Snow College Jr. Mathematics Contest

April 4, 2023 **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 greatest positive integer that evenly divides the sum of any five consecutive positive integers?

   (A) 2
   (B) 3
   (C) 4
   (D) 5
   (E) 6

2. Finish the square so that the numbers in each row, column, and diagonal add up to the same number. What is the sum of the missing numbers?

   (A) 57
   (B) 59
   (C) 62
   (D) 66
   (E) 69

15		
	11	
9		**7**

3. If you add the measure of any 2 angles of triangle T, the sum is always 120°. Triangle T **must** be

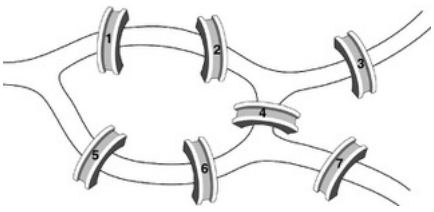
   (A) equiangular.
   (B) scalene.
   (C) right.
   (D) obtuse.
   (E) geodesic.

4. What is the sum of all odd integers between 51 and 375 inclusive?

   (A) 4260
   (B) 5792
   (C) 34719
   (D) 43876
   (E) 51892

5. The city of Königsberg has 7 bridges. Suppose we wanted to take a walk through the city eventually crossing each bridge. What is the minimum number of bridge crossings required to cross every bridge in the city?

   (A) 7
   (B) 8
   (C) 9
   (D) 10
   (E) 11



6. How many of the 15 positive factors of 400 are evenly divisible by 4?

   (A) 4
   (B) 8
   (C) 9
   (D) 10
   (E) 11

7. Your French class is randomly choosing two students for an all-expense-paid trip to Paris. If your class has 20 students, what is the probability that you will be chosen?

   (A) $\frac{1}{9}$
   (B) $\frac{1}{10}$
   (C) $\frac{1}{19}$
   (D) $\frac{1}{20}$
   (E) $\frac{1}{190}$

8. There are several kinds of averages or means. One of them is the geometric mean, which is used often in computing growth rates. The geometric mean of x and y is $\sqrt{xy}$. Compute the geometric mean of 18 and 50.

   (A) 20
   (B) 30
   (C) 34
   (D) $\frac{225}{17}$
   (E) 16

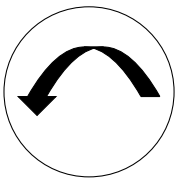
9. My coin jar has 100 pennies, 200 nickels, 300 dimes, and 400 quarters in it. What is the total value of the coins?

   (A) \$91
   (B) \$121
   (C) \$141
   (D) \$161
   (E) \$191

10. A square of side-length 4π has the same perimeter as a circle of what diameter?

    (A) 2
    (B) 4
    (C) 8
    (D) 12
    (E) 16

11. For the following figure, which choice shows a 90° clockwise rotation followed by a reflection across a vertical axis?

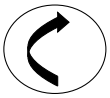


(A) 

(B) 

(C) 

(D) 

(E) 

12. A basketball player has a free throw shooting average of 83%. She is fouled on a 3-point attempt. What is the probability that she will make all three free throws?

    (A) 42.3%
    (B) 57.2%
    (C) 83%
    (D) 49%
    (E) 27.7%

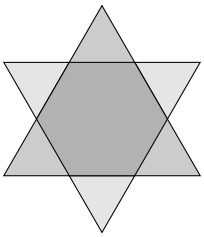
13. It can be shown that the sum of the squares of the first k natural numbers, $\sum_{j=1}^{k} j^2$, has a value of $k(k+1)(2k+1)/6$. Compute the sum of squares of the first 15 natural numbers.

    (A) 1240
    (B) 1200
    (C) 930
    (D) 1440
    (E) 1015

14. If you place a cake of soap on a pan of a scale and $\frac{3}{4}$ cake of soap and a $\frac{3}{4}$-kg weight on the other, the pans balance. How much does a cake of soap weigh?

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

15. Two congruent equilateral triangles each with area of 14 cm^2 overlap to form a regular hexagon as shown below. How many square centimeters is each of the small exterior triangles?

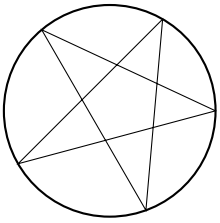


(A) 9/15
(B) 14/15
(C) 14/9
(D) 15/9
(E) 14/6

16. Let $A = \{\text{perfect squares} < 100\}$ and $B = \{\text{multiples of } 3\}$. How many natural numbers are in $A \bigcap B$?

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

17. A circle circumscribes a five-pointed star. What is the sum of the five interior angles of the star?



(A) 90°
(B) 180°
(C) 300°
(D) 360°
(E) Not enough information

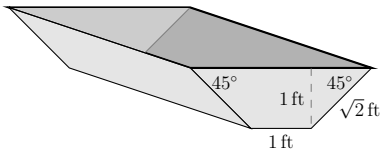
18. What is the 10s digit of the smallest 3 digit palindrome (same forwards and backwards) whose digits add to 18?

(A) 4
(B) 5
(C) 6
(D) 7
(E) 8

19. Simplify the expression $\sqrt{\sqrt[0.06]{3^{0.12}}}$

(A) 2
(B) $2\sqrt{3}$
(C) $3\sqrt{2}$
(D) 3
(E) $6\sqrt{2}$

20. The perimeter of the rectangular top rim of the vat shown below is 26 ft. How many cubic feet of water will the vat hold if it is 1 ft deep?



(A) $12\sqrt{2}$
(B) $14\sqrt{2}$
(C) 20
(D) 22
(E) 26