1. The Math team's favorite ice cream parlor, Cones R Us, offers 10 flavors of ice cream, 4 sauces, and 6 toppings. A "High volume" dish consists of two different flavors of ice cream, one sauce, and two different toppings. How many possible choices are there for a "High Volume" dish?

   A) 10,800 B) 2,700 C) 1,440 D) 240 E) NOTA

2. Traveling downstream, a boat can go 18 miles in 2 hours; going upstream it can go 2/3 that distance in twice that time. Find the rate of the current.

   A) 1 mph B) 2 mph C) 3 mph D) 4 mph E) NOTA

3. Jamey is older than Jeffy. If the arithmetic mean of their ages equals the difference of their ages, what is the ratio of Jamey's age to Jeffy's age?

   A) 3 : 1 B) 5 : 2 C) 2 : 1 D) 3 : 2 E) NOTA

4. The sum of the squares of two positive integers is 1,753 and the difference of their squares is 295. Find the product of the two integers.

   A) 768 B) 864 C) 1,024 D) 1,089 E) NOTA

5. Morris can paint an entire room in 2 hours. It takes Norris 3 hours to complete the same job. How long would it take Doris to paint the room alone, if the three of them working together can complete the entire job in thirty minutes?

   A) $\frac{1}{2}$ hour B) $\frac{6}{7}$ hour C) 1 hour D) $2\frac{1}{2}$ hours E) NOTA

6. Kim and her pet poodle Woolfey went for a hike on a 6 mile trail. Kim walked at a constant rate of 4 miles per hour, and the entire time Woolfey continuously ran back and forth between Kim and the end of the trail at a constant rate of 7 miles per hour. How many miles did Woolfey run by the time Kim reached the end of the trail?

   A) 10.5 B) 12.6 C) 15 D) 24 E) NOTA

7. An auditorium has seats for 400 people. Tickets to attend a school play cost $3.00 per person. The director estimates that for each increase of 25 cents in ticket price, 20 fewer people will attend. What ticket price will maximize the income in ticket sales?

   A) $3.50 B) $4.00 C) $4.20 D) $5.0 E) NOTA

8. A ten-liter tank is full of a solution that is 50% iodine. If a certain amount of this solution is removed, and then replaced by pure water, the resulting solution will be 40% iodine. How many liters of the original solution were removed?

A) 1 B) 2 C) 3 D) 4 E) NOTA

9. Calvin wrote a book of his memoirs of Mu Alpha Theta. He hand-numbered the 913 handwritten pages of the original manuscript. How many times did Calvin write the digit 5?

A) 181 B) 182 C) 189 D) 281 E) NOTA

10. The average of the scores on a certain test is directly proportional to the square of the number of hours spent studying. Given that the average test score was 75 when the study time was 2 ½ hours, what would be the test score that corresponds to study time of 2 hours 45 minutes? (Round the test score to the nearest whole number.)

A) 78 B) 84 C) 89 D) 91 E) NOTA

11. Two positive numbers are in the ratio of 9:13. If the smaller number is decreased by 5, and the larger number is decreased by 11, the resulting ratio is equal 5:7. What is the original larger number?

A) 130 B) 119 C) 65 D) 39 E) NOTA

12. Rachael emptied her purse and found she had nickels, dimes, and quarters totally $1.85. She had twice as many dimes as quarters, and twice the number of dimes exceeded the number of nickels by two. She then spent all her nickels on a candy bar. How much money did she have left?

A) $1.70 B) $1.55 C) $1.35 D) $1.30 E) NOTA

13. Lisa has a square picture that she is going to center on a rectangular background made out of velvet. The dimensions of the rectangle of velvet are such that the length is 3 more than twice the width and the width is 3 times the measure of a side of the square picture. The area of the picture is 16 square inches. Find the width of the frame, in inches.

A) 8 B) 12 C) 27 D) 30 E) NOTA

14. If Brandi scores a 98% on her next Stat test, her average will be 83%. If, however, her grade on the next test is 66%, then her average will be 79%. How many tests has Brandi already taken?

A) 7 B) 8 C) 9 D) cannot tell E) NOTA

15. If it takes Sammy 12 minutes to cut a board into four pieces, how long would it take him to cut the same type board into 10 pieces?

A) 30 minutes B) 32 minutes C) 40 minutes D) 50 minutes E) NOTA

16. The minute hand of a circular clock extends from the exact center to the edge of the clock, a length of 6 inches. A ladybug is on the very tip of the minute hand, just enjoying the ride. What distance will the ladybug have traveled from 2:40 am until 3:20 am? Leave your answer in terms of π.

A) 4π inches B) 6π inches C) 8π inches D) 12π inches E) NOTA

17. It's time for another clock question. At what time between 8:00 am and 9:00 am are the hour and the minute hands coinciding? Round your answer to the nearest minute.

A) 8:44 am B) 8: 45 am C) 8:46 am D) 8: 47 am E) NOTA

18. Sixty-five schools planned to attend the 2014 National convention at the Doubletree. In choosing the theme park to visit, 36 chose Harry Potter world, 31 chose Universal, and 17 chose Magic Kingdom. Fifteen schools went to both Universal and HP, seven went to both Universal and MK, and eight went to HP and MK. No schools went to all three parks. There were some schools that decided to sleep late, study more, just hang out at the Doubletree pool and not go to any theme parks. How many schools chose not to go to any theme parks?

A) 2 B) 4 C) 9 D) 11 E) NOTA

19. An open box is made by cutting a square with side length 3 inches from each corner of a square piece of aluminum. If the volume of the box must be 972 cubic inches, what must the side length of the original piece of aluminum be?

A) 18 inches B) 21 inches C) 24 inches D) 27 inches E) NOTA

20. What is the total surface area (in square inches) of a cube with 6" edges, if the cube has a right circular cylindrical hole with a 2 inch diameter cut through it from one face to the opposite face?

A) 216 +10π B) 216 +12π C) 216 +14π D) 216 - 2π E) NOTA

21. The length of a diagonal of a closed rectangular box is 10. The total surface area of the box is 224. Find the sum of the lengths of all the edges.

A) 18 B) 36 C) 72 D) 112 E) NOTA

22. A parabolic arch is constructed so that it has a width of 16 feet and a maximum height of 10 feet. What is the height of the arch 2 feet from the edge?

A) $5\frac{5}{8}$ B) 5 ft C) $4\frac{3}{8}$ D) 4 ft E) NOTA

23. A rectangular lot that is bordered on one of its sides by a straight river has an area of 2100 sq. m. To fence the three sides of the lot that are not on the river requires 130 meters of fence. Which of the following could be the difference between the length and the width of this lot?

A) 25 B) 28 C) 30 D) 35 E) NOTA

24. Just for the fun of it, Randal shaped some play-doh into a perfect sphere with a radius of 6 inches. Then Randal decided to take the sphere and remold it into a rectangular prism with a square base and a height of 6 inches. What was the length of the edge of the base of the cube in inches?

A) $\sqrt{2\pi}$ B) $3\sqrt{2\pi}$ C) $4\sqrt{3\pi}$ D) $12\sqrt{2\pi}$ E) NOTA

25. If each letter is to be used exactly once, how many permutations of the letters in the word FLORIDA exist such that all vowels are adjacent to each other?

A) 840 B) 720 C) 288 D) 96 E) NOTA

26. An arch of a bridge is semi-elliptical, with its major axis horizontal. The base of the arch is 30 feet across, and the highest part of the arch is 10 feet above the horizontal roadway. Find the height of the arch 6 feet from the center of the base.

A) 9 B) $3\sqrt{10}$ C) $2\sqrt{21}$ D) $\sqrt{65}$ E) NOTA

27. If a profit function is defined as $P(x,y) = 3x - 2y$, find the maximum profit possible for the following restraints: $x + y \geq 3$, $3y \leq x + 3$, and $y \geq 2x - 6$.

A) $\frac{21}{5}$ B) 9 C) $\frac{63}{5}$ D) $\frac{87}{5}$ E) NOTA

28. I know the Davis family has five children, and at least one of the children is a girl. What is the probability that they have two girls and three boys?

A) $\frac{10}{31}$ B) $\frac{5}{16}$ C) $\frac{3}{8}$ D) $\frac{20}{31}$ E) NOTA

29. A simplified formula, which describes how the intensity (I) of an earthquake is used to determine the well-known Richter scale (R) value of the earthquake, is $R = \log I$. A recent earthquake in San Francisco registered 4.5 on the Richter scale. Of the following, which is the best approximation of the intensity of this earthquake?

A) 30,000 B) 40,000 C) 42,500 D) 45,000 E) NOTA

30. Mr. and Mrs. Snow traveled to Alaska, where they enjoyed building snowmen in every town they visited. One snowman was so well constructed that Mr. Snow measured it. He found that the snowman was made of 3 spheres, which were placed perfectly tangential, and their diameters were consecutive even integers whose sum is 72 inches. What is the total surface area in square inches of this fantastic mathematical snowman, assuming that it has not melted at all.

A) 576π B) 1024π C) 1440π D) 1736π E) NOTA