

Snow College Jr. Mathematics Contest

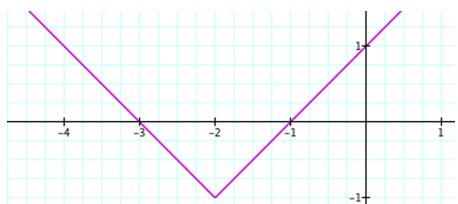
April 5, 2011

Junior Division: Grades 7–9

Form: **T**

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

1. Which equation best represents the graph?



- (A) $y = |x - 2| - 1$
- (B) $y = \sqrt{x^2} - 1$
- (C) $y = (|x| - 2) - 1$
- (D) $y = |x + 2| - 1$
- (E) $y = \sqrt{(x - 2)^2} - 1$

2. In music an interval of a perfect fifth is comprised of two notes whose frequencies have a ratio of 3 to 2. If middle C has a frequency of 260 Hz what is the frequency of the G a perfect fifth above it?

- (A) 130 Hz
- (B) 173 Hz
- (C) 390 Hz
- (D) 520 Hz
- (E) 780 Hz

3. A collection of coins is made up of an equal number of pennies, nickels, dimes, and quarters. What is the largest possible value of the collection which is less than \$2.00?

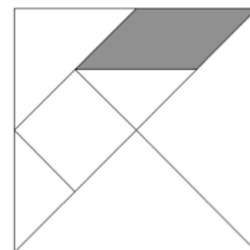
- (A) \$1.64
- (B) \$1.78
- (C) \$1.86
- (D) \$1.89
- (E) \$1.99

4. How many of the integers from 1 to 100 inclusive do **NOT** contain the digit 7?

- (A) 19
- (B) 20
- (C) 80
- (D) 81
- (E) 90

5. If a dart lands at random on a square tangram dartboard, what is the probability of its landing in the shaded parallelogram? (The triangles are all isosceles.)

- (A) 1/20
- (B) 1/10
- (C) 1/8
- (D) 1/5
- (E) 1/4

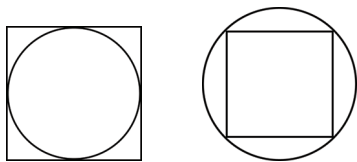


6. Find the product of the matrices.

$$\begin{bmatrix} 4 & 2 & 5 \end{bmatrix} \begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix}$$

- (A) 425×316
- (B) $\begin{bmatrix} 3 \\ 1 \\ 6 \end{bmatrix} \begin{bmatrix} 5 & 2 & 4 \end{bmatrix}$
- (C) [264]
- (D) [41]
- (E) [44]

7. Which is a better (tighter) fit: a round peg in a square hole, or a square peg in a round hole? (A tighter fit fills up more of the hole.)



- (A) round peg in a square hole
 (B) square peg in a round hole
 (C) both are equally tight
 (D) need to know the length of the side of the square
 (E) need to know the radius of the circle

8. Steve is 66 inches tall and Mike is 72 inches tall. How tall is Jacob if the average height of the three is 71 inches?

- (A) 70 inches
 (B) 72 inches
 (C) 75 inches
 (D) 76 inches
 (E) 78 inches

9. A popular dice game is called craps. In it you roll two standard six-sided dice and add the numbers showing on the top faces. What is the probability of rolling a sum of either 7 or 11 (called “throwing craps”)?

- (A) $\frac{1}{9}$
 (B) $\frac{2}{9}$
 (C) $\frac{1}{6}$
 (D) $\frac{7}{36}$
 (E) $\frac{6}{7}$

10. Flip a fair coin. Go 2 for heads, 1 for tails.

Start		Go back 2 spaces	End
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What is the probability of reaching End in exactly 3 turns?

- (A) $\frac{1}{8}$
 (B) $\frac{1}{4}$
 (C) $\frac{1}{2}$
 (D) $\frac{2}{3}$
 (E) $\frac{3}{8}$

11. The sum of the interior angles of a triangle on a sphere add up to more than 180° by an amount e called the *spherical excess*. The area of a spherical triangle is given by

$$A_{\Delta} = \frac{e}{720^\circ} A_{\text{sphere}}$$

How much of a sphere does a spherical triangle with three right angles cover?

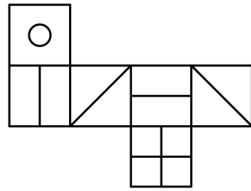
- (A) $\frac{1}{8}$
 (B) $\frac{1}{4\pi}$
 (C) $\frac{1}{4}$
 (D) $\frac{3}{8}$
 (E) $\frac{\pi}{4}$

12. A bookcase has 3 shelves. On the top shelf there are 10 German books, on the middle shelf 12 math books, and on the bottom shelf 8 science books. When six German books are removed from the bookcase, what fraction of the bookcase’s remaining books are math books?

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

13. An item in a store is originally priced at \$4. A clerk marks the item up by 100%. After that, a second clerk marks the new price up by 200%. What is the final price after the two markups?
- (A) \$12
 (B) \$16
 (C) \$18
 (D) \$20
 (E) \$24

14. Which box is formed from folding the figure on the right?



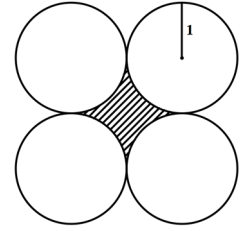
- (A)
- (B)
- (C)
- (D)
- (E)

15. Evaluate: $4 + 4 \times 4 - 4 \div 4$

- (A) 0
 (B) 4
 (C) 7
 (D) 16
 (E) 19

16. Find the area of the shaded region.

- (A) 1
 (B) $4/\pi$
 (C) $4 - \pi$
 (D) π
 (E) 2π



17. What is the sum of all the one-digit prime numbers?
- (A) 16
 (B) 17
 (C) 18
 (D) 27
 (E) 45

18. What is 0.3333 rounded to the nearest fifth?

- (A) 0.1
 (B) 0.2
 (C) 0.3
 (D) 0.4
 (E) 0.5

19. What is $6000\% + 600\% + 60\% + 6\%$?

- (A) 6666
 (B) 666.6
 (C) 66.66
 (D) 6.666
 (E) 0.6666

20. The longest leg of a 30° - 60° - 90° triangle is 18 cm in length. What are the perimeter and area of the triangle?

- (A) 26 cm, 54 cm^2
 (B) $(18 + 18\sqrt{3}) \text{ cm}$, $(54\sqrt{3}) \text{ cm}^2$
 (C) 54 cm, 108 cm^2
 (D) $(27 + 9\sqrt{3}) \text{ cm}$, $(\frac{81}{2}\sqrt{3}) \text{ cm}^2$
 (E) $(27\sqrt{2} + 18) \text{ cm}$, $(81\sqrt{2}) \text{ cm}^2$