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. The angles of a triangle are in the ratio 1:2:3. What is the difference, in degrees, between the largest and the smallest angle?

2. For what value of x does $4x = 6x - 6$?

3. The sum of two consecutive integers is -9. If the smaller integer is doubled and 4 is added to the larger integer, what is the **product** of the two resulting integers?

4. Mary is going to start a new job. Her schedule would require her to work three days in a row and then have two days off. After 28 days, how many days will she have worked?

5. Jamaal is going to paint his bedroom. He is going to paint three of the walls one color, and the fourth wall a different color. If he has 6 colors of paint to choose from, how many different ways can he paint his room?

6. What is the greatest common factor of 135 and 216?

   A. 6
   B. 15
   C. 27
   D. 54

7. $-6x(5y + 8z) =$

   A. $-30xy + 48xz$
   B. $-30xy - 48xz$
   C. $-30xy + 8z$
   D. $-240xyz$

8. Express 76.924×1000 in scientific notation.
   A. $.76924 \times 10^4$
   B. $.76924 \times 10^5$
   C. 7.6924×10^3
   D. 7.6924×10^4

9. What is the prime factorization of 1,400?

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   A. $2^2 \times 5^3 \times 7^2$
   B. $2^3 \times 5^7 \times 2$
   C. $2^3 \times 5^2 \times 7$
   E. $2^2 \times 5^7 \times 3$

10. Five friends are lining up for ice cream. In how many different orders can the five friends sit?

   A. 5
   B. 10
   C. 60
   D. 120

11. N is an element of the set $\{0.3, 0.7, 2.0, 3.0, 9.0\}$, and $1.5N$ is an integer. What is N?

   A. 0.3
   B. 0.7
   C. 2.0
   D. 3.0

12. $(\sqrt{36})(\sqrt{81}) =$

   A. 9
   B. 36
   C. 54
   D. 108

13. $\{1,2,3,\ldots,205,206,207,208\}$

How many numbers in the set above have 5 as a factor but do not have 10 as a factor?

   A. 21
   B. 20
   C. 7
   D. 5

14. There are 2,475 registered voters in Graceland. Of these, $\frac{1}{3}$ were born between 1984 and 1994, inclusive. How many of the registered voters were born either before 1984 or after 1994?

    A. 750
    B. 825
    C. 975
    D. 1,650

15. What is the value of $7|x| + 2|y|$ if $x = -9$ and
$y = -12$

    A. -87
    B. -14
    C. 14
    D. 87

16. This week, Charlie worked 4 days as a cashier at Johnny's Pizzeria. He was paid $9.57 per hour. If he worked for $5\frac{3}{4}$ hours per day, how much should Charlie be paid?
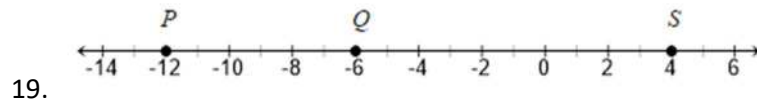
    A. $453.22
    B. $220.11
    C. $191.41
    D. $139.87

17. The product of 3 distinct positive integers is 8. What is their sum?

    A. 6
    B. 7
    C. 11
    E. 14

18. A 13-sided polygon has 4 sides each of length x inches and 7 sides each of length $2x$ centimeters. The lengths of the other 2 sides are 14 centimeters and 15 centimeters. If the perimeter of the polygon is 101 centimeters, what is the value of x?

    A. 4
    B. 7
    C. 18
    D. 36

19.

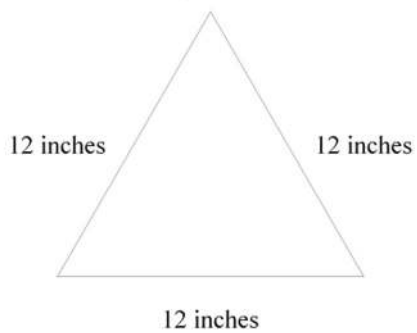On the number line above, R (not shown) is the midpoint of $\overline{QS}$. What is the length of $\overline{PR}$?

A. 3.5 units
B. 6 units
C. 10 units
D. 11 units

20. For what positive value of x does

$$\frac{25}{10} = \frac{x^2}{40}$$

A. 5
B. 10
C. 40
D. 100

21.

12 inches   12 inches

12 inches

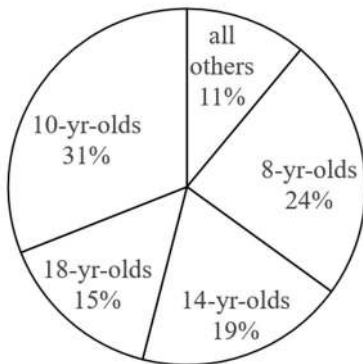What is the area of a square that has the same perimeter as the triangle above?

A. 24 sq in
B. 36 sq in
C. 48 sq in
D. 81 sq in

22.

PEOPLE WHO EAT CHOCOLATE

If 20,000 pounds of chocolate are consumed each year, how many pounds are consumed by 18-year-olds?

    A. 30 lb
    B. 150 lb
    C. 300 lb
    D. 3,000 lb

23. $(6 - 12) \div (-6 + 9)$

If the parentheses are removed from the above expression, how will the value of the expression change?

    A. No change
    B. Increase of 6
    C. Increase of 12
    D. Increase of 19

24. In a ballroom dance class, the ratio of women to men is 4:3. What percent of the students are men?

    A. 28.57%
    B. 42.86%
    C. 57.14%
    D. 133.33%

25. A transportation company charges $4 per ride plus $0.50 for each $\frac{1}{4}$ of a mile ridden. If a taxi ride costs $16.00, how many miles long was the ride?

    A. $5\frac{1}{2}$ mi
    B. 6 mi
    C. $7\frac{3}{4}$ mi
    D. 8 mi

26. On a map, 1 inch represents 6 miles. If the distance between two cities is 57 miles, how many inches would they be apart on this map?

    A. 8 in
    B. 8.25 in
    C. 9.5 in
    D. 9.75 in

27. If $70 \div r = 28s$, what is the value of rs?

    A. 0.4
    B. 2.5
    C. 4.8
    D. 1960

28. What is the value of $9(x + 5) + 7(x - 3)$ in terms of y if $x = 3y$?

    A. $16y + 2$
    B. $16y + 24$
    C. $48y + 2$
    D. $48y + 24$

29. Jamal is x years old now, and Jake is 6 years older than Jamal. In 3 years, Jake will be exactly twice as old as Jamal is then. How old is Jamal now?

    A. 3
    B. 6
    C. 9
    D. 12

30. $60 < x^2 < 80$
        $19 < y^2 < 35$

If x and y are positive integers, what is the value of xy?

    A. 8

    B. 25

    C. 40

    D. 64

31. If a is 40% of b, and b is 70% of c, what is the value of a when $c = 300$?

    A. 14
    B. 21
    C. 41
    D. 84

32. How many positive integers are between $\frac{46}{8}$ and $\frac{89}{6}$

    A. 6

    B. 7

    C. 9

    D. 11

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

In the volume formula shown above, if r is multiplied by 2 and h is quartered, what is the ratio of the new volume to the original volume?

    A. 1:1
    B. 1:2
    C. 1:4
    D. 4:1

34. A horse is tied by an 8 meter rope to the outside corner of a square shed measuring 10 meters by 10 meters. What is the area of the surrounding grass on which the goat can graze?

    A. 8π
    B. 16π
    C. 32π
    D. 48π
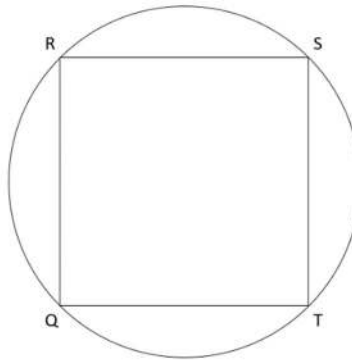
35. For what value of p is $5(p - 4) = 2(p + 2)$?

    A. 2
    B. 4
    C. 6
    D. 8

36. If the perimeter of a square is 52 inches, then what is its area, in square inches?

    A. 36
    B. 64
    C. 81
    D. 169

37.

In the figure above, Q, R, S, T are points on a circle and $QRST$ is a square. If the diagonal of the square is 24 inches long, what is the circumference of the circle?

    A. 8π
    B. 16π
    C. 24π
    D. 32π

38. $\left(\dfrac{1}{3} - \dfrac{4}{15}\right) \div \dfrac{1}{5} =$

    A. $\dfrac{1}{15}$
    B. $\dfrac{4}{45}$
    C. $\dfrac{1}{3}$
    D. $\dfrac{1}{2}$

39. What is the greatest prime factor of 91?

    A.   3
    B.   7
    C.   13
    D.   91

40.

Position	Even Integer
1	0
2	2
3	4
4	6
⋮	⋮
400	x

The beginning of a list of even integers is shown in the table above. What will the 400ᵗʰ number on the list be?

    A. 400
    B. 796
    C. 798
    D. 800

41. $4, 5, 6, 7, 8, 9$

If $\dfrac{x+9}{x-9}$ is a whole number, how many of the numbers listed above **cannot** be a value of x?

    A. 0
    B. 1
    C. 2
    D. 3

42. $(4m - 5n) + (5m + 4n) + k = 0$

For any value of m and n, what is the value of k in the equation above?

    A. $-9m + n$
    B. $-9m - n$
    C. 0
    D. $9m - n$

43. What is the least integer greater than $\dfrac{31}{7}$?
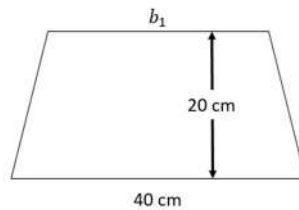
    A. 4
    B. 4.2
    C. 4.3
    D. 5

44. $A_1A_2 + A_2A_3 + A_3A_4 + A_4A_5 + A_5A_6$

If $A_k = \dfrac{2}{k}$ for any positive value of k, and k is a positive integer, what is the value of the expression above?

A. $\dfrac{15}{100}$

B. $\dfrac{15}{50}$

C. $\dfrac{1}{2}$

D. $\dfrac{50}{15}$

45.

If the area of this trapezoid is 600 sq cm, what is the length of b_1?

A. 15 cm
B. 20 cm
C. 40 cm
D. 45 cm

46. The probability of drawing a blue lollipop from a jar of 30 lollipops is $\dfrac{2}{5}$. How many red lollipops should be added to the jar in order to reduce the probability to $\dfrac{1}{4}$?

A. 3
B. 9
C. 18
D. 27

47. If x is an odd integer, which of the following **cannot** be an even integer?

A. $2x + 1$
B. $x - 1$
C. $2x$
D. $x + 1$

48. One side of a square is 144 units long and lies on the y-axis of a coordinate system. Another side of the square lies on the x-axis of the coordinate system. What **must** be the coordinates of one corner of this square?

    A. (0,0)
    B. $(0, -144)$
    C. $(-144,0)$
    D. (144,144)

49. A regular decagon has 10 equal sides and 10 equal angles. How many degrees are in each interior angle of a regular decagon?

    A. 36°
    B. 135°
    C. 140°
    D. 144°

50. If $\frac{14y}{x} = 7$, what is $\frac{x}{y}$ equal to?

    A. 2
    B. $2xy$
    C. 21
    D. $21y$

51. A square with sides of length 10 units lies in the xy-plane with sides parallel to the x-axis and y-axis. 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, 0)
    B. (-3, 10)
    C. (5, -7)
    D. (7, -5)

52. If $\frac{4t-s}{5} = 7s$, what is the value of s in terms of t?

    A. $\dfrac{t}{2}$
    B. $\dfrac{t}{3}$
    C. $\dfrac{t}{7}$
    D. $\dfrac{t}{9}$

53. In the set of all integers from 6 to 108, inclusive, how many are multiples of 2 or 9 or both?

    A. 56
    B. 57
    C. 58
    D. 59

54. If *a, b,* and *c* are integers greater than 1, where *ab* = 15 and *bc* = 51, which of the following must be true?

    A. *c > a > b*
    B. *c > b > a*
    C. *a > b > c*
    D. *a > c > b*

55. Mr. Crowdell determines math grades on the basis of 5 tests, each worth 100 points. An average of at least 80 points is needed for a grade of B. On the first 4 tests, Brian scored 89, 85, 63, and 68. What is the lowest score she may receive on the final test and still earn a B?

    A. 87
    B. 91
    C. 93
    D. 95

56. Maria has 300 ounces of tomato sauce. If she uses $\dfrac{3}{5}$ of an ounce every day, how many consecutive days will the tomato sauce last?

    A. 4,500
    B. 500
    C. 180
    D. 20

57. If *n* = 2 and *p* = 7, what is the value of *k*?

$$\frac{n}{12} = \frac{p}{k}$$

    A. 42
    B. 3.42
    C. 1.16
    D. 0.86