school account. The first digit must be a letter and the other 4 digits must be numbers. How many different codes are possible? (The password is not case-sensitive.)

- A. 50
- B. 260
- C. 2600
- D. 260,000

17. For what value of x is $4(x - 1) = 2(x + 2)$?

- A. 0
- B. 2
- C. 4
- D. 6

18. What is the value of

$$|-7| + |3| + |-5| + \left| \frac{1}{5} \right| \times |-5| ?$$

- A. -16
- B. 16
- C. 20
- D. 44

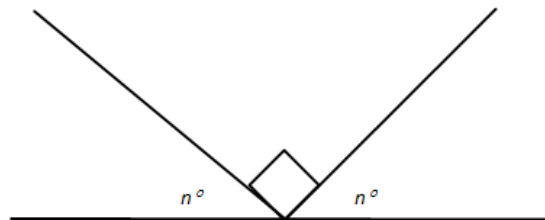
19. Circle A has a radius r . Circle B has radius $r + 1$. What is the difference between the circumference of circle B and the circumference of circle A ?

- A. 1
- B. 2π
- C. $2\pi + 1$
- D. $2r\pi + 2\pi$

20. 32% of high school students take an AP class. If a high school has 1250 students, how many students do not take an AP class?

- A. 400
- B. 625
- C. 750
- D. 850

21. In the figure below, what is the value of n ?



- A. 30°
- B. 45°
- C. 60°
- D. 90°

22. If n is an integer, which of the following must be odd?

- A. $n + 1$
- B. $2n + 1$
- C. $3n + 1$
- D. $n^2 + 1$

23. What is the value of $20 - (3 \times 2^3 - 5)$?

- A. -191
- B. 1
- C. 7
- D. 11

24. What is the value of $4 + [-1(-2 - 1)]^2$?

- A. -5
- B. 9
- C. 13
- D. 49

25. If $3xy = 6$, what is the value of x in terms of y ?

- A. 2
- B. $\frac{2}{y}$
- C. $\frac{2}{y^2}$
- D. $2y$

26. There are 845 students that are taking school buses on a trip. Each school bus seats 45 students. If the school busses are filled to maximum capacity before the next one starts, how many students will be in the last school bus?

- A. 20
- B. 25
- C. 30
- D. 35

27. At a local farmer's market, a 10 oz. bag of carrots sells for \$2.25. At this rate, what would be the price of a 2-pound bag of carrots? (1 pound=16 oz.)

- A. \$4.50
- B. \$7.05
- C. \$7.20
- D. \$7.75

28. On a map, 1 inch represents 8 miles. If the distance between two cities is 60 miles, how many inches would they be apart on this map?

- A. 7.5
- B. 7.75
- C. 8
- D. 8.25

29. When positive integer p is divided by 6, the remainder is 3. When p is divided by 4, the remainder is 3. What is the least possible value of p ?

- A. 7
- B. 9
- C. 15
- D. 27

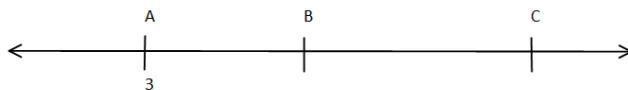
30. What is the value of $10(x + 3) + 6(x - 5)$ in terms of y if $x = 2y$?

- A. $8y$
- B. $16y$
- C. $32y$
- D. $16y + 30$

31. Liverpool had 4 times as many losses as it had draws in a season. If Liverpool won none of its games, which could be the total number of games it played that season?

- A. 12
- B. 15
- C. 18
- D. 24

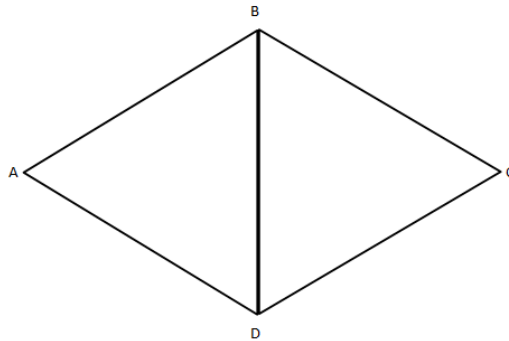
32. On the number line below, $AB = 2\frac{1}{2}$ and $BC = 3\frac{3}{4}$. What is the position of C?



- A. $6\frac{1}{4}$
B. $6\frac{1}{2}$
C. $9\frac{1}{4}$
D. $9\frac{3}{4}$
33. If a is 25% of b , and b is 40% of c , what is the value of a when $c = 150$?
- A. 8
B. 15
C. 24
D. 37.5
34. If $x = 2$ and $y = 3$, what is the value of $\frac{xy}{x^y}$?

- A. $\frac{3}{4}$
B. 1
C. $\frac{3}{2}$
D. 2

35. All the line segments in the figure below are equal. What is the measure of angle ABC ?



- A. 60°
- B. 120°
- C. 135°
- D. 150°

36. Concert tickets will be given to two groups of people. Group A contains 225 people. One-fifth of the people in Group A will be selected to win concert tickets. Group B contains 500 people. One-tenth of the people in Group B will be selected to win concert tickets. What is the ratio of **non-winners** in Group A to **non-winners** in Group B?

- A. 9 : 10
- B. 10 : 9
- C. 2 : 5
- D. 5 : 2

37. Hank is three times as old as Julian. The difference in their ages is 12 years. How old is Hank?

- A. 12
- B. 18
- C. 24
- D. 36

38. If the perimeter of a square is 36 inches, then what is its area, in square inches?

- A. 32
- B. 48
- C. 81
- D. 324

39. What is the value of $2(5x - 7)$ in terms of y if $x = 3y$?

- A. $15y - 7$
- B. $30y + 7$
- C. $30y - 7$
- D. $30y - 14$

40. A certain comet only passes by earth once every 23 years. This comet was first sighted in 1819. How many times did this comet pass by earth between 1840 and 2013 inclusive?

- A. 7
- B. 8
- C. 9
- D. 10

41. Kate ran 7 miles on the first day and 10 miles on the second day. How many miles did Kate run on the third day if she ran an average of 11 miles over the three days?

- A. 11
- B. 13
- C. 16
- D. 17

42. How many positive integers are between $\frac{33}{4}$ and $\frac{58}{5}$?

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

43. John finished $\frac{2}{7}$ of his homework in 24 minutes. If he continues at the same rate, how many minutes will it take him to finish the remainder of his homework?

- A. 48
- B. 56
- C. 60
- D. 84

44. Terry got a 15% discount when he bought his new pair of shoes. If the discount was \$25, what was the original price?

- A. \$150.00
- B. \$166.67
- C. \$180.00
- D. \$186.67

45. What is the least integer greater than $\frac{13}{3}$?

- A. 4
- B. 4.4
- C. 5
- D. 7

46. In the figure below, points N and P are on line segment $\overline{MQ}$

$$MQ = 42 \text{ cm}$$

$$MN: NQ = 4:3$$

$$NP: PQ = 2:1$$



What is the length of $\overline{PQ}$?

- A. 3 cm
- B. 6 cm
- C. 8 cm
- D. 9 cm

47. Henry has n baseball autographs and Raymond has 3 times as many baseball autographs. If Raymond gives Henry 6 autographs, they would have an equal number of autographs. How many autographs does Henry have?

- A. 6
- B. 9
- C. 15
- D. 18

48. The 5 numbers shown below are repeated indefinitely. What is the product of the first 20 numbers of this sequence?

$$-1, 2, 3, 1, \frac{1}{2} \dots$$

- A. -3
- B. 3
- C. 27
- D. 81

49. There are 3 different positions available in student office. The positions are president, vice-president, and secretary. If 10 students are eligible for election, but a student can only occupy one position at a time, then how many different outcomes are possible in the election?

- A. 10
- B. 30
- C. 720
- D. 1000

50. There is a leak in Robert's basement. The water is 3 inches deep and the basement is 20 feet by 14 feet. What is the volume of water in Robert's basement?

- A. 70 cu ft
- B. 96 cu ft
- C. 720 cu ft
- D. 840 cu ft

51. If x is an odd integer and y is an even integer, which of the following must be odd?

- A. $2x + y$
- B. $xy + y$
- C. $2x + y^2$
- D. $x^2 + y^2$

52. If $\frac{9y}{x} = 3$, what is $\frac{x}{y}$ equal to?

- A. 3
- B. $3x$
- C. $3xy$
- D. 27

53. One side of a rectangle with a length of 8 units lies on the y -axis of a coordinate system. The coordinates of one corner of the rectangle is $(-3, 5)$. Which of the following could be the coordinates of the opposite corner?

- A. $(0, 5)$
- B. $(0, -3)$
- C. $(-3, 13)$
- D. $(-3, -3)$

54. If n is a positive integer less than 200, and $\frac{14n}{60}$ is an integer, how many distinct prime factors does n have?

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

55. The mean of a , b , c , and x is 87. The mean of a , b , c and y is 90. What is the value of $y - x$?

- A. 3
- B. 9
- C. 12
- D. 16

56. If a , b , and c are integers greater than 1, where $ab = 15$ and $bc = 33$, which of the following must be true?

- A. $c > a > b$
- B. $c > b > a$
- C. $a > c > b$
- D. $b > a > c$

57. Circle O is inscribed in a square. The perimeter of the square is 48 centimeters. What is the area of the circle?

- A. $6\pi \text{ cm}^2$
- B. $12\pi \text{ cm}^2$
- C. $18\pi \text{ cm}$
- D. $24\pi \text{ cm}^2$