

3rd Annual

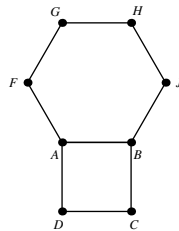
# Math Invitational Invitational

# 4Girls

Sponsored By



- Solve for  $x$ :  $2x + 7 = 21$   
 (A) 5 (B) 6 (C) 7 (D) 8 (E) 9
- If a shrub grows at the rate of 6 inches per 5 days, how many feet would it grow in a non-leap year?  
 (A)  $2\frac{1}{2}$  ft (B)  $36\frac{1}{2}$  ft (C)  $182\frac{1}{2}$  ft (D) 73 ft (E) 365 ft
- If 1 in every 20 people is left handed, what is the expected number of left handed people in a group of 400 people?  
 (A) 0.05 (B) 5 (C) 15 (D) 20 (E) 200
- Percy buys 3 apples for 6 dollars, 4 pears for 16 dollars, and 1 watermelon for 5 dollars. Assuming the rates stay the same, how much would it cost to buy 10 apples, 3 pears, and 2 watermelons?  
 (A) 38 (B) 39 (C) 40 (D) 41 (E) 42
- Based on the fact that only 10% of the total volume of an iceberg can be seen above the surface of the water, if  $500 \text{ m}^3$  of a certain iceberg is seen, then what is the total volume of the iceberg?  
 (A) 5 (B) 50 (C) 500 (D) 5,000 (E) impossible to determined
- Thomas is to read 225 pages of a book over the summer. He decides to read one page the first day, three pages the second day, five pages the third day, and so on, each day reading two more pages than the previous. How many days will it take Thomas to finish reading the book?  
 (A) 11 (B) 12 (C) 13 (D) 14 (E) 15
- 1 cow can produce 3 gallons of milk each day. How many cows would it take to produce 210 gallons of milk in a week?  
 (A) 3 (B) 7 (C) 10 (D) 30 (E) 70
- Johnny, standing 8 feet from a very tall wall, points his laser pointer at the wall, with it level with the ground. He then flicks his wrist upward  $60^\circ$ . How many feet upwards does the center of the laser beam move on the wall?  
 (A)  $\frac{8\sqrt{3}}{3}$  (B)  $6\sqrt{3}$  (C)  $8\sqrt{3}$  (D) 16 (E) impossible to determine
- In the diagram below, hexagon  $ABFGHI$  is drawn on side  $AB$  of square  $ABCD$ . What is the measure of  $\angle CAJ$ ?



- (A) 45 (B) 60 (C) 75 (D) 85 (E) 90
- At the Dinosaur Museum, adult tickets cost \$2, while children's tickets cost \$1.50. On January 4th, 500 people visited the museum, resulting in a \$850 profit. How many adults visited the museum

on that day?

- (A) 100                      (B) 200                      (C) 300                      (D) 400                      (E) 500

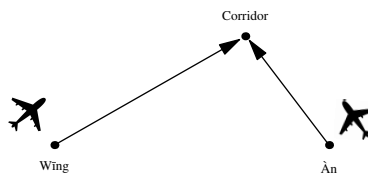
11. By what percent does the volume of a spherical balloon increase when the radius is tripled?

- (A) 100                      (B) 200                      (C) 800                      (D) 2600                      (E) impossible to determine

12. If  $x^2 = 7$ , what is the sum of the possible values of  $x$ ?

- (A)  $-2$                       (B)  $-1$                       (C)  $0$                       (D)  $1$                       (E)  $2$

13. Two planes, one leaving from the city of Àn, and the other from the city of Wìng, both leave their respective cities at the same time and fly at a constant speed to the city of Corridor, arriving there at the same time. If the distance from Àn to Corridor is 500 miles, and the distance from Wìng to Corridor is 650 miles, what is the ratio of the speed of the plane leaving from Àn to the speed of the plane leaving from Wìng?

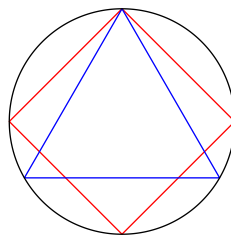


- (A)  $\frac{1}{2}$                       (B)  $\frac{2}{3}$                       (C)  $\frac{10}{13}$                       (D)  $\frac{13}{10}$                       (E) impossible to determine

14. The radius of Circle  $\Omega$  is 15,732 km. If the circle's radius was to increase by 1 km, by how much would its circumference increase?

- (A)  $\pi$                       (B)  $2\pi$                       (C)  $15,731\pi$                       (D)  $15,732\pi$                       (E)  $15,733\pi$

15. A triangle and a square are inscribed within the same circle. What is the ratio of the area of the square to the area of the triangle?



- (A)  $\frac{1}{2\pi}$                       (B)  $\frac{\sqrt{3}}{4}$                       (C)  $\frac{1}{2}$                       (D)  $\frac{8\sqrt{3}}{9}$                       (E)  $\pi$

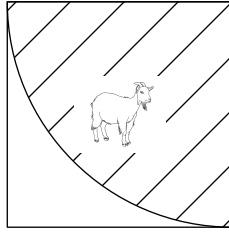
16. If  $ab = 4$  and  $a + b = 1$ , what is the value of  $\frac{1}{a} + \frac{1}{b}$ ?

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

17. What is the units digit of  $2^{68} \times 5^4$ ?

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

18. Inside a square pen with sidelength 2,017 meters, a goat is tied to a corner on the inside of the pen with a rope such that he is able to reach a circular region with radius 2,017 meters. What fraction of the pen is the goat able to reach?



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

19. John has a secret number that Mary must guess. He gives Mary several clues:

- (I) My number is between 1 and 9, inclusive.
- (II) My number is not prime.
- (III) My number is not a multiple of 3.
- (IV) My number is not a factor of 68.

What is John's number?

- (A) 2                      (B) 4                      (C) 5                      (D) 8                      (E) 9
20. Rectangle ABCD has length 4 and width 3. A side is randomly picked, and, on the opposite side, a point is randomly selected. The selected side and point are connected to create a triangle. What is the area of this triangle?
- (A) 3                      (B) 4                      (C) 6                      (D) 9                      (E) 12
21. What is the sum of the digits of the product  $1111 \times 1111$ ?
- (A) 13                      (B) 14                      (C) 15                      (D) 16                      (E) 17
22.  $1000^2 - 999^2 + 998^2 - 997^2 + 996^2 - 995^2 + \dots - 4^2 - 3^2 + 2^2 - 1^2 = ?$
- (A) 55                      (B) 5,050                      (C) 10,000                      (D) 500,500                      (E) 50,005,000
23. The letters  $A, B,$  and  $C$  are assigned values 0 through 9 such that they satisfy:

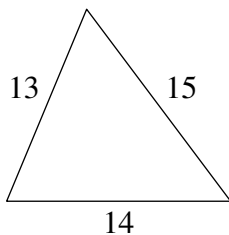
$$\begin{array}{r} \phantom{\times} \phantom{A} \phantom{C} \phantom{A} \\ \phantom{\times} \phantom{A} \phantom{B} \phantom{A} \phantom{B} \\ \times \phantom{A} \phantom{B} \phantom{A} \phantom{B} \\ \hline A \phantom{B} \phantom{A} \phantom{B} \end{array}$$

where a number like  $AB$  is a two digit number with tens digit  $A$  and units digit  $B$ . If numbers cannot start with zero, what is the value of  $C$ ?

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

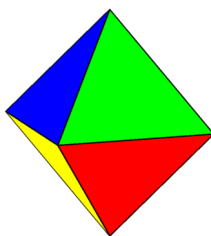
24.  $\triangle ABC$  has sidelengths 13, 14, and 15. If the sidelengths of  $\triangle ABC$  are doubled in length, which of the following statements are true?

- (I) The area of  $\triangle ABC$  is doubled.
- (II) The measures of the angles of  $\triangle ABC$  are doubled.
- (III) The measures of the angles of  $\triangle ABC$  remain constant.
- (IV)  $\triangle ABC$  now has sidelengths of 26, 28, and 30.
- (V) The area of  $\triangle ABC$  is quadrupled (multiplied by 4).



- (A) I, II      (B) I, II, IV      (C) I, III, IV      (D) II, IV, V      (E) III, IV, V

25. Jane and James play a game with a fair 8 sided die, each side with a different color. Jane rolls first, and then James. If James rolls the same color as Jane did previously, he wins. If he does not, then Jane rolls. If her color is the same as James', then she wins. If not, James rolls afterwards, and the same rules apply. This goes on until someone wins. What is the probability that James wins?



- (A)  $\frac{1}{8}$       (B)  $\frac{3}{7}$       (C)  $\frac{7}{15}$       (D)  $\frac{8}{15}$       (E)  $\frac{4}{7}$