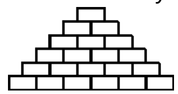
24. My friend wants to use a special seven digit password. The digits of the password occur exactly as many times as its digit value. And the same digits of this number are always written consecutively. For example 4444333 or 1666666. How many possible passwords can he choose from?
(A) 6 (B) 7 (C) 10 (D) 12 (E) 13

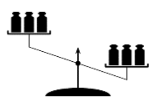
25. Paul wants to write a natural number in each box in the diagram such that each number is the sum of the two numbers in the boxes immediately underneath. At most how many odd numbers can Paul write?
(A) 13 (B) 14 (C) 15 (D) 16 (E) 17



26. Liza counted the sum of angles of a convex polygon. She missed one of the angles and so her result was 2017°. The missed angle was
(A) 37° (B) 53° (C) 97° (D) 127° (E) 143°

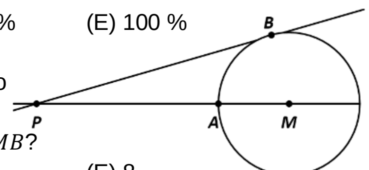
27. There are 30 dancers standing in a circle and facing the centre. After the "Left" command some dancers turned to the left and all the others - to the right. Those dancers who were facing each other, said "Hello". It turned out to be 10 such dancers. Then after the command "Around" all the dancers made a half-turn. Again, those dancers who were facing each other, said "Hello". How many dancers said "Hello" then?
(A) 10 (B) 20 (C) 8 (D) 15 (E) impossible to determine

28. On a balance scale 3 different masses are put at random on each pan and the result is shown in the picture. The masses are of 101, 102, 103, 104, 105 and 106 grams. What is the probability that the 106 gram mass stands on the heavier (right) pan?

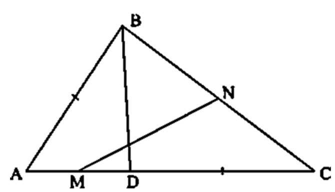


(A) 75 % (B) 80 % (C) 90 % (D) 95 % (E) 100 %

29. A and B are on the circle with centre M. PB is tangent to the circle at B. The distances PA and MB are integers, $PB = PA + 6$. How many possible values are there for MB?
(A) 0 (B) 2 (C) 4 (D) 6 (E) 8



30. Point D is chosen on the side AC of triangle ABC so that $DC = AB$. Points M and N are the midpoints of the segments AD and BC, respectively. If $\angle NMC = \alpha$ then $\angle BAC$ always equals
(A) 2α (B) $90^\circ - \alpha$ (C) $45^\circ + \alpha$
(D) $90^\circ - \frac{\alpha}{2}$ (E) 60°



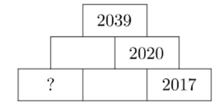
Laiks uzdevumu risināšanai – 75 minūtes!

Starptautiskā konkursa
„Ķengurs”
uzdevumi

23.03.2017. 9.-10. klases

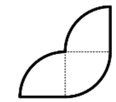
3 point problems

1. In this diagram each number is the sum of the two numbers below.Which number must be in the cell marked with "?"?



(A) 15 (B) 16 (C) 17 (D) 18 (E) 19

2. We divide a circle of area 36π into four quadrants, of which we have placed three as shown in figure. What is the perimeter of this figure?



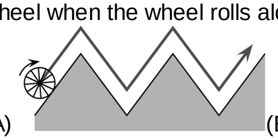
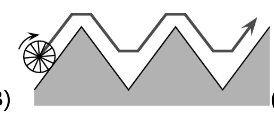
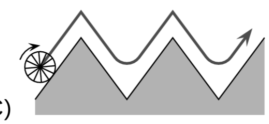
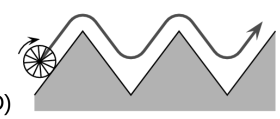
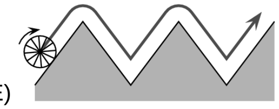
(A) $6\pi + 12$ (B) $9\pi + 12$ (C) $9\pi + 24$ (D) $12\pi + 12$ (E) $12\pi + 24$

3. Angela made a decoration with grey and white asteroids. The areas of the asteroids are 1 cm^2, 4 cm^2, 9 cm^2 and 16 cm^2. What is the total area of the visible grey regions?

(A) 9 cm^2 (B) 10 cm^2 (C) 11 cm^2 (D) 12 cm^2 (E) 13 cm^2

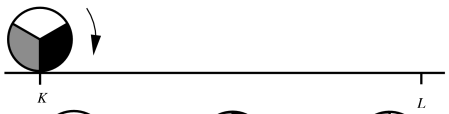
4. Maria has 24 euros. Every one of her 3 siblings has 12 euros. How much does she have to give to each of her siblings so that each of the four siblings has the same amount?
(A) 1 (B) 2 (C) 3 (D) 4 (E) 6

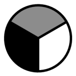
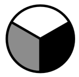
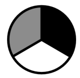
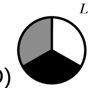
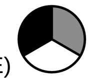
5. Which of the following pictures shows the curve of movement of the midpoint of the wheel when the wheel rolls along the zig-zag-curve shown?

(A)

(B)

(C)

(D)

(E)


6. Some girls were dancing in a circle. Antonia was the fifth to the left from Bianca and the eighth to the right from Bianca. How many girls were in the group?
(A) 11 (B) 12 (C) 13 (D) 14 (E) 15

7. Circle of radius 1 rolls along a straight line from the point K to the point L, where KL = 2017π (see figure). What does the circle look like in the end position at?



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

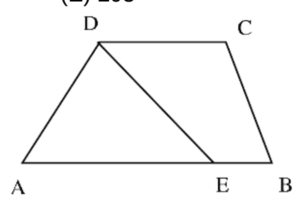
8. Martin plays chess. He has played 15 games this season, out of which he has won nine. He has 5 more games to play. What will his success rate be in this season if he wins all 5 remaining games?
(A) 60 % (B) 65 % (C) 70 % (D) 75 % (E) 80 %

9. One eighth of the guests of a wedding were children. Three sevenths of the adult guests were men. What fraction of the wedding guests were women?
(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{5}$ (D) $\frac{1}{7}$ (E) $\frac{3}{7}$

10. My maths teacher has a box with coloured buttons. There are 203 red buttons, 117 white buttons and 28 blue buttons. The students are asked to take a button from the box one by one without looking. How many students have to take a button to be sure that there are at least 3 buttons of the same colour?
(A) 3 (B) 6 (C) 7 (D) 28 (E) 203

4 point problems

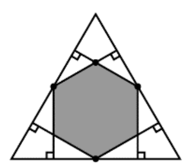
11. $ABCD$ is a trapezoid with sides AB parallel to D , where AB = 50, CD = 20. E is a point on the side AB with the property, that the segment DE divides the given trapezoid into two parts of equal area (see figure). Calculate the length AE.



(A) 25 (B) 30 (C) 35 (D) 40 (E) 45

12. How many natural numbers A possess the property that exactly one of the numbers A and A + 20 is 4-digit?
(A) 19 (B) 20 (C) 38 (D) 39 (E) 40

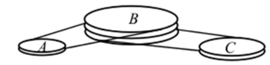
13. Six perpendiculars to the sides are drawn from the midpoints of the sides of a regular triangle (see figure). What fraction of the area of the initial triangle does the resulting hexagon cover?



(A) $\frac{1}{3}$ (B) $\frac{2}{5}$ (C) $\frac{4}{9}$ (D) $\frac{1}{2}$ (E) $\frac{2}{3}$

14. The sum of the squares of three consecutive positive integers is 770. Which is the largest of these integers?
(A) 15 (B) 16 (C) 17 (D) 18 (E) 19

15. A belt drive system consists of the wheels A, B and C, which rotate without a slippage. B turns 4 full rounds when A turns 5 full rounds, and B turns 6 full rounds when C turns 7 full rounds. Find the perimeter of A if the perimeter of C is 30 cm.



(A) 27 cm (B) 28 cm (C) 29 cm (D) 30 cm (E) 31 cm

16. Tycho wants to prepare a schedule for his jogging. Every week he wants to jog on the same days of the week. He never wants to jog on two consecutive days. He wants to jog three times per week. How many schedules can he choose from?
(A) 6 (B) 7 (C) 9 (D) 10 (E) 35

17. Four brothers have different heights. Tobias is shorter than Victor by the same length by which he is taller than Peter. Oscar is shorter than Peter by the same length as well. Tobias is 184 cm tall and the average height of all the four brothers is 178 cm. How tall is Oscar?
(A) 160 cm (B) 166 cm (C) 172 cm (D) 184 cm (E) 190 cm

18.

19. It rained 7 times during our holiday. If it rained in the morning, it was sunny in the afternoon. If it rained in the afternoon, it was sunny in the morning. There were 5 sunny mornings and 6 sunny afternoons. How many days did our holiday last at least?
(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

20. Jenny decided to enter numbers into the cells of the 3 × 3 table in order that the sums of the numbers in all four 2 × 2 squares were the same. The three numbers in the corner cells have already been written as shown in the figure. Which number should she write in the fourth corner cell marked with the "?"?

3		1
2		?

(A) 5 (B) 4 (C) 1 (D) 0 (E) impossible to determine

21. Seven natural numbers a, b, c, d, e, f, g are written in a row. The sum of all them equals 2017. Any two neighbouring numbers differ by 1 or −1. Which of the numbers can be equal to 286?
(A) only a or g (B) only b or f (C) only c or e (D) only d (E) any of them

5 *point problems*

22. There are 4 children of different integer ages under 18. The product of their ages is 882, what is the sum of their ages?
(A) 23 (B) 25 (C) 27 (D) 31 (E) 33

23. On the faces of a given dice these numbers appear: −3, −2, −1, 0, 1, 2. If you throw it twice and multiply the results, what is the probability that the product is negative?
(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{11}{36}$ (D) $\frac{13}{36}$ (E) $\frac{1}{3}$

24. An arbitrary two-digit number consists of the digits a and b. By repeating this pair of digits three times, one obtains a six-digit number. This new number is always divisible by
(A) 2 (B) 5 (C) 7 (D) 9 (E) 11