

24. A large number  $N$  is divisible by all integers from 2 to 11 except for two. Which of the following couples of integers could be these exceptions?

- (A) 2 and 3 (B) 4 and 5 (C) 6 and 7 (D) 7 and 8 (E) 10 and 11

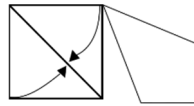
25. In the morning, the ice-cream shop offers 16 flavors. Anna wants to choose a 2-flavor ice cream. In the evening several flavors are sold out and Bella wants to choose a 3-flavor ice cream from those flavors left. Both Anna and Bella can choose from the same number of possible combinations. How many flavors were sold out?

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

26. Tony has 71 marbles at his disposal in a box. He is allowed to take out exactly 30 marbles from the box or to return exactly 18 marbles to it. If Tony is allowed to apply each operation as many times as he wishes, what is the smallest number of marbles than can be in the box?

- (A) 1 (B) 3 (C) 5 (D) 7 (E) 11

27. Wajda took a square piece of paper of side 1 and folded two of its sides to the diagonal (see image), obtaining a quadrilateral. What is the area of this quadrilateral?

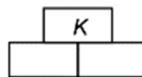


- (A)  $2 - \sqrt{2}$  (B)  $\frac{\sqrt{2}}{2}$  (C)  $\sqrt{2} - 1$  (D)  $\frac{7}{10}$  (E)  $\frac{3}{5}$

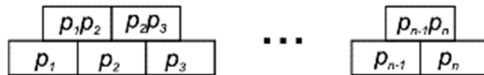
28. An iceberg has the shape of a cube. Exactly 90% of its volume is hidden below the surface of the water. Three edges of the cube are partially visible over the water. The visible parts of these edges are 24m, 25m and 27m. How long is an edge of the cube?

- (A) 30 m (B) 33 m (C) 34 m (D) 35 m (E) 39 m

29. There are  $n$  different prime numbers in the bottom row of the table from left to right as  $p_1$  to  $p_n$ . The product of two numbers next to each other in the same row will be placed in the box exactly above them. A number  $K = p_1^{\alpha_1} p_2^{\alpha_2} \dots p_n^{\alpha_n}$  is in the box in top row. If  $\alpha_2 = 8$ , how many numbers in the table are divisible by the number  $p_4$ ?



- (A) 4 (B) 16 (C) 24 (D) 28 (E) 36



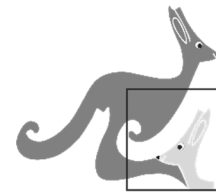
30. Adam and Britt try to find out which of the following figures is Carl's favourite.



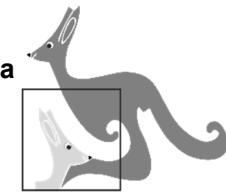
Adam knows that Carl has told Britt its shape. Britt knows that Carl has told Adam its colour. Then the following conversation takes place. Adam: "I don't know Carl's favourite figure and I know that Britt doesn't know it either." Britt: "At first I didn't know Carl's favourite figure, but now I do." Adam: "Now I know it too." Which figure is Carl's favourite?

- (A) (B) (C) (D) (E)

Laiks uzdevumu risināšanai – 75 minūtes!



Starptautiskā konkursa  
„Kengurs”  
uzdevumi



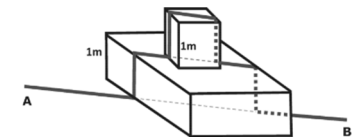
26.03.2020. /16.04.2020.

11.-12. klases

3 point problems

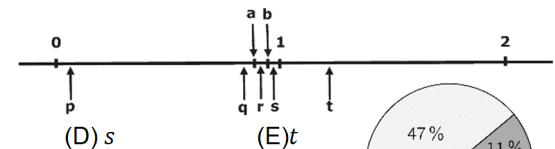
1. The sum of the last two digits of the product  $1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$  is  
(A) 2 (B) 4 (C) 6 (D) 8 (E) 16

2. An ant walked every day on a straight horizontal line path from  $A$  to  $B$ , which are 5 m apart. One day humans placed on its path two strange obstacles of height 1 m each. Now the ant walks along or above the same straight line except that it now has to climb up and down vertically over both the two obstacles, as in the picture. How long is its path now?



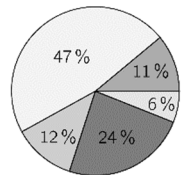
- (A) 7 m (B) 9 m (C)  $(5 + 4\sqrt{2})$  m (D)  $(9 - 2\sqrt{2})$  m  
(E) the length depends on the angles the obstacles are situated along the path

3. Rene marked as accurately as possible two points  $a$  and  $b$  on the number line. Which of the points  $p, q, r, s, t$  on the number line best represents their product  $ab$ ?



- (A)  $p$  (B)  $q$  (C)  $r$  (D)  $s$  (E)  $t$

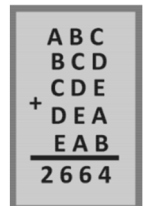
4. The pie chart shows how the students of my school get to school. Approximately twice as many go by bike as use public transport and roughly the same number come by car as walk. The rest use a moped. What percentage use a moped?



- (A) 6 % (B) 11 % (C) 12 % (D) 24 % (E) 47 %

5. The sum of five three-digit numbers is 2664 as shown on the board.

- What is the value of  $A + B + C + D + E$ ?  
(A) 4 (B) 14 (C) 24 (D) 34 (E) 44



6. What is the value of  $\frac{1010^2 + 2020^2 + 3030^2}{2020}$ ?  
(A) 2020 (B) 3030 (C) 4040 (D) 6060 (E) 7070

7. Let  $a, b$  and  $c$  be integers satisfying  $1 \leq a \leq b \leq c$  and  $abc = 1\,000\,000$ . What is the largest possible value of  $b$ ?  
(A) 100 (B) 250 (C) 500 (D) 1000 (E) 2000

8. If  $D$  dogs weigh  $K$  kilos and  $E$  elephants weigh the same as  $M$  dogs, how many kilos does one elephant weigh?

- (A)  $DKEM$  (B)  $\frac{DK}{EM}$  (C)  $\frac{KE}{DM}$  (D)  $\frac{KM}{DE}$  (E)  $\frac{DM}{KE}$

9. There are two dice. Each one has two red faces, two blue faces and two white faces. If we roll both dice together, what is the probability that both show the same color?

- (A)  $\frac{1}{12}$  (B)  $\frac{1}{9}$  (C)  $\frac{1}{6}$  (D)  $\frac{2}{9}$  (E)  $\frac{1}{3}$

10. Which of the following numbers is not divisible by 3 for any integer  $n$ ?

- (A)  $5n + 1$  (B)  $n^2$  (C)  $n(n + 1)$  (D)  $6n - 1$  (E)  $n^3 - 2$

4 point problems

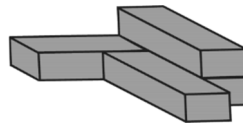
11. 4 different cases of mutual arrangement of two rectangles are shown in the figure. The general part of the rectangles is white. We denote by  $B$  the area of the part of the largest rectangle that is not common to the two rectangles, and we denote by  $R$  the area of the smallest rectangle that is not common to the two rectangles. Which of the following statements is true about the quantity  $B - R$ ?



- (A) In case 1 the quantity  $B - R$  is larger than in the other cases  
 (B) In case 2 the quantity  $B - R$  is larger than in the other cases  
 (C) In case 3 the quantity  $B - R$  is larger than in the other cases  
 (D) In case 4 the quantity  $B - R$  is larger than in the other cases  
 (E) The quantity  $B - R$  is the same in all cases

12. Five coins are lying on a table with the "heads" side up. At each step you must turn over exactly three of the coins. What is the least number of steps required to have all the coins have their "tails" side up?

- (A) 2 (B) 3 (C) 4 (D) 5  
 (E) not possible to have all the coins with their "tails" side up.



13. Four identical boxes are glued together to make the shape shown in the picture. If you require 1 liter of paint to paint the outside of one such box, how many liters of paint are required to paint the outside of the glued construction?

- (A) 2,5 (B) 3 (C) 3,25 (D) 3,5 (E) 4

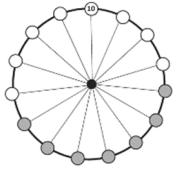
14. Let  $a$ ,  $b$  and  $c$  be integers. Which of the following is certainly NOT equal to  $(a - b)^2 + (b - c)^2 + (c - a)^2$ ?

- (A) 0 (B) 1 (C) 2 (D) 6 (E) 8

15. The first two digits of a 100-digit integer are 2 and 9. How many digits does the square of this number have?

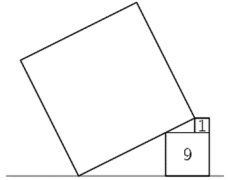
- (A) 101 (B) 199 (C) 200  
 (D) 201 (E) It cannot be determined

16. We have 15 integer numbers placed on a wheel. Only one of the numbers is visible (a 10 at the top). The sum of the numbers in any 7 consecutive positions on the wheel (such as the grey ones) is the same in all cases. If we add all 15 numbers, exactly how many of the numbers 75, 216, 365, or 2020 are possible totals?



- (A) zero (B) one (C) two (D) three (E) four

17. A square is put on two other squares as shown in the picture. The numbers on the small squares show the area of the squares. What is the area of the big square?

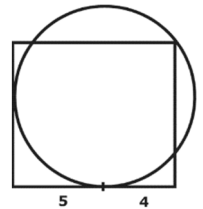


- (A) 49 (B) 80 (C) 81  
 (D) 82 (E) 100

18. The sequence  $f_n$  is given by  $f_1 = 1$ ,  $f_2 = 3$  and  $f_{n+2} = f_n + f_{n+1}$  for  $n \geq 1$ . How many of the first 2020 elements of the sequence are even?

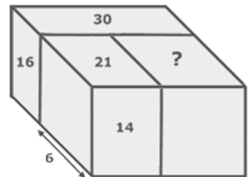
- (A) 673 (B) 674 (C) 1010 (D) 1011 (E) 1347

19. We are given a rectangle and a circle that touches two of the sides of the rectangle and passes through a vertex, as shown. One of the touching points is at a distance 5 and, respectively, 4 from the adjacent vertices of the rectangle. What is the area of the rectangle?



- (A)  $\frac{27}{\pi}$  (B)  $\frac{25}{\pi}$  (C) 72  
 (D) 63 (E) none of the previous

20. Three cuboids are arranged to make a larger cuboid as in the figure. The width of one of them is 6 and the areas of some of their faces are 14, 21, 16, 30, as shown. What is the area of the face with the question mark?

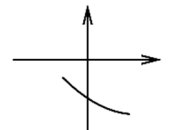


- (A) 18 (B) 24 (C) 28  
 (D) 30 (E) cannot be determined

5 point problems

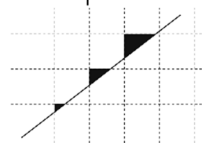
21. The figure shows a section of the parabola with equation  $y = ax^2 + bx + c$ . Which of the following numbers is positive?

- (A)  $c$  (B)  $b + c$  (C)  $ac$  (D)  $bc$  (E)  $ab$

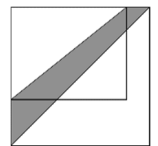


22. A Alex draws a line on a square grid paper and colours in three triangles as shown. Which of the following could be the ratio of the areas of the triangles?

- (A) 1:2:3 (B) 1:2:4 (C) 1:3:9  
 (D) 1:4:8 (E) None of the previous is correct



23. The length of one of the sides of a rectangular garden is enlarged by 20% and the other one is enlarged by 50% so that it has become a square garden as shown in the picture. If the shaded area between the two diagonals is  $30 \text{ m}^2$ , what was the area of the original garden?



- (A)  $60 \text{ m}^2$  (B)  $65 \text{ m}^2$  (C)  $70 \text{ m}^2$  (D)  $75 \text{ m}^2$  (E)  $80 \text{ m}^2$