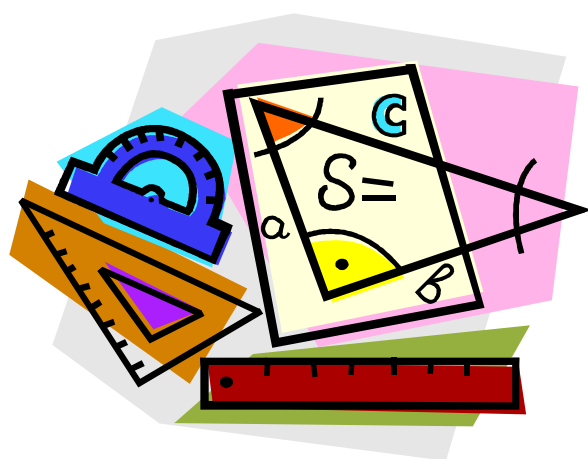


Level I



**Do NOT open until
you are told to do so.**

March 21, 2019

1. Zantac can relieve acid reflux. The recommended dosage for a child is 5 mg/kg/day. Zantac comes in liquid form where the concentration of the medicine is 15 mg per mL. If a child with acid reflux weighs 44 pounds, how many milliliters of Zantac should be taken each day? Assume 1 kg = 2.2 lb.
a. 1500 mL b. 60 mL c. $6\frac{2}{3}$ mL d. $5\frac{1}{3}$ mL e. 6 mL

2. What is the number of hours from 7 pm Monday until 4 am Wednesday of the same week?
a. 15 b. 33 c. 29 d. 35 e. 34

3. There are two girls and six boys playing a game. How many additional girls must join the game so that $\frac{5}{8}$ of the players are girls?
a. 6 b. 3 c. 5 d. 8 e. 7

4. Carly takes 3 steps to walk the same distance as Jim walks in four steps. Each of Carly's steps covers 0.5 yard. How many feet does Jim travel in 24 steps?
a. 9 b. 27 c. 36 d. 18 e. 12

5. The average of $\frac{1}{5}$ and $\frac{1}{10}$ is $\frac{1}{x}$. What is x ?
a. $\frac{3}{20}$ b. $\frac{20}{3}$ c. 8 d. $\frac{10}{3}$ e. $\frac{2}{15}$

6. The product of the digits of a four-digit number is 810. If none of the digits is repeated, what is the sum of the digits?
- a. 23 b. 19 c. 18 d. 25 e. 22
7. How many integers satisfy the statement: "The square of the integer is less than five more than four times the integer."?
- a. 4 b. 8 c. 0 d. 5 e. an infinite number
8. What shape is the graph of the equation $x^2 + y = xy + x$?
- a. two lines b. line c. hyperbola and line d. parabola e. hyperbola
9. The line $Ax + By = 1$ passes through the point $(-9, 10)$, has negative slope, and has intercepts $(p, 0)$ and $(0, q)$. If $p + q = 14$, what is $A + B$?
- a. $-\frac{1}{28}$ b. $-\frac{14}{45}$ c. $\frac{1}{28}$ d. $\frac{5}{17}$ e. $\frac{14}{45}$
10. Emily drives to school at a speed of 60 miles per hour. On the return trip, she runs into traffic and travels at 20 miles per hour. What is her average speed for the entire trip?
- a. 24 mph b. 30 mph c. 36 mph d. 40 mph e. 42 mph

11. A customer orders 15 Pantry Fudgesicles. Fudgesicles are placed in packages of four, three, or one. In how many different ways can the order be filled? (For example: One way to fill the order is with 15 packages of one and another way is 5 packages of three.)
- a. 12 b. 13 c. 14 d. 15 e. 16
12. If a pup is worth a pooch and a mutt, and a pup and a pooch are worth one bird dog, and two bird dogs are worth three mutts, how many pooches is a pup worth?
- a. 3 b. 2 c. 6 d. 4 e. 5
13. The degree measure of one of two complementary angles is 30 degrees less than twice the other. What is the degree measure of the larger angle?
- a. 60° b. 70° c. 65° d. 75° e. 50°
14. The length of a rectangular picture is three times its width. The picture is surrounded by a frame which 4 cm wide. If the perimeter of the outside of the frame is 96 cm, how many centimeters long is the picture?
- a. 24 cm b. 16 cm c. 20 cm d. 48 cm e. 32 cm
15. If $x + y = 6$ and $x^2 - y^2 = 24$, what is 2^{x-y} ?
- a. 4 b. 8 c. 16 d. 32 e. 64

16. Assume x varies directly as y^2 and inversely as z . What is the effect on x , if y is tripled and z is halved?
- a. stays the same b. 4.5 times as large c. twice as large
d. 9 times as large e. 18 times as large
17. The solution of $\begin{cases} 3x + 4y > 12 \\ 5x - 6y \geq -30 \end{cases}$ intersects more than one quadrant. Which quadrant does NOT include some part of the solution set of $\begin{cases} 3x + 4y > 12 \\ 5x - 6y \geq -30 \end{cases}$?
- a. I b. II c. III d. IV e. all quadrants are included
18. A wall has been built in such a way that the top row contains one block, the next lower row contains 3 blocks, the next lower has 5 blocks, and so on, increasing by 2 blocks in each row. How many rows high is the wall if there are a total of 900 blocks used?
- a. 450 b. 50 c. 45 d. 30 e. 15
19. What is the sum of all real solutions to the equation $|2x^2 - 8x + 6| = 6$?
- a. 4 b. 8 c. 6 d. 12 e. 16
20. Morse code involves transmitting dots “•” and dashes “—”. An agent attempted to send a five-character code five different times, but only one of the five transmissions was correct. However, it is known that each erroneous transmission had a different number of errors than the others, and no transmission had five errors. The five transmissions sent are shown below, which is the correct one?
- a. • • • • • b. — — • • — c. • — — — • d. • — • — • e. • — — • —

SHORT ANSWER

Place the answer in the appropriate space.

66. Let $A = \{1, 2, 3, 4\}$. Let M be the number of distinct proper subsets of A . Let N be the number of distinct nonzero differences of two elements of A . What is $M + N$?
67. What is the largest prime divisor of $59! + 60!$?
68. The first three terms of an arithmetic sequence are represented by $8x - 1$, $4x + 2$, and $2x - 6$. What is the sum of these three terms?
69. How many different ways can a cashier break (return an equivalent dollar amount in smaller denominations) a \$50 bill if there are an unlimited number of \$20, \$10, \$5, and \$1 bills available to the cashier? Assume bills of the same denomination are indistinguishable.
70. Let A , B , and C be positive integers such that $\frac{A}{4} + \frac{B}{6} + \frac{C}{15} = \frac{71}{60}$, where the three fractions on the left side of the equation are all proper fractions in lowest terms. What is $A + B + C$?

1. C
2. B
3. D
4. B
5. B
6. A
7. D
8. A
9. E
10. B
11. D
12. E
13. E
14. A
15. C
16. E
17. C
18. D
19. A
20. C

66. 21
67. 61
68. 72
69. 56
70. 8