

**Problems 3 points each**

1. In *Math Kangaroo* competition Eva had the 50<sup>th</sup> best result, which turned out to be also the 50<sup>th</sup> poorest result. How many students took part in the competition, if each student had a different score?

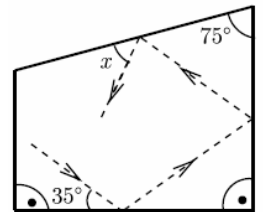
- A) 50            B) 75            C) 99            D) 100            E) 101

2. The product of the reciprocals of fractions:  $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \dots, \frac{2003}{2004}, \frac{2004}{2005}$  is equal to:

- A) 1            B)  $\frac{1}{2005}$             C) 2005            D)  $2005^2$             E)  $\frac{1}{2005^2}$

3. Diagram illustrates the path of a billiard ball that hit the edge of a particular table at 35° angle in the way shown in the picture. The measure of angle x is equal to:

- A) 35°            B) 40°            C) 45°            D) 50°            E) 60°



4. Two different kind of bricks were produced. The dimensions of one kind are 10cm x 12cm x 14 cm and the dimensions of other are 12cm x 14cm x 16cm. By what percent is the volume of the larger brick greater than the volume of the smaller brick?

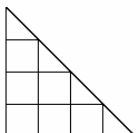
- A) by 20%            B) by 30%            C) by 40%            D) by 50%            E) by 60%

5. Eighteen students participated in a table tennis contest. The students were divided into pairs numbered from 1 to 9. Each pair with an even number consisted of a boy and a girl and each pair with an odd number consisted of two boys. How many boys participated in the contest?

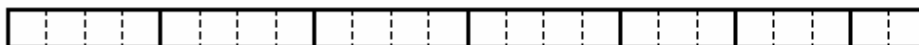
- A) 10            B) 12            C) 14            D) 11            E) 18

6. How many more triangles than squares are there inside the large triangle shown in the picture?

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



7. A rectangular piece of paper with a length of 24 and a width of 1 (see the diagram below) was cut into smaller pieces along the solid lines. Out of all the pieces, a new rectangle with the smallest perimeter possible was formed. What is the perimeter of the new rectangle?



- A) 14            B) 20            C) 22            D) 24            E) 50

8. A machine produces 8 components in 3 minutes. Any ten consecutive components contains one defective piece. How many non-defective components will the machine produce in 2 hours?

- A) 160            B) 216            C) 240            D) 288            E) 320

9. How many positive integers  $n$  fulfill inequality  $2000 < \sqrt{n(n+1)} < 2005$ ?

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

10. Mother kangaroo and her baby Jumpy are jumping around a stadium with a perimeter of 330 meters. Both make 1 jump every second. The mother's jumps are 5 meters long, while Jumpy's jumps are 2 meters long. Both kangaroos started at the same point and are moving in the same direction. After 25 seconds, Jumpy got tired and stopped while his mother continued to jump. From this time, how long will it take the mother to get to the place where Jumpy stopped?

- A) 15 s            B) 24 s            C) 51 s            D) 66 s            E) 76 s

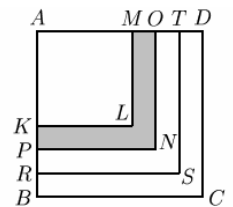
**Problems 4 points each**

11.  $1 + 2 - 3 - 4 + 5 + 6 - 7 - 8 + \dots + 2001 + 2002 - 2003 - 2004 + 2005 =$

- A) 0            B) 2005            C) 1            D) 2004            E) - 4

12. Four squares with sides of lengths that are integers are put one on top of the other in the way shown in the picture. If we know that segments KP, PR and RB have the same length, and that the area of the shaded figure equals 17, then the area of square ABCD equals

- A) 2005            B) 121            C) 169            D) 100            E) 225

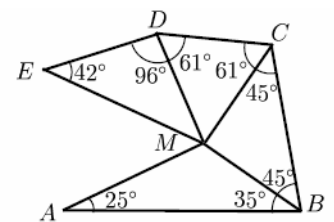


13. A circle was inscribed into a square with each side equal to 10. A rectangle was inscribed into this circle with one of the sides equal to 8. What percent of the area of the square is the area of the rectangle?

- A) 80%            B) 64%            C) 48%            D) 36%            E) 24%

14. Which side of the polygon shown in the picture is the shortest?

- A) DE            B) CD            C) MB            D) AM            E) BC



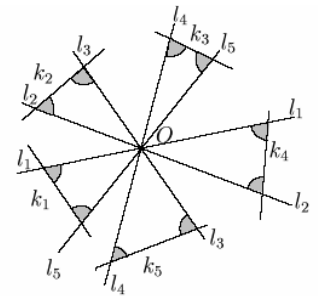
15. There are 17 balls in a bag. Each ball has a number from 1 to 17 on it. We randomly pick a ball from the bag. What is the smallest number of balls we have to pick in order to be sure that we have at least one pair of balls that the sum of the numbers on which is 18?

- A) 7            B) 8            C) 10            D) 11            E) 17

16. Two bottles of the same volume were filled with a mixture of water and juice. The ratios of water to juice in these bottles are 2 : 1 and 4 : 1 respectively. If we pour the mixture from both bottles into one container, the ratio of the volume of water to the volume of juice is equal to:

- A) 11 : 4            B) 6 : 2            C) 6 : 1            D) 15 : 4            E) 8 : 1.

17. Five lines  $l_1, l_2, l_3, l_4, l_5$ , that intersect at point  $O$  are intersected by five other lines  $k_1, k_2, k_3, k_4, k_5$  (see the picture). The sum of the measures of the shaded angles is:

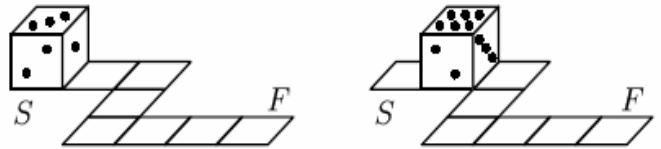


- A)  $300^\circ$       B)  $450^\circ$       C)  $360^\circ$       D)  $600^\circ$       E)  $720^\circ$ .

18. How many four-digit divisors does number  $102^2$  have?

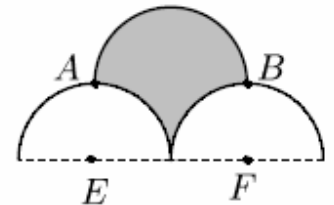
- A) 2      B) 3      C) 4      D) 5      E) 6

19. The sum of the dots on any two opposite sides of a die is equal to 7. The die rolls along the path shown in the diagram. There are 3 dots on top of the die at the starting point. What is the number of dots on top of the die when it gets to the square marked with the letter F?



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

20. There are three semicircles (see the picture). The radius of each of the semicircles equals 2 cm. Quadrilateral  $ABFE$  is a rectangle. Points  $E$  and  $F$  are the centers of the bottom semicircles. The area of the shaded figure given in  $\text{cm}^2$  is equal to:



- A)  $2\pi$       B) 7      C)  $2\pi + 1$       D) 8      E)  $2\pi + 2$ .

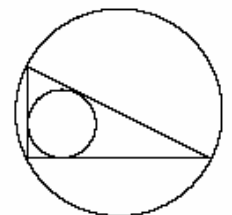
**Problems 5 points each**

21. There are some days when Karol tells only the truth and there are some days when he always lies. Today Karol said 4 from the following sentences:

- A) The number of my friends is a prime number.
- B) I have as many girl friends as boy friends.
- C) My name is Karol.
- D) I always tell the truth.
- E) Three of my friends are older than I am.

Which of the above sentences did Karol not say today? A) B) C) D) E)

22. Let  $a$  and  $b$  represent the lengths of a right triangle's legs. If  $d$  is the diameter of a circle inscribed into the triangle, and  $D$  is the diameter of a circle superscribed on the triangle, then  $d + D$  equals:

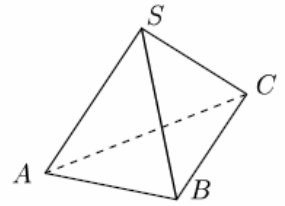


- A)  $a + b$       B)  $2(a + b)$       C)  $\frac{1}{2}(a + b)$       D)  $\sqrt{ab}$       E)  $\sqrt{a^2 + b^2}$

23. A machine makes 900 components per hour. The number of the components produced is counted by a meter. At 21:00 (meaning 9 PM) the meter showed 1160. The time shown by the clock and the display shown by the meter are considered an ordered set of four digits. After some time the meter and the clock were showing exactly the same numbers. What time was it?

- A) 21:30      B) 21:50      C) 22:00      D) 22:10      E) 22:30

24. In pyramid  $SABC$  (see the picture), all the angles with a common vertex  $S$  are right angles. The areas of sides  $SAB$ ,  $SAC$  and  $SBC$  are respectively equal to: 3, 4, and 6. What is the volume of pyramid  $SABC$ ?

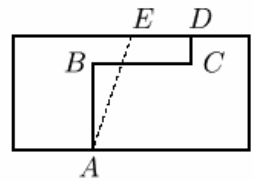


- A) 4      B) 5      C) 6      D) 8      E) 12

25. Let us consider a set of 16 different positive integers with their mean equal to 16. The greatest number that can be in this set is:

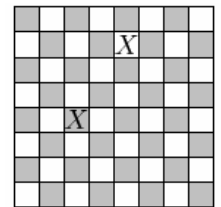
- A) 16      B) 24      C) 32      D) 136      E) 256

26. The diagram illustrates a rectangular yard divided by the path  $ABCD$  into two parts. The segments  $AB$ ,  $BC$  and  $CD$  are parallel to the sides of the rectangle and their lengths are 30m, 24m and 10m respectively. We want to replace the path  $ABCD$  with the line  $AE$  so that the areas of the two parts of the yard stay the same. What is the distance between points  $D$  and  $E$ ?



- A) 8m      B) 10m      C) 12m      D) 14m      E) 16m

27. In how many different ways can we choose one white and one black square from the checkerboard so that they are not in the same row and not in the same column? (An example of this kind of choice is shown in the picture.)

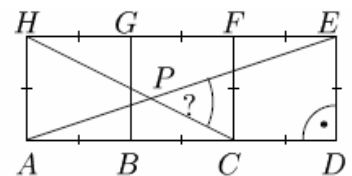


- A) 56      B) 504      C) 720      D) 672      E) 768

28. Let  $\sqrt{2005} + \sqrt{1995} = a$ . Which of the numbers below represents the value of  $\sqrt{2005} - \sqrt{1995}$ ?

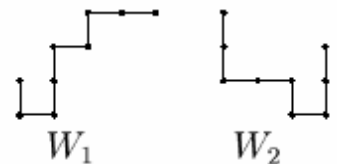
- A)  $10 - a$       B)  $\frac{1}{a}$       C)  $\frac{10}{a}$       D)  $\frac{a}{10}$       E)  $10 + a$

29. Three squares form a rectangle (see the picture). Lines  $AE$  and  $CH$  intersect each other at point  $P$ . What is the measure of angle  $CPE$ ?



- A)  $30^\circ$       B)  $45^\circ$       C)  $60^\circ$       D)  $50^\circ$       E)  $40^\circ$

30. Two pieces of wire form the figures  $W_1$  and  $W_2$  (see the picture). Both figures are made of 8 parts each with the length of 1. What is the largest possible length of the common part of these two pieces if we put them on top of each other without any bending?



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

