**Section "Iztok" – UBM**
**Christmas Competition – 09.12.2006**
**11-12 grade**

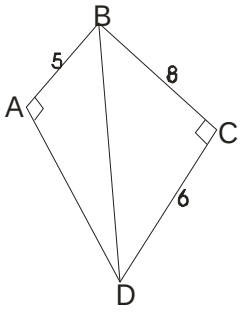
**Time - 120 minutes**

**Rules:** For each problem from 1 to 60 you receive1 point and there is only one correct answer. For each problem from 45 to 60 you have to write the correct answer.

**Organizing committee wishes a successful work!**

**Name**……**School**……**City**……..

1. If $4x+2=26$, then $4x+8=$ a)32 b)34 c)36 d)38 e)40
2. What are all the values of $x$ for which $(x-2)(x-5)=0$? a)–5 b)–2 c) 2 and –5 d) –2 and 5 e)2 and 5
3. If $a+2>5$ and $a-4<1$, which of following could be a value for a? a)2 b)3) c)4 d)5 e)6
4. The four-digit number $7,X7X$ is divisible by 3 if $X$ is replaced by which of following digits?
a)4 b)5 c)6 d)7 e)9
5. If the perimeter of a regular polygon is 21, which of the following could be the length of one side of the polygon? a)6 b)5 c)4 d)3 e)2
6. If Jorge earns \$2000 a month and spends \$600 a month on rent, what percent of Jorge's monthly earigs does he spent on rent? a)25% b)30% c)35% d)40% e)45%
7 If $a$ is an odd negative number and $b$ is a positive even number, which of the following must be even and positive? a) $a+b$ b) $-ab$ c) $ab$ d)$b/a$ e) $b-a$
8. Patty uses 2 gallons of paint to cover 875 square feet of surface. At this rate, how many gallons will she need to cover 4,375 square feet of surface? a) 4 b) 5 c) 8 d) 10 e) 15
9. A rectangular box is 24 inches long, 10 inches wide, and 15 inches high. If exactly 60 smaller identical rectangular boxes can be stored perfectly in this larger box, which of the following could be the dimensions, in inches, of these smaller boxes? a) 2 by 5 by 6 b) 3 by 4 by 6 c) 3 by 5 by 6 d) 4 by 5 by 6 e) 5 by 6 by 12
10. If the sum of 4 numbers is between 53 and 57, then the average (arithmetic mean) of the 4 numbers could be which of the following? a) $11\frac{1}{2}$ b) 12 c) $12\frac{1}{2}$ d) 13 e) 14




11. In quadrilateral ABCD above, if CD = 6, BC = 8, and AB = 5, what is the length of AD? a) 4 b) $3\sqrt{5}$ c) $5\sqrt{3}$ d) 10 e) 15
12. In a coordinate plane, if points C(2,5), D(-1,2), and E($x$,$y$) lie on line l, which of the following could be the coordinates of point E? a)(0,1) b)(1,1) c) (0,2) d)(1,3) e) (1,4)
13. If the fraction $\frac{1}{21}$ equals the repeating decimal .0476190476190…, what is the 51st digit after the decimal point of the repeating decimal? a) 0 b) 1 c) 4 d) 6 e) 7
14. Sharon Has exactly 6 quarters, 5 dimes, and 10 nickels in her pocket. She pulls out a coin at random and puts it aside since the coin is not a quarter. If she pulls out a second coin at random from her pocket, what is the probability that the second coin is a quarter?
a) $\frac{3}{7}$ b) The answer can not be determined from this information c) $\frac{3}{11}$ d) $\frac{6}{19}$ e) $\frac{1}{4}$
15. If $a$ is a nonzero integer and $b$ is not an integer, which of the following could be an integer?
a) $a+b$ b) $a-b$ c) $ab$ d) $2a-b$ e) $b/a$
16. The daily cost of running a certain air conditioner is 12 cents per hour for the first 8 hours, and 10 cents per hour for each additional hour over 8 hours. Which of the following expressions represents the cost, in dollars, of running this air conditioner for h hours each day, for 90 days, if $8<h<24$? a) 90(.12) + 9(h-8)
b) 90(.12)h + h-8 c) 90(.12)h + 9(h-8) d) 90(.12)(8) + 9(h-8) e) 90(.12)(8) + (h-8)
17. If the lengths of the sides of a certain triangle are a, b, and c, which of following statements could be true?
a) c=b+a b) c=b-a c) c=2a+b d) c+2=a+b+3 e) c+3=a+b+2
18. If $xy>0$, $\frac{1}{x}+\frac{1}{y}=5$, $\frac{1}{xy}=6$, then $\frac{x+y}{5}=$ a)1/25 b)1/6 c)1/5 d)5 e)6
19. At a basketball tournament involving 8 teams, each team played 4 games with each of the other teams. How many games were played at this tournament? a)64 b)98 c)112 d)128 e)224
20. The lengths of two sides of a triangle are (x-2) and (x+2), where $x>2$. Which of the following ranges includes all and only the possible values of the third side y? a)$0<y<x$ b)$0<y<2x$ c)$2<x<y$ d)$4<y<x$ e)$4<y<2x$

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21. Which of the following is the equivalent of the statement that three-fourths of the cube of *a* plus the value of *b* divided by the square of *c* equals *a*?

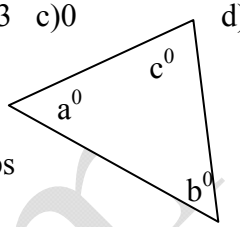
a) $(-a)^3 + b - c^2 = a$ b) $\frac{3}{4}a^2 + \frac{b}{c} = a$ c) $\frac{3a^3}{4} + \frac{b}{c^2} = a$ d) $\frac{3}{4}a^3 + \frac{b}{c} = a$ e) $\frac{3}{4}a^3 + bc^2 = a$

22. A car rental agency charges $40 per day for the first 7 days, and $35 a day for each day after that. How much would Joe be charged if the rented a car for 10 days? a)$375 b)$385 c) $395 d)$405 e)$415

23. If 8a<3b and 3b<10c, which of following is true? a) 8a<10c b)10c<8a c)c<a d)8a=10c e)8a+1=10c

24. If g(t)=2t–6, then at what value of t does the graph on g(t0 cross the x-axis? a)–6 b)–3 c)0 d)2 e)3

25. In the figure, if a=7c and b=2c, what is the value of c? a)18 b)20 c)28 d)34 e)36




26. The number of tulips that Samantha grows each season varies directly with the age of her daughter Kim. If Samantha grew 16 tulips when Kim was 10 years old, how many tulips will she grow when Kim is 25 years old? a)25 b)26 c)30 d)40 e) 45

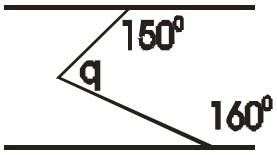
| g | h |
|---|---|
| 2 | 10 |
| 4 | j |
| j | k |

27. In the table, if h=3g+4, what is the value of k?
a)12 b)16 c)27 d)36 e)52

28. Tameka cleans her house every 7 days and does laundry every 5 days. In the next 315 days, how many times will she have to clean her house and do laundry on the same day?
a)9 b)12 c)26 d)45 e)63

29. In the length of one side of triangle is 5, which of the following cannot be the lengths of the other two sides of the triangle? a) 3 and 3 b)3 and 5 c)7 and 8 d)7 and 3 e)7 and 12

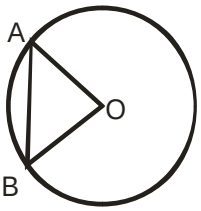
30. Line *l* has an undefined slope and contains the points (-2, 3) and (0,1}. Which of the following points is also on line *l*?
a) (0,3) b) (5, 5) c) (0, 0) d) (3, -2) e) (-2, 5)




31. In the figure right, *l* || *m*. What is the value of *q*? a) $40^0$ b) $50^0$ c) $60^0$ d) $70^0$ e) $80^0$

32. If $x^6+4=x^6+w$, then w= a)–4 b) $-\sqrt[6]{4}$ c) $\sqrt[6]{4}$ d)4 e)$4^6$

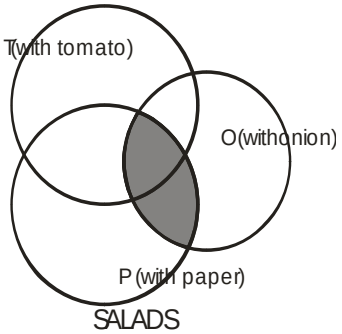
33. Point O is the center of the circle in the figure right. If angle AOB = $70^0$, what is the measure of angle ABO? a) 40 b) 50 c) 55 d) 70 e) 110




34. For all positive integers $f$ and $g$, let $f\#g$ be defined as $\frac{f+2g}{f-2g}$. What is the value of $1007\ \#\ 3.5$? a) 1014 b) 1.014 c) 10.14 d) 10,140 e) 101,400

| A | | | B |
|---|---|---|---|
| | | | |
| | | | |
| D | | | C |

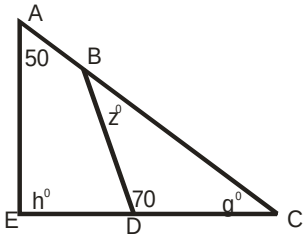
35. In the figure left, a square with side length 8 is divided into 16 squares. What is the area of the circle (not shown) that passes through points A, B, C, and D, which are the centers of the four corner squares?
a) $\sqrt{2}\pi$ b) $2\sqrt{2}\pi$ c) $3\sqrt{2}\pi$ d) $9\pi$ e) $18\pi$




36. In the figure above, circular region O represents salads with onions, circular region P represents salads with pepper, and circular region T represents salads with tomato. What does the shaded region represent? a) Salads with tomatoes, onions, and peppers. b) Salads with onions and peppers, but without tomatoes. c) Salads with onions and peppers (some possibly with tomatoes). d) Salads with onions and tomatoes (some possibly with peppers). e) Salads with peppers and tomatoes (some possibly onions)

37. While away at school, Eileen receives an allowance of $400 each month, 35 percent of which she uses to pay her bills. If she budgets 30 percent of the remainder for shopping, allots $130 for entertainment, and saves the rest of the money, what percentage of her allowance is she able to save each month? a) 2.5% b) 13% c) 20% d) 35% e) 52%

38. In the figure right, line $\overline{BD}$ crosses $\angle ACE$, what is the value of $h$ in terms of $z$?
a) $20+z$ b) $20+2z$ c) $20-2z$ d) $140-z$ e) $140+z$




39. The lines are equally spaced on the number line. What is the value of $P-Q$?


a) $\frac{1}{5}$ b) $\frac{1}{4}$ c) $\frac{2}{5}$ d) $\frac{2}{4}$ e) $\frac{3}{5}$

40. If *a* number is rounded to 16.8, which of the following could have been the original number? a) 16 b) 16.704 c) 16.763 d) 16.873 e) 17

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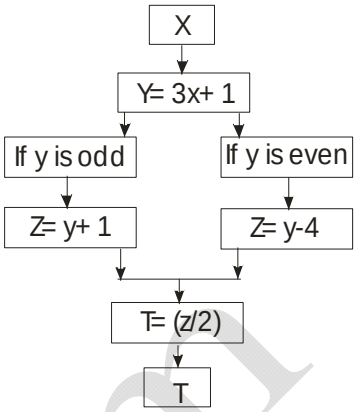
41. If $f(x)=\sqrt{x^2-4}$, then $f(x)$ is undefined for which of the following values of *x*? a) -6 b) -4 c) -2 d) 0 e) 2

42 A person selects a positive integer *x* and follows the steps in the diagram right to get *t*. Which of following statements must be true?

I. $t>0$ a) I only d) II and III only

II. *z* is even b) II only e) I, II, and III

III. *t* is even c) I and II only




43. If $3a+5b-4c=12$ and $a+3b-2c=-4$, what is the value of $a-b$?

a) 4 b) 8 c) 16 d) 20 e) The answer can not be determined from this information.

44. If *k* friends contribute *d* dollars each, and that money is distributed equally among *c* number of charities, how much money is received by each charity?

a) $\frac{kd}{c}$ b) $\frac{c}{dk}$ c) $dk+c$ d) $\frac{dc}{k}$ e) $(k-c)d$

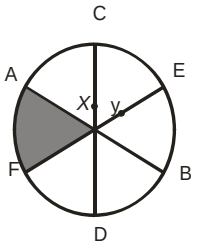
45. On a cruise, 80 percent of the 3,000 passengers were married. Of these married passengers, 60 persent had been married less than a year, and 200 had been married more than 10 years. How many had been married 1-10 years?

46. In a class of 720 students, 35% are boys. How many girls are in the class?

47. To borrow a single book from a lending library, Mr. Brown was charged $2 for 2 weeks, plus a fine of $.15 per day for every day he was late returning it. If he paid a total of $4.55, how many days did he have the book?

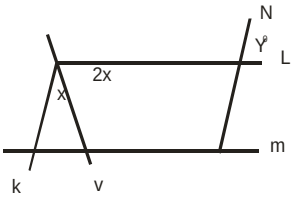
48. If (&j) is the least prime integer greater than j, and (@j) is the greatest even integer less than j, what is the value of [&(-1.32)]-(@3.481)?

49. The perimeter of rectangular plot of land is 300 meters. If the length of one side of the plot is 55 meters, what is of the plot, in square meters?




50. What is the slope of a line that passes through the points (0,1) and (-5,-1)?

51. In the figure right, *k* is parallel to *n* and *l* is parallel to *m*. If $37^0<x<40^0$, what are the possible values of *y*?




52. In the figure left, $\overline{AB},\overline{CD}$, and $\overline{EF}$ are diameters of the circle. If $y=3x+10$ and the shaded area is ¼ the area of the circle, what is the value of *x*?

53. Find the number of the real roots of the equation $\frac{1}{x}+\frac{1}{\sqrt{x}}=0$

54.If A(-1;2) and B(2;-1), where A and B are two points in the coordinate plane, then what is the length of segment AB?

55.An operation $*$ on the numbers $a$ and $b$ is defined by the formula $a*b=2(a=2b)$. For what values of $x$ and $y$ is $x*y=y*x$?

56.A circle with center (-3;4) is tangent to the x-axis. Which are the points of intersection of the circle with the y-axis?

57.If $|x|^2-|x|-6=0$, then what is $x$?

58.For what value of $c$ will $2x^2-3x+c=0$ have one and only one real root?

59.If $f(x)=x+1$ and $g(x)=x^2-1$, for what value(s) of $x$ does $g(f(x))=0$?

60.If $(a^x)^{2/3}=\frac{1}{a^2}$ then what is $x$?

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1a 2e 3c 4b 5d 6b 7b 8d 9a 10e 11c 12e 13e 14b 15c 16d 17e 18e 19c 20e 21c 22b 23a 24e 25a 26d 27e 28a 29e 30? 31b 32d 33c 34c 35e 36c 37b 38a 39? 40c 41d 42a 43d 44a

**45** 760, **46** 768, **47** 31, **48** -3, **49** 4225, **50** 0,4, **51** 60<y<69, **52** 20 **53** 0 **54** $3\sqrt{2}$ , **55** $x = y$ ,**56** $\left(0;4\pm\sqrt{7}\right)$

**57** 3 and -3, **58** 1,125, **59** 0 and -2, **60** -3

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