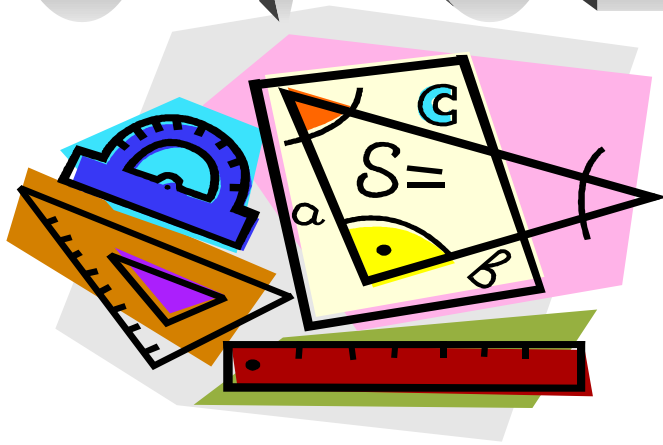


Level III



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

April 9, 2015

1. According to a survey conducted by Parade magazine, the average American ate 405 savory snacks, 366 sweet snacks, and 357 healthier snacks in 2013. Since 2006, healthier snacks are up 14% while sweet snacks are down 6%. Using this data which of the following would best represent the number of healthier snacks consumed by the average American in 2006?
 - a. 313
 - b. 307
 - c. 309
 - d. 250
 - e. 323

2. Andy did a survey of the students in his math class and found that 8 students walk to school, 16 students ride the bus to school, 7 students drive to school, and 9 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. 8°
 - b. 36°
 - c. 45°
 - d. 72°
 - e. 80°

3. Let A and B be two cubes such that the ratio of the volume of A to the volume of B is 8:1. What is the ratio of the surface area of A to the surface area of B ?
 - a. 1:1
 - b. 2:1
 - c. 4:1
 - d. $2\sqrt{2}:1$
 - e. 8:1

4. Which of the following is the inverse of "If I do all my homework, then I will get a good grade."?
 - a. If I get a good grade, then I did all my homework.
 - b. If I do not do all my homework, then I will not get a good grade.
 - c. If I do not get a good grade, then I did not do all my homework.
 - d. If I do not do some of my homework, then I will not get a good grade.
 - e. If I do not get a good grade, then I did not do some of my homework.

5. The manufacturers of a certain pen claim that it can draw a line 1 km long before it runs dry. If the line it draws is 0.4 mm wide, then what is the area, in square decimeters, that the pen is expected to cover?
 - a. 4000 dm^2
 - b. 400 dm^2
 - c. 40 dm^2
 - d. 4 dm^2
 - e. 0.4 dm^2

6. Only four sentences are found on a card:

On this card exactly one statement is true.

On this card exactly two statements are false.

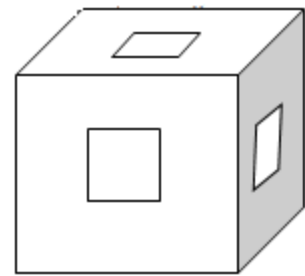
On this card exactly three statements are false.

On this card exactly four statements are true.

Exactly how many of the sentences are false?

- a. 4 b. 3 c. 2 d. 1 e. 0

7. In the figure at the right, a solid wooden cube has edges of length 3 meters. Square holes 1 meter on each side, centered in each face, are cut through to the opposite face. The edges of the holes are parallel to the edges of the cube. What is the entire surface area including the inside in square meters?



- a. 54 m^2 b. 72 m^2 c. 76 m^2 d. 84 m^2 e. 86 m^2

8. Let 5, 9, and c be the lengths of the sides of a triangle. If c is an integer, then what is the difference between the largest and smallest possible value of c ?

- a. 4 b. 5 c. 6 d. 7 e. 8

9. What is the maximum number of obtuse angles that any convex polygon can have?

- a. 50 b. 100 c. 360 d. 1000 e. no limit

10. An equilateral triangle and a regular hexagon have the same perimeter. What is the ratio of the area of the hexagon to the area of the triangle?

- a. 1.5 b. 2 c. $\frac{3\sqrt{3}}{2}$ d. $\frac{4\sqrt{3}}{3}$ e. 1

11. During a windstorm, a 32-foot vertical flag pole positioned on flat ground cracks in such a way that the top of the pole touches the ground 12 feet from the base of the pole. How many feet above the ground did the break occur?
- a. 12.5 ft b. 13 ft c. 13.75 ft d. 12.75 ft e. 13.5 ft
12. What is the number of hours from 5 pm Monday until 9 am Wednesday of the same week?
- a. 38 b. 40 c. 41 d. 36 e. 39
13. A final grade consists of the average of six tests grades. If the first four test grades are 82, 88, 93, and 87, what final two test grade average is needed to obtain a 90 final average?
- a. 93 b. 94 c. 95 d. 96 e. 97
14. Which number is the sum of the solutions to the equation $3x^2 + 7x - 2 = (x + 1)^2$?
- a. 0 b. -1.5 c. 1.5 d. -2.5 e. 2.5
15. Two runners running around a 600 m track in opposite directions and starting from the same place run a lap in 100 sec and 150 sec respectively. How many meters from the starting place are the runners when they meet for the eighth time (not counting the start)?
- a. 60 m b. 120 m c. 180 m d. 240 m e. 300 m
16. A streetlight and a nearby building simultaneously cast shadows of lengths 52 ft and 88ft respectively. If the streetlight is known to be 39 ft high, how tall is the building?
- a. 60 ft b. 66 ft c. 70 ft d. 75 ft e. 78 ft

17. The point $A(-3, 2)$ is rotated 90° clockwise around the origin to point B . Point B is then reflected over the line $y = x$ to point C . What are the coordinates of C ?
- a. $(2, 3)$ b. $(2, -3)$ c. $(-3, -2)$ d. $(3, -2)$ e. $(3, 2)$
18. What is the maximum number of pieces into which a circular pizza can be cut by making 5 straight cuts?
- a. 16 b. 18 c. 15 d. 17 e. 10
19. Which of the following five numbers is the mean of the other four numbers?
- a. 37 b. 49 c. 51 d. 53 e. 75
20. The admission fee to a mathematics exhibition was \$10. When the fee was reduced, the (nonzero) number of customers per day went up by 25% and the amount of money collected per day went up by 20%. What was the reduced fee?
- a. \$9.60 b. \$8.50 c. \$9 d. \$8.40 e. \$9.50
21. For how many pairs of positive integers (x, y) is $2x + y = 50$?
- a. 50 b. 25 c. 18 d. 24 e. 27
22. Which one of the following transformations on the set $\{(-1, 1); (0, 2); (1, 5)\}$ does not result in a set of collinear points?
- a. $(x, y) \rightarrow (x, \sqrt{y-1})$ b. $(x, y) \rightarrow (3-x, \sqrt{y-1})$ c. $(x, y) \rightarrow ((x+1)^2, y-1)$
- d. $(x, y) \rightarrow (x^2 + 2x, y-2)$ e. $(x, y) \rightarrow (2x, y-3)$

23. In how many ways can 36 be written as the sum of two primes?

- a. 1 b. 2 c. 3 d. 4 e. 5

24. A formula in physics states $\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$. What does R equal if $R_1 = 6$ and $R_2 = 4$?

- a. $\frac{5}{12}$ b. $\frac{1}{2}$ c. $\frac{6}{5}$ d. $\frac{14}{5}$ e. 2.4

25. The top three finishers in a recent math contest were Greg, Tonya, and Stephen. These three students attended three different high schools named North, West, and Central. The student from Central High School finished in second place. Two times Greg's score minus the score of the student from West HS equaled the score of the first place finisher. Tonya scored a 106 on the contest, but did not finish in first place. The difference between first place and second place was four points. What was the sum of the top three scores?

- a. 324 b. 322 c. 330 d. 320 e. 336

SHORT ANSWER

Place the answer in the appropriate space.

66. Determine the ratio of the perimeter of a rectangle to its area if its length and width are the zeroes of the polynomial $P(x) = x^2 - 24x + 8$.

67. Consider the decimal expansion of $\frac{1}{14}$, determine the sum of the first 10 digits of the expansion.

68. An equable shape is one whose area and perimeter are numerically equal. What is the length of one leg of an equable isosceles right triangle?

69. In every non-leap year, January begins on the same day as only one other month. What is that month?

70. What is the value of y in the system $\left\{ \begin{array}{l} \frac{3}{x+1} + \frac{5}{y-2} = 1 \\ \frac{6}{x+1} + \frac{1}{y-2} = 5 \end{array} \right\}$?

Answer Key

1. a
2. d
3. c
4. b
5. c
6. a
7. b
8. e
9. e
10. a
11. c
12. b
13. c
14. d
15. b
16. b
17. e
18. a
19. d
20. a
21. d
22. e
23. d
24. e
25. c

66. 6

67. 39

68. $4+2\sqrt{2}$

69. October

70. -1