

(районная математическая олимпиада 2014 г.)

10 класс

1.

900

300

?

$u, v$

900

$L-900$  ( )

$$\frac{u}{v} = \frac{900}{L-900}$$

$L+300$

$2L-300$

$$\frac{u}{v} = \frac{L+300}{2L-300}$$

$$\frac{900}{L-900} = \frac{L+300}{2L-300}$$

$$900(2L-300) = (L+300)(L-900)$$

$$1800L - 270000 = L^2 - 600L - 270000$$

$$L^2 - 2400L = 0$$

$$L = 2400 -$$

1800

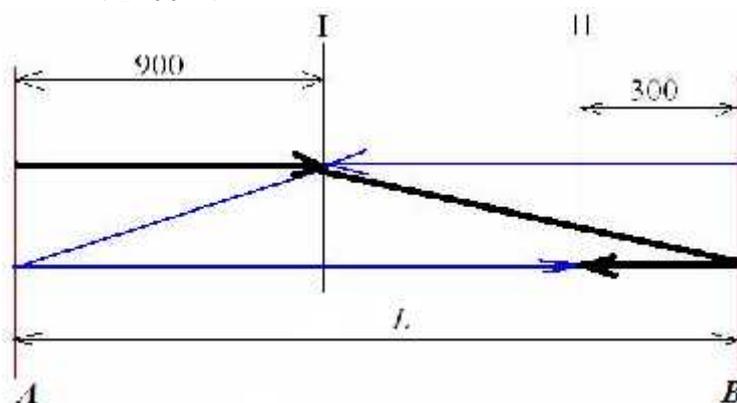
900

1800 300

$$L = 900 + 1800 - 300 =$$

2400 ( )

: 2400



2.

$$x^2 + 2x \sin(xy) + 1 = 0.$$

$x$ ,  $4\sin^2(xy) = 1$ .  
 $\sin^2(xy) = 1$ ,  $\therefore \sin(xy) = \pm 1$ .  $\sin(xy) = 1$ .  
 $x^2 + 2x + 1 = 0$ ,  $x = -1$ ,  $\sin(-y) = 1$ ,  $\therefore y = -\pi/2 + k$ ,  
 $k \in \mathbb{Z}$ .  $\sin(xy) = -1$ .  $x^2 - 2x + 1 = 0$ ,  $x = 1$ ,  
 $\sin(y) = -1$ ,  $\therefore y = -\pi/2 + k$ ,  $k \in \mathbb{Z}$ .  
 $\therefore x = \pm 1, y = -\pi/2 + k, k \in \mathbb{Z}$ .

**3.**  $\sqrt{a+b\sqrt{2}}$ ,  $a, b$  — ,  
 $\sqrt{c+d\sqrt{7}}$ ,  $c, d$  — ,  
 ?

$$\sqrt{A+B\sqrt{2}} + \sqrt{A-B\sqrt{2}} = \sqrt{C+D\sqrt{7}}$$

$$2A + 2\sqrt{A^2 - 2B^2} = C + D\sqrt{7}$$

$A = 3, B = 1, C = 6, D = 2$ ,  $A^2 - 2B^2 = 7$ ,  $C = 2A$ ,  
 $D = 2$ .  
 $\sqrt{3+\sqrt{2}} + \sqrt{3-\sqrt{2}} = \sqrt{6+2\sqrt{7}}$

**4.**  $170$  ,  $35$  ,  
 $n$  .  
 $180$  .  
 $(n-36) \cdot 180$  ,  $36$  ,  $170$  (  $n - 36$  ,  $36 \cdot 170$  )  
 $(n-2) \cdot 180 < 36 \cdot 170 + (n-36) \cdot 180$  .  
 $34 \cdot 180 < 36 \cdot 170$  ,  
 $170$  ,  
 $36$  ,  
 $360$  .

**5.**  $6$  ( ? ,  
 ).  
 ?

$$6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 = 720.$$

,

,

?

—

$$6 \cdot 4 = 24$$

.

24

,

,

30.