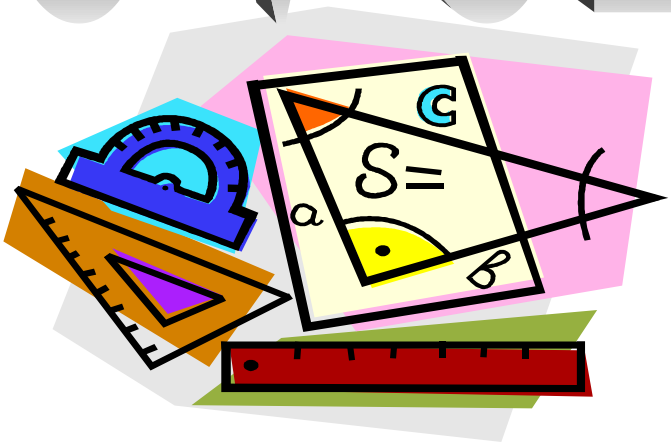
Level II



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. $6\frac{2}{3}$ mL b. 6 mL c. 1500 mL d. $5\frac{1}{3}$ mL e. 60 mL

2. Andy did a survey of the students in his math class and found that 4 students walk to school, 15 students ride the bus to school, 6 students drive to school, and 7 students ride to school with their parents. When he made a pie graph of the data, what was the degree measure of the sector representing the students who walk to school?

   a. 4° b. 40° c. 90° d. 50° e. 45°

3. What is the perimeter of the quadrilateral formed by joining the midpoints of the sides of quadrilateral $ABCD$ given that $AC = 15$ inches and $BD = 30$ inches?

   a. Cannot be determined b. 45 in c. 37.5 in d. 22.5 in e. 90 in

4. 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

5. What is the name of a regular polygon which has interior angles of 144°?

   a. pentagon b. hexagon c. octagon d. decagon e. dodecagon

6. 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. $\frac{14}{45}$

7. The degree measure of one of two complimentary angles is 30 degrees less than twice the other. What is the degree measure of the larger angle?

a. 60° b. 70° c. 50° d. 75° e. 65°

8. 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

9. The hypotenuse of a right triangle is 10 inches. One of the angles is 30°. What is the length of the leg adjacent to the 30° angle?

a. 5 in b. $5\sqrt{3}$ in c. $2\sqrt{3}$ in d. $\frac{5\sqrt{3}}{3}$ in e. $\frac{10\sqrt{3}}{3}$ in

10. A rectangular room measures 12 feet 4 inches by 9 feet 8 inches. How many 4 inch by 4 inch square tiles are needed to completely cover the floor?

a. 764 b. 1304 c. 1073 d. 4292 e. 4548

11. Points A and B lie on a circle with radius 6 units centered at C. The measure of ∠ACB is 120°. Point X is outside the circle such that segments XB and XA are both tangent to the circle. What is the area of quadrilateral XACB?

    a. $18\sqrt{3}$ sq units b. 48 sq units c. $36\sqrt{3}$ sq units d. 64 sq units e. $48\sqrt{3}$ sq units

12. The coordinates of ΔABC are $A(0,0)$; $B(5,0)$; and $C(0,10)$. Point A is reflected over $\overleftrightarrow{BC}$ and labeled A'. What are the coordinates of A'?

    a. $(4,10)$ b. $(8,4)$ c. $(10,4)$ d. $(4,8)$ e. $(10,5)$

13. A Ferris Wheel has diameter 240 feet. It takes 4 minutes for the Ferris Wheel to complete one rotation. What is the speed of a person on the Ferris Wheel when it is turning?

    a. 60π ft/sec b. π ft/min c. 12π in/sec d. 60π in/sec e. 60π in/min

14. The radius of a right circular cylinder is 2 inches; its height is 5 inches. A second right circular cylinder has radius 5 inches and height 2 inches. What is the ratio of the volume of the cylinder of smaller volume to the volume of the cylinder of larger volume?

    a. 2:5 b. 4:25 c. 1:2 d. 4:5 e. 4:15

15. The radius of a right circular cylinder is 2 inches; its height is 5 inches. A second right circular cylinder has radius 5 inches and height 2 inches. What is the ratio of the surface area of the cylinder of smaller volume to the surface area of the cylinder of larger volume?

    a. 2:5 b. 4:25 c. 1:2 d. 4:5 e. 4:15

16. The mean of 3 numbers is 10 more than the least of the numbers and 15 less than the greatest of the three. If the median is 5, then what is the sum of the three numbers?

a. 5 b. 36 c. 25 d. 20 e. 30

17. Two adjacent faces of a rectangular box have areas 36 and 63. If all three edge lengths are positive integers, what is the ratio of the largest possible volume of the box to the smallest possible volume?

a. 1 b. 2 c. 3 d. 9 e. 12

18. Sue works weekdays for $10 an hour, Saturdays for $15 an hour, and Sundays for $20 an hour. If she worked 180 hours last month and earned $2315, how many more weekday hours than Sunday hours did she work last month?

a. 75 b. 77 c. 80 d. 82 e. 85

19. If a hen and a half can lay an egg and a half in a day and a half, how many eggs can two dozen hens lay in two dozen days?

a. 384 eggs b. 8 eggs c. 24 eggs d. 576 eggs e. 12 eggs

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. An isosceles triangle has two sides of length 40 and base of length 48. A circle circumscribes the triangle. What is the radius of the circle?

67. If the sides of a right triangle are 6 inches, 8 inches, and 10 inches the area is 24 square inches and its perimeter is 24 inches. There is one other Pythagorean triple that has this same property (where the number of square units in the area is equal to the number of units in the perimeter). What is the other Pythagorean triple with this property?

68. Three rods are picked at random without replacement from a group of 20 rods of length 1, 2, 3, …, 20 inches. How many different sets of three rods could form a right triangle, assuming the ends of the rods must form the vertices of the triangle?

69. Suppose ΔABC has area $\frac{\sqrt{3}-1}{2}$, $AB=\sqrt{3}-1$, $AC=2$, and $\angle CAB$ is acute. What is the measure of $\angle ACB$ in degrees?

70. There are six colored vases in a row on a shelf, one of which is blue. The green one is not on the far right. The red one is between two others. The white one is immediately to the left of the orange one. The yellow one lies between the red one and the white one but is adjacent to neither of them. In what position is the blue vase if the vases are counted from left to right?

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

66. 25
67. 5-12-13
68. 6
69. 15°
70. 6
71.