



Mathematics
2020-21 – Middle Grades - Practice Questions

Student Instructions:

- Write your complete ID code on your answer sheet.
 - If you change your answer, erase well.
1. What is the sum of the first 20 positive integers?
A. 190
B. 210
C. 230
D. 250

 2. Find the least common multiple of 30 and 39.
A. 780
B. 840
C. 390
D. 420

 3. How many prime numbers are between 80 and 100, inclusive?
A. 2
B. 3
C. 4
D. 5

 4. Find the next number in the sequence: 2, 5, 11, 23, ?
A. 41
B. 43
C. 45
D. 47

 5. An arithmetic sequence has a first term of 8 and a common difference of 5. Find the 22nd term of the sequence.
A. 113
B. 118
C. 123
D. 128

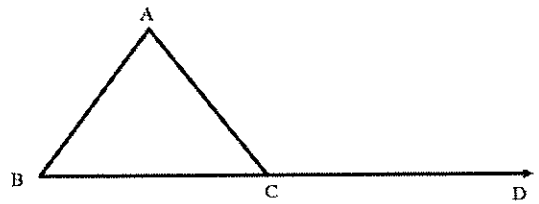
 6. The first term of geometric sequence is 3 and the third term is 48. Find the common ratio of the sequence.
A. 4
B. 22.5
C. 3
D. 15

 7. The decimal number $0.\overline{2}$ can be written as the rational fraction $\frac{a}{b}$. Find the sum of a and b.
A. 10
B. 11
C. 12
D. 13

8. Evaluate $|8 - x^2| - |-2 - (-3)|$ when x equals -4 .
- A. 19
 - B. 29
 - C. 7
 - D. 9
9. What number is halfway in between $1/3$ and $7/18$?
- A. $13/36$
 - B. $5/12$
 - C. $11/36$
 - D. $1/4$
10. What is 50% of 90% of 400?
- A. 80
 - B. 90
 - C. 160
 - D. 180
11. At store A, an item that cost \$100 undergoes successive discounts of 10% and then 20%. At store B, the same item still costs \$100, but undergoes successive discounts of 20% and then 10%. What is the difference between the final sale prices for the item at store A versus store B?
- A. \$5
 - B. \$0
 - C. \$7.50
 - D. \$2.50
12. Solve for x : $\frac{3}{2x-1} = \frac{9}{7x-7}$.
- A. $x = 8/3$
 - B. $x = -8/3$
 - C. $x = 10$
 - D. $x = -10$
13. Convert one quart and one cup to gallons.
- A. $1/4$
 - B. $5/16$
 - C. $3/8$
 - D. $7/16$
14. How many centimeters are in 2.3 meters?
- A. 230
 - B. 23
 - C. 0.23
 - D. 0.023
15. There are 6 “unit b”s in one “unit a”. There are 12 “unit c”s in one “unit b”. How many “unit c”s are in one “unit a”?
- A. 2
 - B. $1/2$
 - C. 72
 - D. $1/72$

16. In the figure to the right, $m\angle ACB = (4x + 12)^\circ$ and $m\angle ACD = (13x - 19)^\circ$. Solve for x .

- A. $x = 31/9$
- B. $x = 68/9$
- C. $x = 11$
- D. $x = 13$



17. How many diagonals does a regular octagon have?

- A. 20
- B. 24
- C. 28
- D. 32

18. A circle has an area, in square units, that is numerically equal to its circumference, in units. Find the diameter, in units, of the circle.

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

19. Find the area, in square inches, of an equilateral triangle with a side length of 6 inches.

- A. $6\sqrt{3}$
- B. $12\sqrt{3}$
- C. $9\sqrt{3}$
- D. $18\sqrt{3}$

20. A rectangular prism has dimensions of 2 units by 5 units by 8 units. Find the surface area, in square units, of the prism.

- A. 132
- B. 144
- C. 152
- D. 160

21. A square has a diagonal that measures 8 inches. Find the area, in square inches, of the square.

- A. 64
- B. $48\sqrt{2}$
- C. $32\sqrt{2}$
- D. 32

22. A cylinder has a volume of 54π cubic units and its height, in units, is twice as large as its radius, in units. Find the radius, in units, of the cylinder.

- A. 6
- B. 3
- C. 8
- D. 4

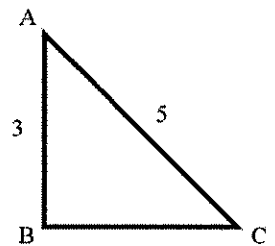
23. Find the volume, in cubic centimeters, of a sphere with a radius of 6 centimeters.

- A. 432π
- B. 576π
- C. 288π
- D. 396π

24. Find the volume, in cubic units, of a triangular prism whose base is an equilateral triangle with side length 8 units and a has a length of 12 units.
- A. $384\sqrt{3}$
 B. $288\sqrt{3}$
 C. $240\sqrt{3}$
 D. $192\sqrt{3}$

25. A right triangle has one leg that measures $6\sqrt{5}$ inches and its hypotenuse measures 18 inches. Find the length, in inches, of the other leg.
- A. $\sqrt{174}$
 B. 12
 C. $7\sqrt{6}$
 D. 13

26. In the figure of triangle ABC to the right, angle B is a right angle. Find the tangent of angle C.
- A. $3/4$
 B. $4/3$
 C. $3/5$
 D. $5/3$

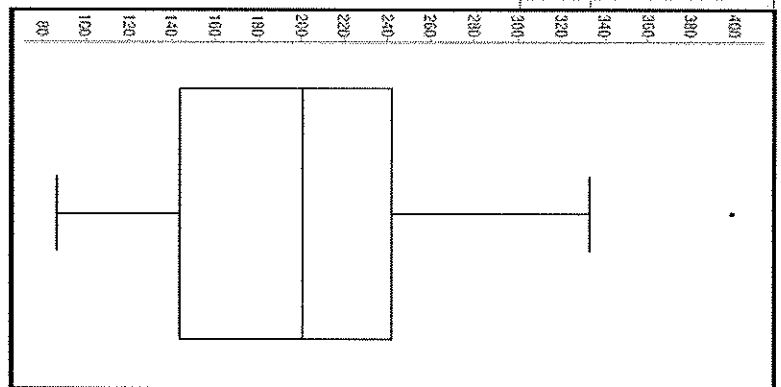


27. What's the positive difference between the mean and the median of the following set of data?: 15, 29, 22, 18, 27, 21.
- A. 0
 B. 0.5
 C. 1
 D. 1.5

28. Given the following stem and leaf plot, find the median. The legend for the plot is 2|3 = 23.
- A. 52
 B. 51
 C. 48
 D. 47

2	2 5 6
3	3 5 6 8
4	2 5 5 6 7 7 7 8 8 9
5	2 4 6 8 8
6	5 8 9
7	4 5
8	7

29. Given the boxplot at right, find the IQR to the nearest ten.
- A. 60
 B. 100
 C. 240
 D. 310



30. The probability it rains today is 0.2. The probability it rains tomorrow is 0.3 Find the probability it rains both today and tomorrow assuming the two events are independent of each other.
- A. 0.06
 B. 0.12
 C. 0.44
 D. 0.5
31. There are 15 students in a club. In how many different ways can the club pick a president and a vice president?
- A. 30
 B. 29
 C. 225
 D. 210
32. In how many different ways can two flavors of ice cream scoops be chosen from 10 flavors? Assume no flavor can be chosen twice.
- A. 45
 B. 50
 C. 90
 D. 120
33. Solve the following inequality for x : $-1 < -3x - 4 < 17$.
- A. $1 < x < 7$
 B. $-1 < x < 7$
 C. $-7 < x < 1$
 D. $-7 < x < -1$
34. Find the sum of the solutions to the following equation: $|3x - 7| = 20$.
- A. 0
 B. $14/3$
 C. 18
 D. -13
35. Find the smallest integer that satisfies the following inequality: $-5x < -35$.
- A. 6
 B. -6
 C. 8
 D. -8
36. Which of the following is equivalent to $(ax + b)(cx^2 + dx + e)$?
- A. $acx^3 + (ad + bc)x^2 + (ac + bd)x + bc$
 B. $acx^3 + (ac + bd)x^2 + (ad + bc)x + bc$
 C. $bcx^3 + (ad + bc)x^2 + (ac + bd)x + ac$
 D. $bcx^3 + (ac + bd)x^2 + (ad + bc)x + ac$

37. Find the difference: $(x^3 - 2x^2 + 7x - 10) - (x^2 - 7x + 2)$.
- A. $x^3 - 3x^2 - 12$
 B. $x^3 - 3x^2 + 14x - 12$
 C. $x^3 - 3x^2 - 8$
 D. $x^3 - 3x^2 + 14x - 8$
38. Find the degree of the following polynomial: $4ab^3c^2 - 5a^3bc^4 - a^5b^2c^3$
- A. 4
 B. 5
 C. 9
 D. 10
39. $f(x) = 3x^2 - 4x + 7$. Evaluate $f(-4)$.
- A. -57
 B. -25
 C. 39
 D. 71
40. X and y vary inversely. If y equals 4 when x equals 20, find the constant of variation.
- A. 80
 B. 1/80
 C. 5
 D. 1/5
41. Which of the following equations does NOT represent a function?
- A. $y = 7 - 9x$
 B. $x + 2y = 24$
 C. $x^2 + y^2 = 49$
 D. $x + y^3 = 12$
42. When the following system of equations is solved, find the positive difference between x and y:
 $3x - 5y = 19$
 $2x + 4y = -2$
- A. 6
 B. 5
 C. 4
 D. 3
43. f is linear function. If f(3) equals 8 and f(10) equals 13, find f(52).
- A. 23
 B. 33
 C. 43
 D. 53

44. Solve the following equation for q : $\frac{3p\sqrt{q}}{5a} = b$

A. $\frac{5ab}{3p}$

B. $\frac{25a^2b^2}{9p^2}$

C. $\frac{3ab}{5p}$

D. $\frac{9a^2b^2}{25p^2}$

45. Simplify $\left(\frac{5x^3y^4}{15x^7y}\right)^4$.

A. $\frac{y^{12}}{81x^{16}}$

B. $\frac{x^{16}}{81y^{12}}$

C. $\frac{y^{12}}{3x^{16}}$

D. $\frac{x^{16}}{3y^{12}}$

46. The sum of $\sqrt{112}$ and $\sqrt{252}$ can be simplified in the form $a\sqrt{b}$. Find the sum of a and b .

A. 15

B. 16

C. 17

D. 18

47. Simplify $\sqrt{d^5} \cdot \sqrt[3]{d^8}$

A. $d^{\frac{37}{6}}$

B. $d^{\frac{31}{6}}$

C. $d^{\frac{20}{3}}$

D. $d^{\frac{13}{3}}$

48. Find the minimum value of the function $f(x) = 2x^2 - 20x + 31$.

A. 19

B. 181

C. -19

D. -181

49. Find the sum of the solutions of the equation $4(x - 3)^2 = 196$.
- A. 6
 - B. -6
 - C. 3
 - D. -3
50. Find the discriminant of the quadratic equation $4x^2 - 3x + 11$.
- A. -165
 - B. -185
 - C. -155
 - D. -175