

Section "Iztok" – UBM
Christmas Competition – 12.12.2009
11-12 grade

Time - 120 minutes

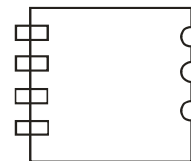
Rules: For each problem from 1 to 50 you receive 1 point and there is only one correct answer.

Organizing committee wishes a successful work!

1. If $\sqrt{x} = 3$ then $x^2 - 1 =$

- (A) 2 (B) 8 (C) 80 (D) 81 (E) 82

2. The figure above is the aerial view of an open parking lot where the rectangles represent the entrances and the circles represent the exits. What is the total number of ways a driver can enter and exit the parking lot?



- (A) 3 (B) 4 (C) 7 (D) 10 (E) 12

3. In the number line above, if segment AD is divided into 3 equal parts by points B and C, which of the following is a possible coordinate for point C?

- (A) 0 (B) 2 (C) 3 (D) 4 (E) 5



4. Tariq has \$10 and wants to buy 21 oranges at \$0.30 each and 12 apples at \$0.50 each. If there is no sales tax, how much more money does he need?

- (A) \$2.00 (B) \$2.30 (C) \$2.60 (D) \$12.00 (E) \$12.30

5. Which of the following equations satisfies the relationship between C and D in the table above?

- (A) $D = C - 3$ (B) $D = 2C$ (C) $D = 2C + 2$ (D) $D = 3C - 1$ (E) $D = 3C + 1$

C	D
-1	-4
1	2
3	8
5	14

6. Kyanna used three pieces of ribbon, each 8 inches long, to make each hair bow for her craft project. Kyanna had a 200-foot spool of ribbon when she started. If no ribbon was wasted, which of the following represents the number of feet of ribbon that was left on the roll after she made g hair bows?

- (A) $200 - 8g$ (B) $200 - 2g$ (C) $200 - g$ (D) $200 - 1/2g$ (E) $200 - 1/4g$

7. The center of a circle is at the origin of a rectangular coordinate plane. If the points $(-3, 0)$, $(0, 3)$, and $(3, 0)$ are on the circumference of the circle, what is the probability that a randomly selected point from within the circle will fall within the triangle formed by those three points?

- (A) $1/4$ (B) $1/\pi$ (C) $1/3$ (D) $\pi/4$ (E) $\pi/3$

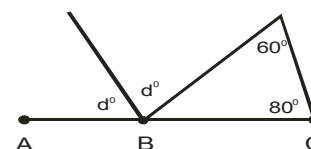
8. In the figure above, D is the midpoint of AE, and $AB = BC = CD$. If $AE = 3$, what is the length of AB?



9. In the figure, if ABC is a straight line, what is the value of d?

10. If $x = (2 - 1/3) + (1/3 - 1/5) + (1/5 - 1/7) + (1/7 - 1/9)$ what is the value of x?

11. If $a > 0$, $b > 3/4$, and $2a + b = 1$, what is one possible value for a?



12. The area of a circle is less than 36π but greater than 25π . If the diameter of this circle is an integer, what is the radius of this circle?

13. If $(x + y)/(x - y) = 7$, what is the value of x/y ?

14. In a recent union poll, 80 percent of the 1,500 union members voted. Of the voting members, 40 percent answered "yes" to a certain yes-no proposal and 125 employees did not respond to that particular proposal. How many employees answered "no" to this proposal?

15. The total cost of a special occasion cake at a particular bakery is the sum of

- (1) a basic fixed charge for baking and decorating the cake
 (2) an additional charge for each layer of cake that is desired.

If the total cost of a 3-layer cake is \$62.50 and the total cost of a 6-layer cake is \$85.00, what is the total cost, in dollars, of a 7-layer cake?

16. If increasing 45 by P percent yields the same result as decreasing 75 by P percent, what is the value of P?

17. A man is laying tiles in his bathroom. He uses five colors of tile: red, blue, yellow, green, and pink, and lays them down in pairs of different colored tiles. If he uses each possible color pair (regardless of order, so red-blue is the same as blue-red) exactly 3 times, how many total tiles are there in his bathroom?

18. A certain car needs 15 gallons to travel 300 miles. At this rate, how many gallons are needed to travel 500 miles?

- (A) 16 (B) 20 (C) 25 (D) 30 (E) 35

19. If $8 \times 27 \times 64 = r^3$, what is the value of r?

- (A) 6 (B) 12 (C) 18 (D) 24 (E) 32

20. If $a^2 - 16 = b^2$, and $2a = 10$, which of the following could be a value for b?

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

21. If from the sequence of numbers below, a new sequence is created by increasing each odd-valued term by 3 and decreasing each even-valued term by 2, the sum of the terms of this new sequence is how much greater than the terms of the original sequence?

3, 8, 13, 18, 23, 28, 33, 38

- (A) 4 (B) 6 (C) 8 (D) 10 (E) 12

22. Which of the following equations best describes the curve in the figure above?

- (A) $y=x^2-2$ (B) $y=x^2+2$ (C) $y=-x^2$ (D) $y=1-x^2$ (E) $y=2-x^2$

23. In the figure, what is the value of $r-s$?

- (A) 50 (B) 55 (C) 60 (D) 65 (E) 70

24. At a certain company, the annual Winter Party is always held on the second Friday of December. What is the latest possible date for party?

- (A) December 14 (B) December 15 (C) December 18 (D) December 20 (E) December 22

25. If the perimeter of equilateral triangle E equals the perimeter of square S, what is the ratio of the length of a side of square S to the length of a side of triangle E?

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

26. In the graph, if the percent decrease from the 1986 population to the 1988 population was the same as the percent decrease from the 1988 population to the 1990 population, what was the 1990 population in City X?

- (A) 350,000 (B) 320,000 (C) 300,000 (D) 280,000 (E) 250,000

27. Hillary buys a television on a twelve-month installment plan. If each of her first three installments is twice as much as each of her nine remaining installments, and her total payment is \$600, how much is her first installment?

- (A) \$20 (B) \$35 (C) \$40 (D) \$65 (E) \$80

28. Which of the following inequalities best describes the indicated values on the number line above?

- (A) $|x-2| \leq 2$ (B) $|x-2| \geq 2$ (C) $|x| \leq 2$ (D) $|x| \geq 2$ (E) $|x+2| \geq 2$

29. Which of the following equations describes a line perpendicular to the line shown in the diagram?

- (A) $y=x$ (B) $y=x-3$ (C) $y=x+3$ (D) $y=3$ (E) $x=3$

30. In the figure, if $AB=8$, what is the area of triangle BCD?

- (A) 8 (B) 16 (C) 24 (D) 20 (E) 48

31. In the square, what is the value of $s-r$?

- (A) 15 (B) 20 (C) 25 (D) 30 (E) 45

32. When the sum of the odd integers from 5 to 27, inclusive, is subtracted from the sum of the even integers from 8 to 30, inclusive, the result is

- (A) 1 (B) 3 (C) 27 (D) 30 (E) 36

33. In the figure, if rectangle RSTU has a perimeter of 12, what is the area of triangle XYU?

- (A) 12 (B) 15 (C) 18 (D) 21 (E) 24

34. A caterer has 120 slices of bread, 75 slices of ham, and 75 slices of cheese. If she needs to make sandwiches each consisting of 2 slices of bread, 1 slice of ham, and 1 slice of cheese, what is the greatest number of sandwiches she can make?

- (A) 60 (B) 65 (C) 75 (D) 90 (E) 120

35. If $x=1$ and $y=-1$, then $x^2+2xy+y^2=$

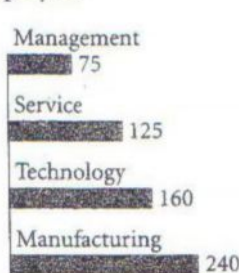
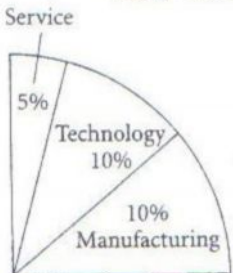
- (A) -1 (B) 0 (C) 1 (D) 2 (E) 4

36. In the figure above, 6 gears are placed next to each other such that if one gear turns, all gears turn. If gear A is turned clockwise, how many of the 6 gears will turn counterclockwise?

- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5

EMPLOYEES BY DEPARTMENT AT COMPANY X

100% = 800 employees



Part-time employees (25%)

Full-time employees (75%)

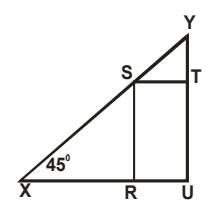
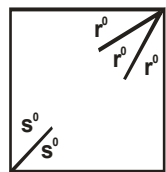
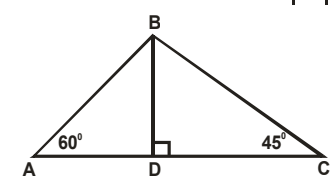
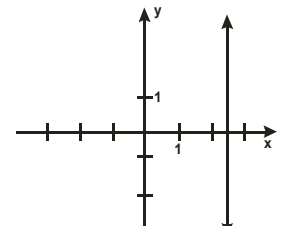
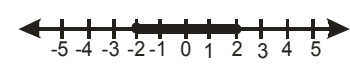
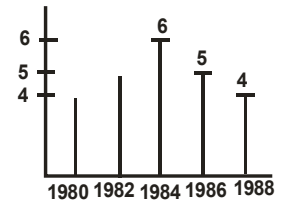
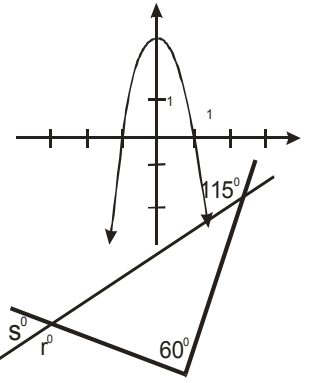
- (A) 100 (B) 200 (C) 300 (D) 400 (E) 500

37. According to the graphs above, the total number of full-time employees is how many more than the total number of part-time employees at Company X

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

38. What percent of all employees at Company X work in the manufacturing department?

- (A) 40% (B) 37.5% (C) 35% (D) 30% (E) 25%



39 If Maurice has \$80.00, and he spends \$32.45 on clothes and gives \$27.55 to his sister, what fraction of the original \$80.00 does Maurice have left?

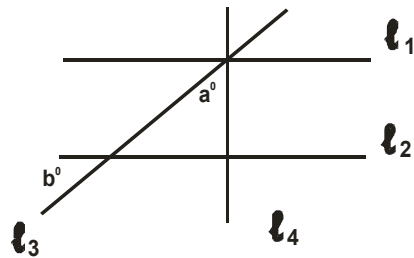
- (A) $1/5$ (B) $1/4$ (C) $3/10$ (D) $1/2$ (E) $3/5$

40 If $x^2 - 4x - 12 = 0$, what is the value of $2x^2 - 8x$?

- (A) 0 (B) 4 (C) 12 (D) 16 (E) 24

41. A “factor-rich” integer is defined as one for which the sum of its positive factors, not including itself, is greater than itself. Which of the following is a “factor-rich” integer?

- (A) 6 (B) 8 (C) 9 (D) 10 (E) 12



42. In the figure, if l_1 is parallel to l_2 and l_4 is perpendicular to l_2 , which of the following must be true?

- I. $l_1 \perp l_4$ II. $a = b$ III. $a + b = 90^\circ$

- (A) I only (B) II only (C) I and II only (D) I and III only (E) II and III only

43. How many hours will it take a hiker, walking at 4 miles per hour, to travel half of the distance that a bicyclist, riding at 12 miles per hour, will travel in two hours?

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

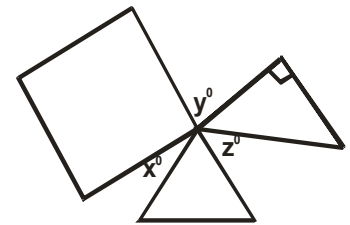
44. Which of the following conditions would make $2a - 2b < 0$?

- (A) $a = b$ (B) $a > 0$ (C) $b > 0$ (D) $a < b$

- (E) $a > b$

45. In the figure, a square, an isosceles right triangle, and an equilateral triangle share the common point D. What is the value of $x + y + z$?

- (A) 165 (B) 170 (C) 175 (D) 185 (E) 195



46. If a and b are integers and $2a + 5b = 15$, which of the following CANNOT be a value of b ?

- (A) -1 (B) 1 (C) 2 (D) 3 (E) 5

47. If $-1 < y < 0$, which of the following is the greatest?

- (A) y^2 (B) $1 - y$ (C) $1 + y$ (D) $2y$ (E) $1/(y + 2)$

48. If set A is $\{3, 5, 7, 11, 19\}$ and set B consists of all the even numbers between 1 and 11, how many elements are in the union of the two sets?

- (A) 0 (B) 10 (C) 11 (D) 19 (E) 30

49. A certain company employs 25 women and 25 men. Some employees drive to work and the rest take public transportation. If 29 employees drive to work, and exactly 6 men take public transportation, how many women drive to work?

- (A) 6 (B) 8 (C) 10 (D) 11 (E) 13

50. Jackie wants to place some photographs into her photo album and discovers that pages 10 through 25, including 10 and 25, are unfilled. If she can place 4 photographs on each unfilled page, what is the total number of photographs she can place on these pages?

- (A) 68 (B) 64 (C) 60 (D) 16 (E) 15

Answers:

1-C; 2-E; 3-D; 4-B; 5-D; 6-D; 7-63.7%; 8-0.5; 9-70%; 10-17/8; 11-a<1/8(for example 0); 12-5.5; 13-4/3;
14-7075; 15-92; 16-25%; 17-D; 18-C; 19-D; 20-E; 21-A; 22-E; 23-E; 24-A; 25-C 25C 26B 27E 28C 29D 30C
31A 32E 33C 34A 35B 36C 37D 38D 39B 40E 41E 42D 43A 44D 45A 46C 47B 48B 49C 50B

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