



## Winter 2018./2019.

School	
Team number	
Category	<b>D2</b>
Commisioner	

#	Student's name and surname	Year	Mentor's name and surname
1.			
2.			
3.			
4.			

Answers:

5th year		6th year		7th year		8th year	
5.1.		6.1.		7.1.		8.1.	
5.2.		6.2.		7.2.		8.2.	
5.3.		6.3.		7.3.		8.3.	
5.4.		6.4.		7.4.		8.4.	
5.5.		6.5.		7.5.		8.5.	
5.6.		6.6.		7.6.		8.6.	
5.7.		6.7.		7.7.		8.7.	
5.8.		6.8.		7.8.		8.8.	
5.9.		6.9.		7.9.		8.9.	
5.10.		6.10.		7.10.		8.10.	
5.11.		6.11.		7.11.		8.11.	
5.12.		6.12.		7.12.		8.12.	

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Author: Maja Zelčić, mathematics professor

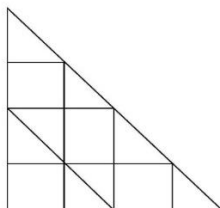
Reviewers: Sanja Stilinović, mathematics professor  
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Translator: Josip Kličinović, mathematics professor

**Correct answer : 10 points****Answer „E“ : 0 points****False answer : -2 points**5.1. How many natural numbers  $x$  are there that satisfy:  $23 \leq x \leq 46$  i  $25 < x < 49$ .

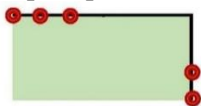
<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
20	21	22	23	

5.2. How many triangles do you see?



<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
16	12	13	14	

5.3. Luke wanted to fence a playground from two sides (like in the picture). He put up columns that were 1 meter apart from each other. How long will the fence be if Luke put up 35 columns?



<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
35 m	33 m	34 m	Can't be determined	

**Correct answer: 20 points****Answer „E“: 0 points****False answer : -4 points**

5.4. On a magical island a three headed dragons, and a two headed dogs met up. There was more dogs than dragons and in total there were 18 heads. How many dragons and dogs met up?

<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
6	7	8	Can't be determined	

5.5. Tanja, Vanja and Sanja collect postcards. Tanja and Vanja together have 73 postcards, Vanja and Sanja together have 124 postcards and Sanja and Tanja together have 109 postcards. How many postcards does Tanja have?

<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
29	80	44	Can't be determined	

5.6. What is the sum of digits of the smallest odd four digit number which every digit is larger than digits on places with the higher place value?

<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
14	6	10	11	

5.7. In a bowl there are little balls that are numerated from 1 to 45. One by one, the balls are being taken out of the bowl. What is the minimum amount of balls we have to draw to make sure the number drawn is two digit?

<b>A.</b>	<b>B.</b>	<b>C.</b>	<b>D.</b>	<b>E.</b> We don't want to answer
28	23	22	27	

<b>Correct answer: 30 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer : -6 points</b>
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5.8. Sven imagined a number. He added 113 to that number, and then he halved that number. He subtracted 65 from that result, and got 100. What is the sum of the digits of that number?

<b>A.</b> Greater than 13	<b>B.</b> 12	<b>C.</b> 11	<b>D.</b> Less than 11	<b>E.</b> We don't want to answer
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5.9. From rectangle shaped paper we cut four rectangles with perimeter 6 cm, whose two adjacent sides are the edge of the paper. What is the perimeter of the shape we got compared to the starting rectangle?

<b>A.</b> Equal	<b>B.</b> Shorter by 24 cm	<b>C.</b> Shorter by 12 cm	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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5.10. What area does the letter M have if the length of a side of the square is 1 cm?



<b>A.</b> Greater than 40 cm <sup>2</sup>	<b>B.</b> 36 cm <sup>2</sup>	<b>C.</b> 32 cm <sup>2</sup>	<b>D.</b> 38 cm <sup>2</sup>	<b>E.</b> We don't want to answer
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5.11. Joanna wrote 7 consecutive natural numbers. What is most certainly correct?

<b>A.</b> The sum is two-digit number	<b>B.</b> The sum is even number	<b>C.</b> Last digit of their product is 0	<b>D.</b> Middle number by the value is even	<b>E.</b> We don't want to answer
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5.12. Julia was building pyramids out of blocks, just like in the pictures: the first pyramid had two levels, the second one had three levels and so on. How many blocks does Julia need to build a pyramid with 36 levels?



<b>A.</b> Less than 600	<b>B.</b> 665	<b>C.</b> 666	<b>D.</b> 630	<b>E.</b> We don't want to answer
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<b>Correct answer: 10 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -2 points</b>
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6.1. Ace is 4 centimeters taller than Bobby, Cico is 8 centimeters taller Dudo, and Bobby is 2 centimeters shorter than Cico. How many centimeters is Dudo shorter than Ace?

<b>A.</b> 10 cm	<b>B.</b> 12 cm	<b>C.</b> 8 cm	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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6.2. Continue the sequence: 1, 3, 7, 15, 31...

<b>A.</b> 47	<b>B.</b> 63	<b>C.</b> 57	<b>D.</b> 53	<b>E.</b> We don't want to answer
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6.3. A Rubiks cube is made up of  $3 \times 3 \times 3 = 27$  little blocks and each side is colored a different color. How many little blocks are colored with exactly two colors?



<b>A.</b> 12	<b>B.</b> 24	<b>C.</b> 8	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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<b>Correct answer: 20 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -4 points</b>
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6.4. What number is  $1 + \frac{1}{2} \cdot \left( 1 + \frac{1}{2} \cdot \left( 1 + \frac{1}{2} \cdot \left( 1 + \frac{1}{2} \right) \right) \right)$ ?

<b>A.</b> $\frac{31}{16}$	<b>B.</b> $\frac{45}{16}$	<b>C.</b> $\frac{81}{16}$	<b>D.</b> None of the above	<b>E.</b> We don't want to answer
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6.5. In an isosceles triangle the angle between the angle bisectors at the base is  $136^\circ$ . What is the angle between the legs of the triangle?

<b>A.</b> $68^\circ$	<b>B.</b> $88^\circ$	<b>C.</b> $92^\circ$	<b>D.</b> Such triangle doesn't exist	<b>E.</b> We don't want to answer
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6.6. A bag with books has a mass of 7.5kg. The mass of the books is five times bigger than the mass of the bag. If we don't bring one fifth of books to school, what will be the mass of the bag with the books.

<b>A.</b> 5.75 kg	<b>B.</b> 6 kg	<b>C.</b> 6.5 kg	<b>D.</b> 6.25 kg	<b>E.</b> We don't want to answer
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6.7. What is the sum of digits of the smallest four digit natural number that is divisible by 2, 3, 4 i 5?

<b>A.</b> 4	<b>B.</b> 3	<b>C.</b> 9	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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**Correct answer: 30 points**

**Answer „E“: 0 points**

**False answer: -6 points**

6.8. When we divide 140 and 188 with the same number they give the same remainder. How many numbers are there that fit the description?

<b>A.</b> 7	<b>B.</b> 8	<b>C.</b> 10	<b>D.</b> 11	<b>E.</b> We don't want to answer
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6.9. If in the sequence 1, 2, 3, ..., 99, 100 we delete all even numbers and all numbers divisible by 3, in what place will the number 97 be?

<b>A.</b> 33	<b>B.</b> 17	<b>C.</b> 29	<b>D.</b> None of the above	<b>E.</b> We don't want to answer
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6.10. Jurica paid  $\frac{1}{2}$  of his pocket money for the birthday present for his friend. For the tram ticket he spent  $\frac{1}{10}$  of what left. On his way he paid  $\frac{1}{8}$  from the rest for the icecream. When he got home, he had 63 kn left. What was the price of the present?

<b>A.</b> 160 kn	<b>B.</b> 80 kn	<b>C.</b> 90 kn	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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6.11. From how many little triangles with 1 centimeter sides is a big triangle with a side of 55 centimeters consisted of?



<b>A.</b> 1540	<b>B.</b> 2969	<b>C.</b> 2970	<b>D.</b> 3025	<b>E.</b> We don't want to answer
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6.12. If we shorten one side of a square by 3 centimeter and the other one by 5 cm the rectangle will have an area 65  $\text{cm}^2$  smaller than before. What is the perimeter of the rectangle?

<b>A.</b> 12 cm	<b>B.</b> 20 cm	<b>C.</b> 24 cm	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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<b>Correct answer: 10 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -2 points</b>
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7.1. Jenny, Lucy and Sofia take lessons two time a week for one class:maths, programming and astronomy. Every day in the week except for Sunday, a lesson from one class takes place, but never the same class two days in a row. Sofia trains soccers on Monday and Wednesday, and on Tuesdays goes to the cinema with Lucy. Jenny has schooling til late hours on Monday so she doesn't go to lessons then. What girls takes lessons on Friday?

<b>A.</b> Jenny	<b>B.</b> Lucy	<b>C.</b> Sofia	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.2. Point A(5, 3) is the vertex of a square ABCD, vertex D of that square belongs to the ordnate axis. What answeerr can be the sum of coordiantes of the vertex that is opposite of the vertex A, if that vertex is on axis ?

<b>A.</b> 5	<b>B.</b> 8	<b>C.</b> 11	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.3.What time is it if the legs of the clock close an angle of 120°.

<b>A.</b> 3:35	<b>B.</b> 1:25	<b>C.</b> 18:50	<b>D.</b> 16:00	<b>E.</b> We don't want to answer
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<b>Correct answer: 20 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -4 points</b>
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7.4. How many pairs (x, y) of whole numbers x and y satisfy the equation  $\frac{6}{x} = \frac{y}{3}$  ?

<b>A.</b> 12	<b>B.</b> 8	<b>C.</b> 6	<b>D.</b> None of the above	<b>E.</b> We don't want to answer
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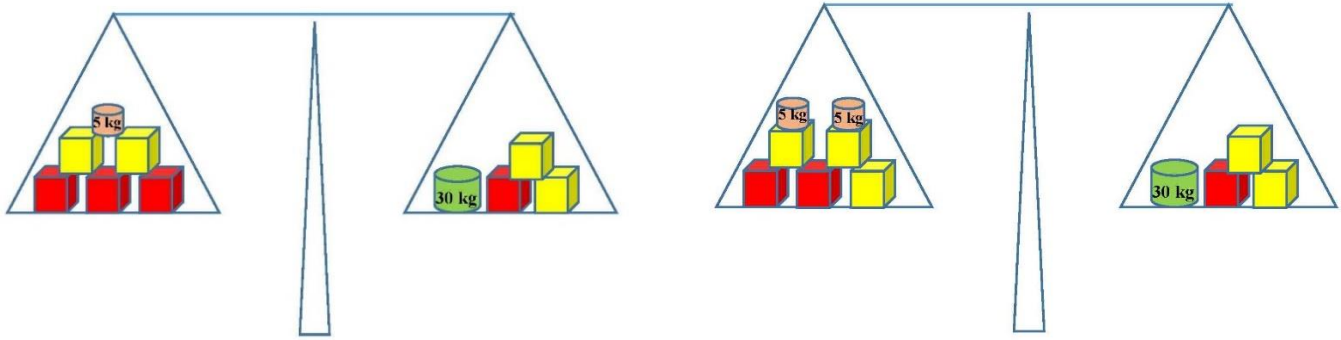
7.5. Vertices of a paper square are folded so that they overlap in the centre of the square. When this process is repeated once again, what is the surface of the resulting shape in comparison to the initial square?

<b>A.</b> 2 times smaller	<b>B.</b> 8 times smaller	<b>C.</b> 4 times smaller	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.6. When some number  $a$  is added to both the numerator and the denominator of the fraction  $\frac{1}{5}$  the result is  $\frac{1}{2}$ .What is the value of  $3a-5$ ?

<b>A.</b> 3	<b>B.</b> -3	<b>C.</b> 4	<b>D.</b> None of the above	<b>E.</b> We don't want to answer
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7.7. On a scale there are two types of cubes along with a few small weights of 5kg and a larger weight of 30kg. What is the difference in mass between the two types of cubes if the scale is in equilibrium?



<b>A.</b> 5.5 kg	<b>B.</b> 7.5 kg	<b>C.</b> 5 kg	<b>D.</b> None of the above	<b>E.</b> We don't want to answer
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<b>Correct answer: 30 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -6 points</b>
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7.8. The five congruent rectangles with a perimeter of 20 cm form a larger rectangle. What is its perimeter?



<b>A.</b> 100 cm	<b>B.</b> 40 cm	<b>C.</b> 36 cm	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.9. What is the area of a triangle ABC defined by the points  $A(-3, 1)$ ,  $B(2, -2)$  and  $C(5, 3)$ ?

<b>A.</b> $14 \text{ cm}^2$	<b>B.</b> $17 \text{ cm}^2$	<b>C.</b> $16 \text{ cm}^2$	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.10. What is the sum of all two-digit numbers with odd and different digits?

<b>A.</b> 1100	<b>B.</b> 1375	<b>C.</b> manje od 1000	<b>D.</b> više od 1500	<b>E.</b> We don't want to answer
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7.11. With how many zeros does the product of the first 100 even numbers end?

<b>A.</b> 10	<b>B.</b> 20	<b>C.</b> 24	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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7.12. How many consecutive natural numbers do we have to multiply to make sure that the resulting sum is divisible by 8?

<b>A.</b> 4	<b>B.</b> 6	<b>C.</b> 8	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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<b>Correct answer: 10 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -4 points</b>
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8.1. Which of the three given numbers on the number line are not equidistant?

<b>A.</b> $\frac{1}{4}, \frac{1}{5}, \frac{1}{6}$	<b>B.</b> 4, 5, 6	<b>C.</b> 0.4, 0.5, 0.6	<b>D.</b> -4, -5, -6	<b>E.</b> We don't want to answer
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8.2. What is  $(-10)^3 \cdot (-10^4)^5 : (-10)^2$ ?

<b>A.</b> $10^{26}$	<b>B.</b> $-10^{26}$	<b>C.</b> $-10^{21}$	<b>D.</b> $10^{21}$	<b>E.</b> We don't want to answer
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8.3. Which of the given equalities isn't always correct?

<b>A.</b> $(a-b)(a+b) = a^2 - b^2$	<b>B.</b> $(a+b)(a+b) = a^2 + b^2$	<b>C.</b> $(a-b)^2 = a^2 - 2ab + b^2$	<b>D.</b> $(a+b)^2 = a^2 + 2ab + b^2$	<b>E.</b> We don't want to answer
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<b>Correct answer: 20 points</b>	<b>Answer „E“: 0 points</b>	<b>False answer: -4 points</b>
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8.4. Anna is three times as old as her brother Greg. When Greg is twice as old as he is today, by what factor will Anna's age be greater than Greg's?

<b>A.</b> 6	<b>B.</b> 4	<b>C.</b> 3	<b>D.</b> 2	<b>E.</b> We don't want to answer
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8.5. Which digit cannot be the last digit of a number  $n^2 + 5m$  for any natural numbers  $n$  and  $m$ ?

<b>A.</b> 4	<b>B.</b> 3	<b>C.</b> 1	<b>D.</b> 6	<b>E.</b> We don't want to answer
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8.6. Calculate the area of a square with a side that belongs to the line  $y = x + 5$ , and diagonals are on the coordinate axes?

<b>A.</b> 50	<b>B.</b> 25	<b>C.</b> 100	<b>D.</b> 75	<b>E.</b> We don't want to answer
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8.7. The sum of the lowest and highest denominator of some number  $n$  is 1357. What is the sum of the lowest and second highest number  $n$ ?

<b>A.</b> 678	<b>B.</b> 681	<b>C.</b> 680	<b>D.</b> Can't be determined	<b>E.</b> We don't want to answer
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Correct answer: 30 points	Answer „E“: 0 points	False answer: -6 points
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8.8. Calculate  $\sqrt{2-\sqrt{3}} - \sqrt{2+\sqrt{3}}$

<b>A.</b> $\sqrt{2}$	<b>B.</b> $-\sqrt{2}$	<b>C.</b> 0	<b>D.</b> $-2\sqrt{3}$	<b>E.</b> We don't want to answer
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8.9. Over sides of the pentagon ABCDE, equilateral triangles are constructed outwards. Trinagles are  $ABB_1, BCC_1, CDD_1, DEE_1, EAA_1$ . what is the measure of the angle  $A_1D_1E_1$  ?

<b>A.</b> $54^\circ$	<b>B.</b> $30^\circ$	<b>C.</b> $36^\circ$	<b>D.</b> None of the abovea	<b>E.</b> We don't want to answer
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8.10. On two parallel lines  $p$  and  $q$  there are points  $A, B, C, D, E$ . The number of triangles with vertices in these points depends on their position. If we count all triangles with vertices in these points, it is not possible to place points in such position that they make at most:

<b>A.</b> 9 triangles	<b>B.</b> 6 triangles	<b>C.</b> 3 triangles	<b>D.</b> 0 triangles	<b>E.</b> We don't want to answer
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8.11. How many pairs of natural numbers  $(m, n)$  are there, if number  $m \cdot 10^n$  is divisible by 30, and  $m$  and  $n$  are odd one-digit natural numbers?

<b>A.</b> 4	<b>B.</b> 8	<b>C.</b> 12	<b>D.</b> 16	<b>E.</b> We don't want to answer
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8.12. Circle with the radius  $R$  is divided with points  $A, B, C, D, E, F$  into six congruent parts. With the center in each of these points, circle is constructed so that each two are touching. What is the radius  $r$  of these circles compared to the radius of the initial circle?

<b>A.</b> 12 times shorter	<b>B.</b> 6 times shorter	<b>C.</b> 3 times shorter	<b>D.</b> 2 times shorter	<b>E.</b> We don't want to answer
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