Snow College Jr. Mathematics Contest

April 5, 2022   **Junior Division: Grades 7–9**   **Form:** T

Bubble in the single best choice for each question you choose to answer.

1. The sum of three consecutive integers is equal to the product of those integers. How many sets of integers satisfy this condition?

   (A)   0

   (B)   1

   (C)   2

   (D)   3

   (E)   5

2. The regular price of a pair of jeans is \$60. They are on sale for $1/4$ off the regular price. If you buy the jeans on sale and pay 8% sales tax, what is the total cost?

   (A)   \$16.20

   (B)   \$45.80

   (C)   \$48.60

   (D)   \$51.84

   (E)   \$62.62

3. What is the surface area of a rectangular solid with a length of $7\,\text{cm}$, a width of $3\,\text{cm}$, and a height of $5\,\text{cm}$?

   (A) $108\,\text{cm}^2$

   (B) $126\,\text{cm}^2$

   (C) $138\,\text{cm}^2$

   (D) $142\,\text{cm}^2$

   (E) $166\,\text{cm}^2$

4. Suppose the Earth is a perfect sphere and that there is a steel belt fitting snugly around it at the equator. If the length of the belt were increased by 10 feet, how far above the Earth would the belt be raised if it remained circular and centered around the Earth?

   (A)   Less than 1 inch

   (B)   Between 1 inch and 2 inches

   (C)   Between 2 inches and 1 foot

   (D)   Between 1 foot and 2 feet

   (E)   More than 2 feet

5. What is $1 + 3 + 5 + \ldots + 497 + 499$?

   (A)   62,000

   (B)   62,500

   (C)   124,500

   (D)   125,000

   (E)   249,500

6. Clara has a tricycle with a large front wheel with a radius of 9 inches. The small rear wheels have a radius of 6 inches. The tricycle moves in a straight line with the large wheel making 150 revolutions. How many revolutions does each small wheel make?

   (A) $66\frac{2}{3}$

   (B)   150

   (C)   200

   (D)   225

   (E)   250

7. A problem on Sam's math test is stated as

$$
\begin{array}{ccc}
 & O & N & E \\
+ & O & N & E \\
\hline
T & W & O
\end{array}
$$

If none of the letters represents either a 1 or 2 and each letter is a distinct digit, what are the values of T, W, and O?

(A) T = 7, W = 4, O = 3

(B) T = 8, W = 3, O = 4

(C) T = 8, W = 4, O = 3

(D) T = 9, W = 4, O = 6

(E) T = 9, W = 3, O = 4

8. $1.5\,\text{m} + 60\,\text{cm} + 0.02\,\text{km} =$

(A) 0.221 m

(B) 2.21 m

(C) 22.1 m

(D) 221 m

(E) 0.0221 m

9. Joe's income has been increasing each year by the same dollar amount. The first year his income was \$24,000, and the ninth year his income was \$31,680. In which year will his income be \$45,120?

(A) 16th year

(B) 19th year

(C) 21st year

(D) 22nd year

(E) 23rd year

10. If $\frac{1}{4x}$ equals the reciprocal of x^3, then x could equal

(A) $\frac{1}{8}$

(B) $\frac{1}{2}$

(C) 2

(D) 8

(E) 10

11. What is the probability that the product of the numbers rolled on three fair six-sided dice is prime?

(A) $\frac{1}{36}$

(B) $\frac{1}{24}$

(C) $\frac{1}{16}$

(D) $\frac{1}{12}$

(E) $\frac{1}{8}$

12. The altitude a, equal sides b, and non-equal side c of an isosceles triangle have lengths that are, in the order listed, consecutive even numbers of centimeters. What is the area of the triangle?

(A) $6\,\text{cm}^2$

(B) $16\,\text{cm}^2$

(C) $30\,\text{cm}^2$

(D) $48\,\text{cm}^2$

(E) $70\,\text{cm}^2$
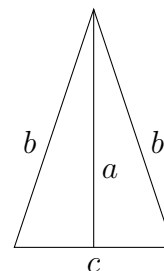
13. If a small circle's diameter is a large circle's radius, then the small circle's area is what percent of the large circle's area?

(A) 20%

(B) 25%

(C) 40%

(D) 50%

(E) 55%

14. Female bees are born from fertilized eggs and male bees are born from unfertilized eggs. This means that a male bee has only a mother, whereas a female has a mother and a father. If the ancestry of a male bee is traced back 8 generations, including the generation of the male bee, how many bees are there in all 8 generations?

(A) 24

(B) 42

(C) 54

(D) 61

(E) 64

15. Many are familiar with the arithmetic mean where you add up all the n values and divide by n. There is another mean called the *harmonic mean*:

$$\frac{n}{\frac{1}{x_1} + \frac{1}{x_2} + \ldots + \frac{1}{x_n}}$$

Find the harmonic mean of 6 and 18.

(A) 7.5

(B) 9

(C) 12

(D) 15

(E) 27

16. In a baseball league consisting of 10 teams, each team plays each of the other teams twice. How many games will be played?
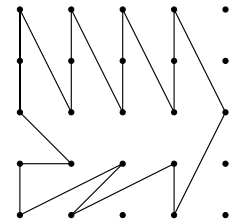
(A) 20 games

(B) 45 games

(C) 78 games

(D) 90 games

(E) 120 games

17. Of the rocks in a box, $\frac{1}{3}$ are igneous, 60 are metamorphic, and the remaining 40% are sedimentary. How many rocks are in the box?

(A) 160

(B) 180

(C) 200

(D) 225

(E) 260

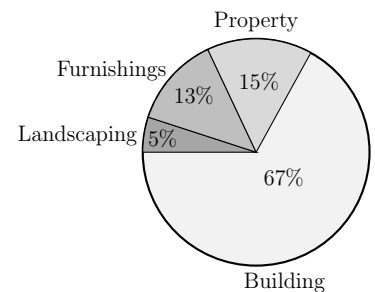18. Find the area if the distance between adjacent dots in a row or column is one unit.

(A) 6

(B) 7

(C) 8

(D) 9

(E) 10

19. What is the cost of landscaping for an $86,000 home?

(A) $17,200

(B) $57,620

(C) $12,900

(D) $4,300

(E) $8,600

20. The substitute teacher for a fifth-grade class is trying to learn the names of the three girls (one of whom is named Debbie) and two boys in the front row. She knows they are in alphabetical order by last name, going from left to right: Benson, Harper, Kimball, Moss, Roker, and she can see they are boy, girl, boy, girl, girl, also from left to right. She also knows that Bobby's last name is Kimball, neither Jill nor Karen is wearing a headband (the middle girl is), and Karen is not sitting next to Brian. Who is sitting between the two boys?

   (A)   Debbie

   (B)   Karen

   (C)   Jill

   (D)   Brian

   (E)   cannot be determined