Name _____ School _____

Solo Challenge

Select the one best answer for each question. Record your answer on the answer sheet provided.

1. What is the value of $2 \times 3 \times 4 \div 4 \times 3 \times 2$?

   A. 1 B. 2 C. 3 D. 18 E. 36

2. Which number comes next in the following sequence?

   $$8, 9, 12, 21, 48, \ldots$$

   A. 69 B. 70 C. 129 D. 144 E. 196

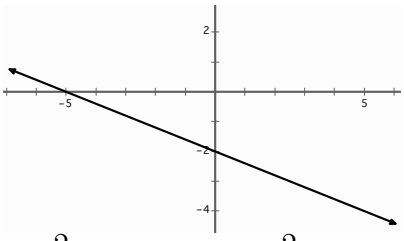
3. Simplify $2^{x+y} \div 2^{x-y}$.

   A. 2^x B. 2^y C. 4^x D. 4^y E. 2^{-2y}

4. Evaluate $(2^{-1} + 3^{-1})^{-1}$.

   A. $\frac{-1}{5}$ B. $\frac{6}{5}$ C. $\frac{5}{2}$ D. 3 E. 5

5. What is the slope of the line pictured here?



A. $\frac{2}{5}$ B. $\frac{-2}{5}$ C. $\frac{5}{2}$ D. $\frac{5}{-2}$ E. $\frac{-2}{-5}$

6. The points (a, b) and $(-b, a)$ have a midpoint at $(1, 5)$. What is the value of a?

A. 2 B. 3 C. 4 D. 5 E. 6

7. What is the area of the triangle formed by the lines $x + y = 8, x = 6$, and $y = 6$?

A. 6 B. 8 C. 16 D. 18 E. 32

8. How many different three-letter "words" can be created using the letters in ALBION if no letter can be used more than once? (A "word" does not have to be an actual meaningful word in any language)

A. 20 B. 60 C. 120 D. 360 E. 720

9. How many ordered triples of positive integers satisfy the equation $a + b + c = 6$? Note that the triple $(1, 2, 3)$ is not the same as the triple $(2, 3, 1)$.

A. 6 B. 7 C. 9 D. 10 E. infinitely many

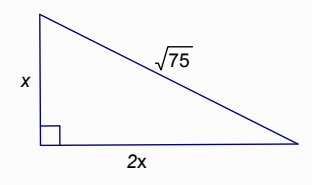
10. If $f(x) = 2^x$, $f(3) + f(-3) =$

A. 0 B. $\frac{65}{8}$ C. $\frac{63}{8}$ D. 18 E. None of these

11. If $0 < x < 1$, which of the following statements is false?

A. $|x| = x$ B. $\frac{1}{x} > 1$ C. $\sqrt{x} < 1$ D. $x^2 \geq x$ E. $3^x > 1$

12. The lengths of the sides of a right triangle are shown. What is the value of x?



A. $\sqrt{5}$ B. $\sqrt{15}$ C. $\sqrt{75}$ D. 5 E. 15

13. If x and y are real numbers the equation $(x+y)^2 = x^2 + y^2$ is true under what conditions?

A. always true B. never true C. true only if at least one of x or y is 0
D. true only when $x = y$ E. true only if x and y have opposite signs

14. An island has no currency, but instead has the following exchange rate:

150 coconuts	= 100 bananas
50 bananas	= 20 fish
60 fish	= 1 gallon of kerosene

How many coconuts equal one gallon of kerosene?

A. 25 B. 100 C. 225 D. 450 E. 900

15. $8^{-5/3} + (27)^{-1/3} =$?

A. $\frac{1}{(35)^2}$ B. 35 C. –35 D. $\frac{3}{32}$ E. $\frac{35}{96}$

16. If 4 cats can catch 4 mice in 12 minutes, how many cats are needed to catch 20 mice in 60 minutes?

A. 60 B. 20 C. 12 D. 6 E. 4

17. A man left $\frac{1}{2}$ of his estate to his wife, $\frac{1}{6}$ to his son, and the remaining \$15,000 to his daughter. How large was the entire estate?

A. \$30,000 B. \$40,000 C. \$45,000 D. \$55,000
E. Cannot be determined

18. A line segment 15 meters long can be divided into how many segments that are 30 centimeters long?

A. 50 B. 20 C. 5 D. 2 E. $\frac{1}{2}$

19. Robin mistakenly multiplies by 10 instead of dividing by 10 while using a calculator to solve a problem The incorrect answer displayed on the calculator is 0.8. What is the correct answer?

A. 0.008 B. 0.08 C. 0.8 D. 8 E. 80

20. What is the sum of the solutions to the equation $x^2 + 4x - 21 = 0$?

A. -10 B. -4 C. 4 D. 10 E. $\frac{21}{4}$

21. $\sqrt{\left(\sqrt{2}-\sqrt{3}\right)^2}$ is equal to

A. $5-2\sqrt{6}$ B. $\sqrt{2}-\sqrt{3}$ C. $\sqrt{5+2\sqrt{6}}$ D. $\sqrt{3}-\sqrt{2}$
E. None of the above

22. Start with a square measuring 1 unit on a side. Construct a smaller square inside this one by connecting the midpoints of adjacent sides. What is the area of this smaller square?

A. $\sqrt{2}$ B. $\frac{1}{\sqrt{2}}$ C. $\frac{7}{8}$ D. $\frac{1}{2}$ E. None of the above

23. Which expression is equivalent to $2+3(x-1)$?

A. $5x-5$ B. $3x+1$ C. $3x-1$ D. $5x-1$ E. $5x-3$

24. In an isosceles triangle the base angles are each 30°more than the vertex angle. What is the measure of a base angle?

A. 30° B. 40° C. 60° D. 70° E. 140°

25. Anna earned scores of 98, 92, and 86 on her first three math tests. What score must she earn on her text test to have an average of 90 overall?

A. 80 B. 82 C. 84 D. 86 E. 88

26. Suppose that the circular face of a combination lock is numbers clockwise from 1 to 50. If the number 23 is at the top to start, then the dial is turned 83 clicks clockwise and 72 clicks counterclockwise, what number ends up on top?

A. 12 B. 34 C. 28 D. 18 E. 4

27. If $a, b,$ and c are the lengths of the sides of a right triangle, which of the following are also sides of a right triangle?

A. $(2a, 2b, 2c)$ B. $(\sqrt{a}, \sqrt{b}, \sqrt{c})$ C. $(a+4, b+4, c+4)$ D. (a^2, b^2, c^2)
E. All of these.

28. Whch of these sets of numbers could be the lengths of sides of a triangle?

I.$(3, 5, 7)$ II.$(4, 6, 11)$ III.$(5, 8, 12)$

A. I and II B. I and III C. II and III D. I, II and III E. none

29. Suppose $\triangle ABC$ is similar to $\triangle XYZ$ with $\angle A \cong \angle X$ and $\angle B \cong \angle Y$. If $AB = 8$ cm, $BC = 10$ cm, $AC = 15$ cm, and $XY = 12$ cm. What is the sum of $XZ + YZ$?

A. 27.6 cm. B. 33 cm. C. 33.3 cm D. 34.5 cm E. 37.5 cm

30. An investment is valued at \$100 per share. If the value increases by 10%, then decreases by 10%, what is the final value of the investment?

A. \$90 B. \$99 C. \$100 D. \$101 E. None of these

31. The ratio of men to women in a class of 28 people is 3 to 4. How many class members are men?

A. 12 B. 15 C. 16 D. 18 E. 21

32. A theater sells childrens tickets for half the adult ticket price. If 10 adult tickets and 16 childrens tickets cost a total of \$54, what is the cost of an adult ticket?

A. \$1.50 B. \$3.00 C. \$4.50 D. \$6.00 E. \$9.00

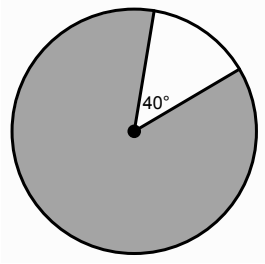
33. Find the y-intercept of a line with slope 3 that passes through the point $(-1, 1)$.

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

34. For the parabola $y = x^2 - 2x - 6$, find the coordinates of the vertex..

A. $(1, -5)$ B. $(1, -7)$ C. $(1, 7)$ D. $(-1, 3)$ E. $(-1, 5)$

35. The circle with center C below has a radius of 3 units. Determine the area of the shaded region.



A. π B. 3π C. 6π D. 8π E. 9π

36. Simplify $\frac{2}{x} + \frac{3}{y}$.

A. $\frac{5}{x+y}$ B. $\frac{5}{xy}$ C. $\frac{2y+3x}{x+y}$ D. $\frac{2y+3x}{xy}$ E. $\frac{5xy}{x+y}$

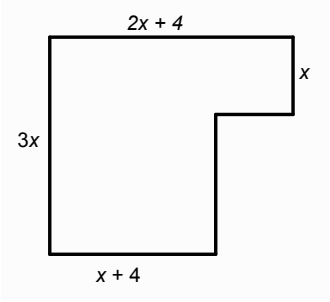
37. What is the domain of the expression $\dfrac{x^2-1}{x^2+1}$?

A. $x \neq -1$ B. $x \neq 0$ C. $x \neq 1$ D. All real numbers E. None of these

38. Which of the following intervals represents the solution to the inequality $-2|x+7| \geq -6$?

A. $(-10,-1)$ B. $[-10,-4]$ C. $(4,10)$ D. $[4,10]$ E. $[-4,10]$

39. The perimeter of the region is 18 units. What is the value of x?



A. 1 B. 2 C. 3 D. 4 E. Cannot be determined

40. When you solve the system of equations, $2x - y = 1, 4x + y = 2$ what is the value of xy?

A. $\dfrac{1}{2}$ B. $\dfrac{2}{3}$ C. 1 D. -1 E. 0