

Snow College Jr. Mathematics Contest

March 18, 2025

Junior Division: Grades 7–9

Form: T

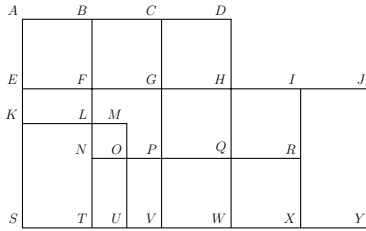
Bubble in clearly the single best choice for each question you choose to answer.

1. What is the sum of the prime factors of 2025?

- (A) 22
- (B) 23
- (C) 25
- (D) 27
- (E) 28

2. This diagram is filled with squares of various sizes. How many total squares are there?

- (A) 14
- (B) 15
- (C) 16
- (D) 17
- (E) 18

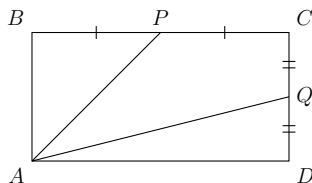


3. A person is jogging around a $\frac{1}{4}$ mi track at 5 mph. If they jogged for 42 min, how many times did they go around the track?

- (A) 9
- (B) 12
- (C) 13
- (D) 14
- (E) 15

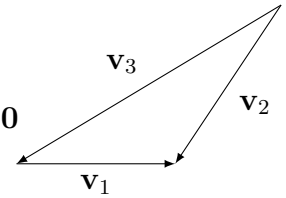
4. The area of quadrilateral $APCQ$ is 9 cm^2 . What is the area of rectangle $ABCD$?

- (A) 12 cm^2
- (B) 14 cm^2
- (C) 15 cm^2
- (D) 18 cm^2
- (E) 20 cm^2



5. A vector is a quantity with both size and direction; they are often represented by arrows. Vectors \mathbf{v}_1 , \mathbf{v}_2 , and \mathbf{v}_3 are shown below. Which of the following is the correct relationship between the three vectors?

- (A) $\mathbf{v}_1 + \mathbf{v}_2 = \mathbf{v}_3$
- (B) $\mathbf{v}_1 - \mathbf{v}_2 = \mathbf{v}_3$
- (C) $\mathbf{v}_1 + \mathbf{v}_2 + \mathbf{v}_3 = \mathbf{0}$
- (D) $\mathbf{v}_1 + \mathbf{v}_3 = \mathbf{v}_2$
- (E) $\mathbf{v}_3 - \mathbf{v}_2 = \mathbf{v}_1$



6. If $2^x \cdot 3^y \cdot 7^z = 392$ and x , y , and z are integers, then what is xyz ?

- (A) -2
- (B) 2
- (C) 0
- (D) 5
- (E) 6

7. Rationalize the denominator.

$$\frac{1}{\sqrt{2} + \sqrt{3} + \sqrt{5}}$$

- (A) $\frac{2\sqrt{3}+3\sqrt{2}-\sqrt{30}}{12}$
- (B) $\frac{\sqrt{3}+\sqrt{2}-\sqrt{5}}{12}$
- (C) $\frac{6+\sqrt{10}-\sqrt{30}}{6}$
- (D) $\frac{\sqrt{3}+3-\sqrt{15}}{6}$
- (E) $\frac{2\sqrt{3}-3\sqrt{2}+\sqrt{30}}{4}$

8. On a dark, cloudy night, Bud stands 15 ft away from a 20-ft tall light pole. The light on the pole is on and is the only source of light near Bud. Bud is 5 ft tall. What is the angle of elevation of the line segment joining the highest point of the light pole to the point on Bud's shadow that is farthest from the light pole?

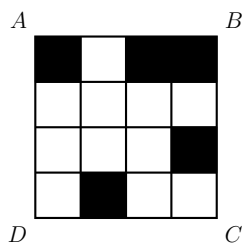
- (A) 20°
- (B) 30°
- (C) 40°
- (D) 45°
- (E) 60°

9. Replace each letter in **ONE + ONE = TWO** with a base-10 digit so that identical letters are replaced by identical digits and different letters are replaced with different digits, **T** is the only odd digit, and **O** cannot be zero. What is the value of **N**?

- (A) 0
- (B) 2
- (C) 4
- (D) 6
- (E) 8

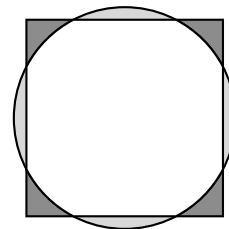
10. What is the minimum number of small squares that must be colored black so that a line of symmetry lies on the diagonal \overline{BD} of square $ABCD$?

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5



11. A square with side length 2 and a circle share the same center. The total area of the regions that are inside the circle and outside the square is equal to the total area of the regions that are outside the circle and inside the square. What is the circle's radius?

- (A) $\frac{2}{\sqrt{\pi}}$
- (B) $\frac{1+\sqrt{2}}{2}$
- (C) $\frac{3}{2}$
- (D) 4
- (E) 5



12. Alice and Bob play a game involving a circle whose circumference is divided by 12 equally-spaced points. The points are numbered clockwise from 1 to 12. Both start on point 12. Alice moves clockwise around the circle and Bob counterclockwise. In each turn of the game, Alice moves 5 points clockwise and Bob moves 9 points counterclockwise. The game ends when they stop on the same point. How many turns will this take?

- (A) 6
- (B) 8
- (C) 12
- (D) 14
- (E) 24

13. The Little Twelve Basketball Conference has two divisions, with six teams in each division. Each team plays each of the other teams in its own division twice and every team in the other division once. How many conference games are scheduled?

- (A) 80
- (B) 96
- (C) 100
- (D) 108
- (E) 124

14. Each day, Jenny ate 20% of the jellybeans that were in her jar at the beginning of that day. At the end of the second day, 32 remained. How many jellybeans were in the jar originally?

- (A) 40
- (B) 50
- (C) 55
- (D) 60
- (E) 75

15. For the dataset $\{15, 14, 15, 5, 12, 5\}$, compute the value of **mean** $-$ **median**.

- (A) 1
- (B) -2
- (C) 2
- (D) -1
- (E) -0.5

16. It is 2025 and Danni is not old enough to vote but has had her birthday this year. Danni noticed that her age is equal to the sum of the digits in her birth year. What is the sum of the digits in her birth year?

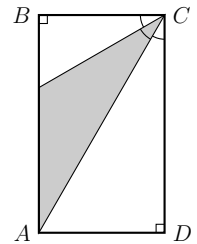
- (A) 7
- (B) 9
- (C) 12
- (D) 14
- (E) 15

17. What is the area of the largest rectangle that can be inscribed in a closed semicircle of radius 4?

- (A) 32
- (B) 16
- (C) $8\sqrt{2}$
- (D) $16\sqrt{2}$
- (E) $12\sqrt{3}$

18. $ABCD$ is a rectangle. The three measured angles at vertex C are all congruent. What fraction of the rectangle is shaded?

- (A) $\sqrt{3}/4$
- (B) $1/3$
- (C) $1/2$
- (D) $\sqrt{3}/5$
- (E) $1/4$



19. There are 396 men, women, and children in a room. If the ratio of women to men is 2:3, and the ratio of men to children is 1:2, how many men are in the room?

- (A) 79
- (B) 82
- (C) 86
- (D) 95
- (E) 108

20. For what value of k is the line through the points $(3, 2k + 1)$ and $(8, 4k - 5)$ parallel to the x -axis?

- (A) -4
- (B) 2
- (C) 0
- (D) -1
- (E) 3