

2nd Annual

Math Invitational

4Girls

Saturday, April 23, 2016

Sponsored By



Name: _____

School: _____ **Grade:** _____

2016 MIG Individual Round

- Solve for x : $0.5(12x + 400) = 600 + 4 \times 200$
(A) -200 (B) -100 (C) 0 (D) 100 (E) 200
- A right triangle has a hypotenuse of length 15 and a leg of length 12. What is the measure of its shorter leg?
(A) 6 (B) 7 (C) 8 (D) 9 (E) 10
- Jonathan is thinking of a number. He multiplies his number by four, then adds eight to the product and yields twenty-four. Bob is thinking of a different number that is two more than Jonathan's number. What is Bob's number?
(A) 4 (B) 5 (C) 6 (D) 7 (E) 8
- A menu has 6 appetizers, 4 entrees, and 5 desserts. Maya is allergic to eggs, and one appetizer and one dessert contain eggs. If a three-course meal consists of one appetizer, one entree, and one dessert, given Maya can order the rest of the dishes, how many different three-course meals could she order?
(A) 40 (B) 60 (C) 80 (D) 100 (E) 120
- What is the sum of the first ten odd integers?
(A) 81 (B) 100 (C) 121 (D) 144 (E) 169
- A drawer contains twelve green socks and eight blue socks. Swathi draws one sock at a time at random without replacement. What is the least number of socks Swathi must draw in order to ensure she draws a green sock?
(A) 7 (B) 8 (C) 9 (D) 10 (E) It is impossible to ensure she draws a green sock.

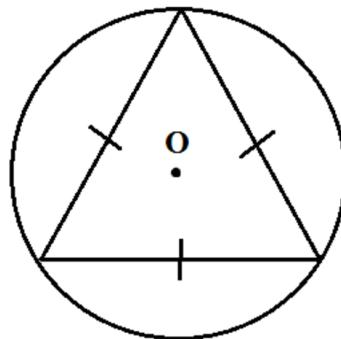
7. A box containing a shipment of Rubik's cubes is 12 centimeters long, 9 centimeters wide, and 6 centimeters tall. The box contains 5 Rubik's cubes, each with sides of length 3 centimeters. What is the volume of the space in the box unoccupied by the Rubik's cubes?



- (A) 513 (B) 540 (C) 567 (D) 594 (E) 621
8. Anita drove to work at 40 miles per hour, and the distance from her house to her workplace is 40 miles. On the way back home, however, she was in a hurry and drove at 60 miles per hour. Anita got caught for speeding and spent 20 extra minutes waiting for her speeding ticket. What was Anita's average speed for her round-trip? (Note: After getting her speeding ticket, Anita continued at the same rate of 60 miles per hour.)
- (A) 36 (B) 40 (C) 48 (D) 50 (E) 54
9. Lavender flips a fair-sided coin once. If it lands on heads, she will draw a marble from Bag A. If it lands on tails, she will draw a marble from Bag B. Bag A contains five scarlet marbles and three violet marbles. Bag B contains nine scarlet marbles and eleven violet marbles. What is the probability Lavender draws a violet marble?

- (A) $\frac{37}{80}$ (B) $\frac{1}{2}$ (C) $\frac{43}{80}$ (D) $\frac{23}{40}$ (E) $\frac{49}{80}$

10. What is the area of the region inside circle outside but outside the equilateral triangle with sides of length 6?



- (A) $12\pi - 6\sqrt{3}$ (B) $12\pi - 9\sqrt{3}$ (C) $9\pi - 6\sqrt{3}$
(D) $9\pi - 9\sqrt{3}$ (E) 9π

11. Music Masters Middle has a total of 105 students. 45 students are singers in Choir, 70 play instruments in Orchestra, and 53 are pianists in the Beethoven Club. If 25 are in both Choir and Orchestra, 33 are in both Orchestra and the Beethoven Club, and 20 are in both Choir and the Beethoven Club, how many students are members of all three musical groups?

- (A) 0 (B) 5 (C) 10 (D) 15 (E) 20

12. Find the measure of the smaller angle formed by the hour and minute hand of a clock at 6:45.

- (A) 45.5° (B) 60° (C) 67.5° (D) 75° (E) 90.5°

13. Aimée thoroughly and evenly mixes a glass of 15 ounces of milk and 10 ounces of coffee. However, her friend Jaime drinks ten ounces. What is the absolute value difference between the number of ounces of milk and ounces of coffee Aimée needs to add to the mixture now in order to achieve a 30 ounce beverage that is 70% coffee and 30% milk? (E.g. The absolute value difference of $5 - 7$ is 2.)

- (A) 5 (B) 10 (C) 15 (D) 20 (E) 25

14. What is the maximum number of regions that can be formed with four lines on a plane?

- (A) 10 (B) 11 (C) 12 (D) 13 (E) 14

15. Whole numbers k and m satisfy $k \times m = 60$. Find the largest possible value of $k + m$.

- (A) 17 (B) 19 (C) 23 (D) 32 (E) 61

16. The equation of a parabola is $y = 3x^2 + 8x + 5$. The line $y = 8x + 80$ intersects this parabola at exactly two points. What is the area of the triangle with vertices at these two points of intersection and the origin?

- (A) 250 (B) 300 (C) 350 (D) 400 (E) 450

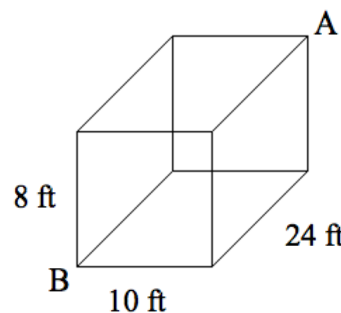
17. Emi keeps rolling a dice until she rolls a two. What is the probability it takes her at least three rolls before she rolls a two? (E.g. Three rolls would constitute of two rolls of a number other than two and the last roll of a two.)

- (A) $\frac{1}{6}$ (B) $\frac{5}{6}$ (C) $\frac{5}{36}$ (D) $\frac{25}{36}$ (E) 1

18. Find the sum of the coefficients of the polynomial $(x-1)(x-3)(x-5)(x-7)(x-9)$.

- (A) -384 (B) -192 (C) 0 (D) 192 (E) 384

19. A worm is trying to crawl from Corner A of a room to Corner B. The room is a rectangular prism with edges of lengths 8 ft, 10 ft, and 24 ft, as shown to the right. What is the shortest distance in feet the worm must crawl to reach its destination? Assume the worm can crawl across the edges and faces of the room.



- (A) 12 (B) 26 (C) $\sqrt{740}$ (D) 30 (E) 42

20. What is the sum of all positive integer factors of 2016?

- (A) 6552 (B) 6656 (C) 7056 (D) 7371 (E) 8064

21. How many zeros are at the end of the product

$$125 \times 125 \times 25 \times 25 \times 5 \times 9 \times 9 \times 8 \times 8 \times 4 \times 4 \times 4 \times 2 ?$$

- (A) 11 (B) 12 (C) 13 (D) 14 (E) 15

22. Find x if $x = \sqrt{2 + \sqrt{2 + \sqrt{2 + \dots}}}$

- (A) $\sqrt{2}$ (B) 0.5 (C) 1 (D) 2 (E) none of these

23. A number which when divided by 10 leaves a remainder of 8, when divided by 9 leaves a remainder of 7, when divided by 8 leaves a remainder 6, etc., down to where, when divided by 2, it leaves a remainder of 0, is:

- (A) 418 (B) 1258 (C) 2518 (D) 3508 (E) none of these

24. Find the sum of all positive integers n such that $30 + n^2$ will be a perfect square.

- (A) 14 (B) 16 (C) 18 (D) 20 (E) none of these

25. Mimi draws 150 congruent circles in the plane, all passing through a fixed point K . What is the largest number of regions into which these circles can split the plane? (Include the region outside the circles in your count.)

- (A) 10,879 (B) 11,027 (C) 11,176 (D) 11,326 (E) 11,477