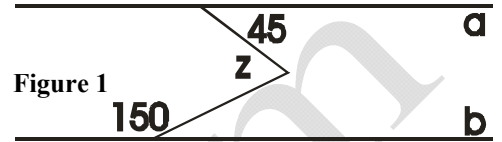**Time - 120 minutes**
Rules: For each problem from 1 to 50 you receive1 point and there is only one correct answer.
Organizing committee wishes a successful work!
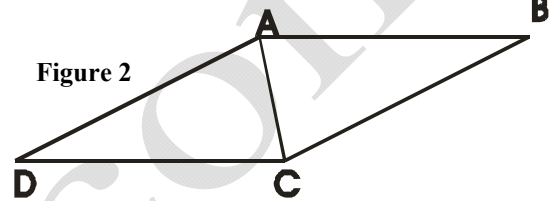Name…………………………………………..School…………………………….City……………………..

Зад.1 In the figure 1, lines *a* and *b* are parallel. The angle *z* is equal to:
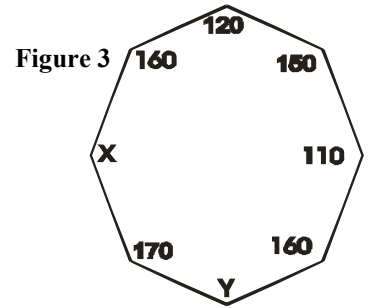a) 30   b) 45   c) 90   d) 75   e) 60

Зад.2 Two congruent isosceles triangles with lateral sides equal to 10 units and base equal to 12 units are glued alongside their bases (see fig.2). The area of *ABCD* in square units is equal to:
a) 96   b) 120 c) 240 d) 60 e) 72

Зад.3 If *a*:*b*=4; *a*=8*c*; *c*=9 then *b* equals:
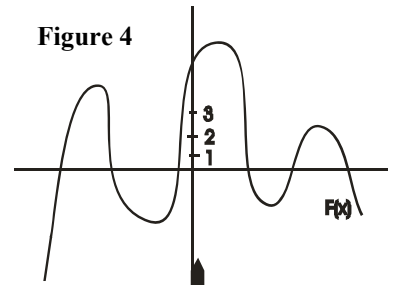a)2   b) 8   c)18   d) 36   e)72

Зад4. In figure 3 the value of *X*+*Y* equals :
a) 180 b) 210 c)220 d) 360 e) it cannot be determined
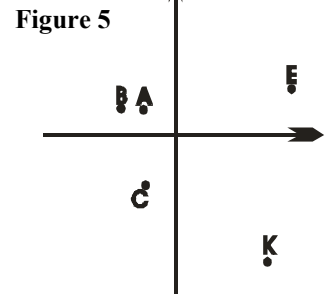
Зад.5 If $4^x=8^{x-1}$ then *x* equals:
a) 1   b) 2   c) 3   d) 4   e) 0

Зад. 6 Let <<x<< be defined for all positive integers *x* as the product of all odd factors of 3*x*. What is <<7<<?
a) 441 b) 21   c) 3087   d) 148 e) 63

Зад.7 Find the number of the roots of the equation *F*(*x*)=3, if the graph of *F*(*x*) is shown on the figure 4.
a) 6   b) 5   c) 4   d) 3   e) 2

Зад.8 For which point on the figure 5 the sum of its coordinates is the least?
a) A   b) B   c) C   d) E   e) K

Зад.9 If *x*>0, *y*>0 and $x\#y=\dfrac{x+2y}{x-2y}$ then 1007#3.5 equals:
a) 1004   b) 1,014 c) 10,14   d) 10,140   e) 101,400

Зад 10 Elena's salary equals $400. 35% of the salary pays the rent of her apartment, 30% pays her education and she spends $130 for shopping. What percentage of her salary does she spare?
a) 2,5%   b) 13%   c) 20%   d) 35%   e)52%

Fig. 6 shows the increasing of the production of a manufacturer company during 1995 – 2003г. The following 4 problems use information from fig. 6.

Зад 11 What is the percentage of 1997 production as part of 1999 production?
a) 25% b) 35% c) 40%   d) 50% e) 80%

Зад 12 What is the percentage of 2002 production as part of 1998 production?
a) 200% b) 300% c) 340%   d) 450% e) 150%

Зад.13 What is the percentage of the increase of the production in 1998 in comparison with 1997?
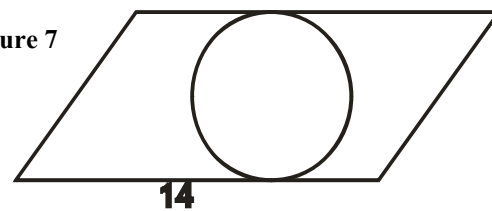a) 25% b) 35% c) 40%   d) 50% e) 80%

Figure 1

Figure 2

Figure 3

Figure 4
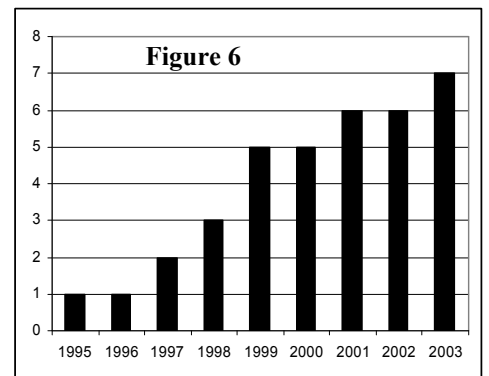
Figure 5

Figure 6

Зад.14 What is the arithmetical mean quantity of production for the considered period?
a) 4   b) 5,(3)   c) 4,2   d) 3,25   e) 3,9

Зад.15 In the figure 7 the circle is tangent to two of the sides of the parallelogram with area 168 square units. What is the area in square units of the circle?
a) 12π b) 26π c) 36π d) 49π e) 144π

Figure 7

Зад.16 What is the angle between the hands of a clock at 9:15?
a) $162^0 30$'   b) $172^0 30$'   c) 180 d) 150^0 e) 175^0

Зад.17 In the figure 8 the segment $CD=4$. The parameter a equals:
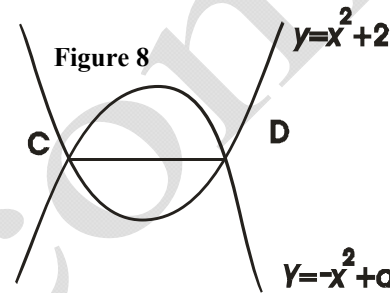a) 2   b) 4   c) 5   d) 8   e) 10

Зад.18 If $x^2+x=20$ then x^2-x could equal:
a) –30   b) 20   c) 30   d) 40   e) 450

Figure 8

Зад.19 If α and β are angles in a triangle and
$\cot g\beta - \cot g\alpha = \sin^2 \alpha \cot g\beta - \sin^2 \beta \cot g\alpha$ determine the type of the triangle.
a) equilateral triangle   b) right triangle   c) right or isosceles triangle
d) acute triangle with an angle 60   e) it cannot be determined

Зад.20 Solve the inequality $|1-|x||>1$
a) $x\in(-\infty;0)\cup(2;+\infty)$ b) $x\in(-\infty;-2)\cup(2;+\infty)$ c) $x\in(-\infty;2)$
d) $x\in(-\infty;-2)\cup(0;+\infty)$ e) $x\in(-\infty;+\infty)$

Зад.21 The number of the whole roots of the equation $x^2=|x|$ is:
a) 0   b) 1   c) 2   d) 3   e) 4

Зад 22 The sum of the numbers of several houses between two crossings of a street equals 51. What is the largest possible number that a house could have?
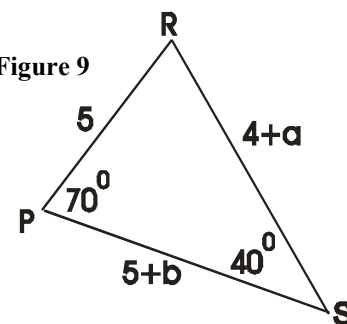
a) 18   b) 3   c) 51   d) 17   e) 21

Зад. 23 Which of the following has two different axis of symmetry?
a) T   b) S   c) I   d) A   e) B

Figure 9

Зад.24 Which of the following is true for the triangle in figure 9?
a) $a=b$ b) $\angle P=\angle S$ c) $a=b+1$ d) $a<b$ e) $b=a+1$
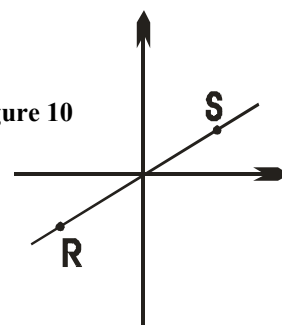
Зад.25 In figure 10 line RS passes through the origin of the xy-plane. If S has coordinates (9;6) и абсцисата на R е –6, каква е ординатата на R.
a) – 9   b) –6   c) –4   d) –3   e) –2

Зад.26 In figure 11, $S=70^0$. Find T.
a) 20^0 b) 30^0 c) 40^0 d) 60^0 e) 70^0

Зад.27 Which of the following number is divisible by 36?
a) 1111112   b) 2211112   c) 2111112   d) 22222222   e) 1111122

Figure 10

Зад.28 At a discount sell-off the price of a suit was reduced by $15, which represents 10% of its original price. What was the original price?

a) $100   b) $120   c) $150   d) $170   e) $200

Зад.29 The number of all three digit numbers whose product with a two digit number having 9 as its first digit equals a four digit number with second digit 2 is equal to:

a) no such numbers   b) 2   c) 3   d) 4   e) 8

Figure 11
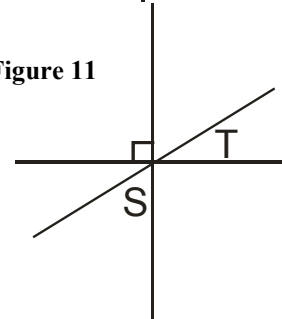
Зад.30 After three games of bowling Carroll's mean result is 138 and her best achievement was 24 points greater than the mean. What of the following could not be determined on the base of this information?
a) Carroll's weakest achievement   b) Carroll's best achievement
c) the sum of the two weakest Carroll's achievements

d) the sum of the three Carroll's results
e) the difference between her best result and the mean result of the three games

Зад.31 The sum of 4 consecutive odd integers w, x, y, and z is 24. What is the median of the set {w,x,y,z,24}?

a) 3   b) 5   c) 7   d) 9   e) 24

Зад.32 If rstv=1 and stuv=0, which of the following must be true?

a) r<1   b) s<1   c) $t<\dfrac{1}{2}$ d) u=0   e) v=0

Зад.33 If $2^{2x}=8^{x-1}$, what is the value of x?

a) 2   b) 3   c) 4   d) 5   e) 6

Зад.34 If a+2(x+1)=s, what is x+1, in terms of *s* and *a*?

a) $\dfrac{s}{2a}$ b) $\dfrac{s-a}{2}$ c) $\dfrac{s+a}{2}$ d) $\dfrac{s}{2}$-a   e) $\dfrac{s}{2}$+a

Зад.35 The least integer of a set of consecutive integers is -25. If the sum of these integers is 26, how many integers are in this set?

a) 25   b) 26   c) 50   d) 51   e) 52

Зад.36 If 30 percent of 40 percent of a positive number is equal to 20 percent of *w* percent of the same number, what is the value of w?

a) 80   b) 60   c) 50   d)15   e) 10

Зад.37 Carlos delivered *n* packages on Monday, 4 times as many packages on Tuesday as on Monday, and 3 more packages on Wednesday than on Monday. What is the average (arithmetic mean) number of packages he delivered per day over the three days?

a) 2n-3   b) 2n-1   c) 2n+1   d) 2n+3   e) 6n+1

Зад.38 If *a* and *b* are odd integers, which of the following must also be an odd integer?

   I.   (a+1)b

   II.   (a+1) + b

   III.   (a+1) – b

a) I only   b) II only   c) III only   d) I and II   e) II and III

Зад.39 In the *xy*-plane, the line with equation y=5x-10 crosses the *x*-axis at the point with coordinates (a,b). What is the value of *a*?

a) -10   b) -2   c) 0   d) 2   e) 5

Зад.40 Line *l* has a positive slope and passes through the point (0,0). If line *k* is perpendicular to line *l*, which of the following must be true?

a) Line *k* passes through the point (0,0).

b) Line *k* has a positive slope.

c) Line *k* has a negative slope.

d) Line *k* has a positive *x*-intercept.

e) Line *k* has a negative *y*-intercept.

Зад.41 If m is the greatest prime factor of 38 and n is the greatest prime factor of 100, what is the value of $m + n$?

a) 7   b) 12   c) 24   d) 29   e) 44

Зад.42 If $18\sqrt{18} = r\sqrt{t}$, where r and t are positive integers and $r > t$, which of the following could be the value of rt?

a) 18   b) 36   c) 108   d) 162   e) 324

Зад.43 If p is an integer and 3 is the remainder when $2p+1$ is divided by 5, then p could be:

a) 2   b) 3   c) 4   d) 5   e) 6

Зад.44 The lengths of the sides of a right triangle are consecutive even integers, and the length of the shortest side is x. Which of the following equations could be used to find x?

a) $x + x + 1 = x + 2$ b) $x^2 + (x+1)^2 = (x+2)^2$ c) $x^2 + (x+2)^2 = (x+4)^2$

d) $x + x + 2 = x + 4$ e) $x^2 = (x+2)(x+4)$

Зад.45 For which of the following functions is $f(-3) > f(3)$?

a) $f(x) = 4x^2$ b) $f(x) = 4$ c) $f(x) = \dfrac{4}{x}$ d) $f(x) = 4 - x^3$ e) $f(x) = x^4 + 4$

Зад.46 The first term in the sequence $7, 15, 31, 63, \ldots$, is 7 and each term after the first is determined by multiplying the preceding term by m and then adding p. What is the value of m?

a) 1   b) 2   c) 3   d) 4   e) 9

Зад.47 For how many ordered pairs of positive integers (x,y) is $2x + 3y < 6$?

a) one   b) two   c) three   d) five   e) seven

Зад.48 If x and y are positive consecutive odd integers, where $y > x$, which of the following is equal to $y^2 - x^2$?

a) $2x$ b) $4x$ c) $2x + 2$ d) $2x + 4$ e) $4x + 4$

Зад.49 If $8 + \sqrt{k} = 15$, then $k =$

a) 7   б) 49   в) 529   г) $\sqrt{7}$ д) $\sqrt{23}$

Зад.50 If a, b and c are different positive integers and $2^a \cdot 2^b \cdot 2^c = 64$, then $2^a + 2^b + 2^c =$

a) 14   b) 17   c) 21   d) 28   e) 34

Отговори 1г; 2а; 3в; 4б; 5в; 6а; 7в; 8д; 9б; 10а; 11в; 12а; 13г; 14а; 15в; 16в; 17д; 18в; 19в; 20б; 21б; 22а; 23в; 24в; 25в; 26а; 27б; 28в;29г; 30а; 31в; 32г; 33б; 34б; 35д; 36б; 37в; 38д; 39г; 40в; 41в; 42в; 43д; 44в; 45г; 46б; 47а; 48д; 49б; 50а;