Spring round 2018/2019

SCHOOL	
TEAM NUMBER	
CATEGORY	**D2**
COMPETITION COMISSIONER	

	FIRST AND LAST NAME OF PARTICIPANT	YEAR	FIRST AND LAST NAME OF MENTOR
1.			
2.			
3.			
4.			

ANSWERS:

YEAR 5		YEAR 6		YEAR 7		YEAR 8	
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.	

I ♥ MATematika

www.matzelcic.com.hr

Author: Maja Zelčić, mathematics professor   Revision: Sanja Stilinović, mathematics professor
Tamara Nemeth, mathematics professor

CORRECT ANSWER: 10 POINTS	**ANSWER „E": 0 POINTS**	**ELSE: –2 POINTS**

5.1. Which of the following is true for numbers 13 and 20?

A. The numbers are prime	**B**. The numbers are coprime	**C**. The numbers are composite	**D**. None of the above	**E**. We do not wish to answer

5.2. What is $2+2\cdot2:2-2:2+2$?

A. 5	**B**. 4	**C**. 2	**D**. 1	**E**. We do not wish to answer

5.3. If we multiply the quotient by the divisor, we will get:

A. The factor	**B**. The quotient	**C**. The dividend	**D**. None of the above	**E**. We do not wish to answer

CORRECT ANSWER: 20 POINTS	**ANSWER „E": 0 POINTS**	**ELSE: –4 POINTS**

5.4. What is the last digit of the product of the first 17 multiples of number 3?

A. 1	**B**. 3	**C**. 0	**D**. It cannot be determined	**E**. We do not wish to answer

5.5. Ivan chose some of the circles on the pictures and ordered them to get the smallest ten-digit number. Which number is on the last circle in the sequence?
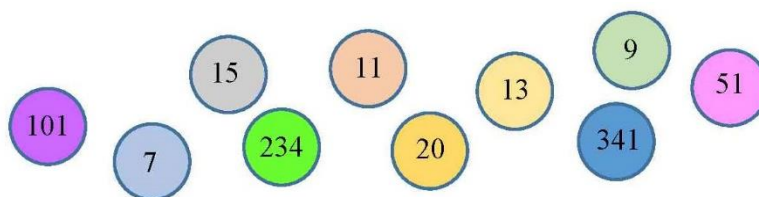
A. 7	**B**. 101	**C**. 341	**D**. It cannot be determined	**E**. We do not wish to answer

5.6. Ivana is drawing different positions of two squares with sides of equal lengths. She is observing the different figures she can get by intersecting the two squares. On the picture, there are two squares and their intersection is a rectangle.
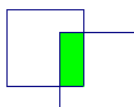
Which one of the following is a figure Ivana cannot get?

A. Right angled triangle	**B**. Equilateral triangle	**C**. Octagon	**D**. Quadrilateral	**E**. We do not wish to answer

5.7. Balls numbered from 1 to 45 are in a drum. We draw the balls one by one. What is the least number of balls we have to draw to be certain that a ball with a multiple of number 5 has been drawn?

A.	B.	C.	D.	E. We do not wish to answer
35	36	37	38	

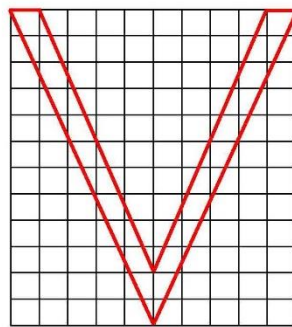| CORRECT ANSWER: 30 POINTS	ANSWER „E“: 0 POINTS	ELSE: –6 POINTS

5.8. Determine the least four-digit number that, when divided by 17, has a remainder 2. What is the sum of its digits?

A.	B.	C.	D.	E. We do not wish to answer
Greater than 8	7	6	Less than 6	

5.9. Points *A*, *B*, *C*, *D* i *E* are on one line. How many line segments do they determine?

A.	B.	C.	D.	E. We do not wish to answer
Less than 9	9	More than 10	10	

5.10. What is the area of the letter **V** if the length of the side of the square on the grid is 1 cm?

A.	B.	C.	D.	E. We do not wish to answer
Greater than 30 cm^2	28 cm^2	24 cm^2	Less than 22 cm^2	

5.11. The code for a lock is a three-digit number divisible by 3. If all digits are odd and different, how many different codes are there?

A.	B.	C.	D.	E. We do not wish to answer
4	12	18	24	

5.12. Twins Anica and Marica celebrate their birthday together. Their friends Jurica and Ivica surprise them with a shared gift each year, and they equally share the cost. Last year they gave them a box with 264 pieces of candy, one for each month of each twin's life. This year, they want to give them one chocolate for each year of their life. If one chocolate costs 11 kn, and Jurica and Ivica share the cost equally, how many kuna should each of them pay?

A.	B.	C.	D.	E. We do not wish to answer
242 kn	253 kn	132 kn	264 kn	

CORRECT ANSWER: 10 POINTS	ANSWER „E": 0 POINTS	ELSE: –2 POINTS

6.1. Measures of two angles in a triangle are given. Which one of them is isosceles?

A.	B.	C.	D.	E. We do not wish to answer
35º and 45º	60º and 65º	55º and 70º	75º and 55º	

6.2. From a monthly allowance, which is 200 kn, Marko spent $\frac{3}{8}$ on his favourite game and 0.14 on candy. How many kuna was he missing to be able to save half of his allowance?

A.	B.	C.	D.	E. We do not wish to answer
2 kn	3 kn	4 kn	5 kn	

6.3. Lovre imagined a natural number, multiplies it by 15 and added 3. Which one of the following numbers is the one he cannot get?

A.	B.	C.	D.	E. We do not wish to answer
198	318	288	347	

CORRECT ANSWER: 20 POINTS	ANSWER „E": 0 POINTS	ELSE: –4 POINTS

6.4. The lengths of the sides of a triangle are 3.14 cm and 7.2 cm. If the length of the third side of the triangle is an even natural number, how many of such triangles exist?

A.	B.	C.	D.	E. We do not wish to answer
6	3	2	None of the above	

6.5. The greatest common factor of two numbers is 12, and their least common multiple is 240. How many such pairs of numbers exist?

A.	B.	C.	D.	E. We do not wish to answer
1	2	3	4	

6.6. Square *BDEC* is constructed above side $\overline{BC}$ of an equilateral triangle *AB*. What is the measure of the angle ∡*DAE*?

A.	B.	C.	D.	E. We do not wish to answer
15º	20º	30º	It depends on the length of the side of the triangle	

6.7. Mum and dad Srećkić live with grandma and have two children. For her birthday, they are buying grandma a rocking chair that costs 2452 kn. Since the chair is their shared gift, they arranged that both mum and dad pay three times the amount each child pays. What is the amount each child must pay?

A.	B.	C.	D.	E. We do not wish to answer
Less than 300 kn	306.50 kn	350.29 kn	More than 400 kn	

CORRECT ANSWER: 30 POINTS	**ANSWER „E": 0 POINTS**	**ELSE: –6 POINTS**

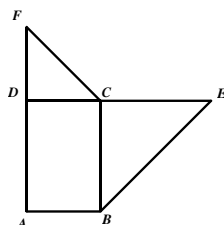6.8. When divided by a number, 150 and 168 have the same remainder. How many such numbers are there?

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
4	6	8	18	

6.9. The garden of the Zelenkić family is a square of area 400 m² and it consists of five equal parcels as shown on the picture. On the parcels on the edge, cucumbers have been planted, next to them tomatoes and in the middle, peppers. If they wish to surround the tomatoes with a tall fence, how many meters of the fence do they need?
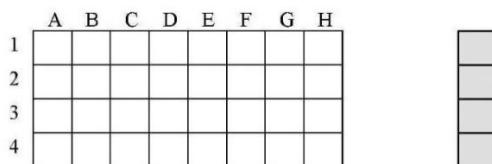

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
48 m	160 m	98 m	None of the given answers	

6.10. An isosceles right-angled triangle *BEC* ($|BC|=|CE|$), is constructed above the side $\overline{BC}$ of the rectangle *ABCD,* which is 3 cm long. An isosceles right-angled triangle *CDF* ($|CD|=|DF|$) is constructed above side $\overline{CD}$ which is 2 cm long. What is the sum of areas of triangles *ACE*, *ABF* i *CEF*?

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
12.5 cm²	12 cm²	13.5 cm²	14 cm²	

6.11. Mia wishes to tile a surface with dimensions 8 x 4 (as shown on the picture) with eight tiles of dimensions 4 x 1. In how many ways can she do that?

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
2	5	6	7	

6.12. In a sequence of natural numbers 2, 3…, we erase all numbers divisible by 2, and then we erase all numbers divisible by 3, and so on. After we have erased all numbers divisible by one-digit numbers (greater than 1), what is the sum of the digits of the fifth number in the leftover sequence?

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
11	8	5	It cannot be determined	

CORRECT ANSWER: 10 POINTS	**ANSWER „E": 0 POINTS**	**ELSE: –2 POINTS**

7.1. A four-student team of MAT 4-league solves tasks for 90 minutes in every round. Before the spring round, the youngest team member fell ill and couldn't participate. How much time does the three-student team have for solving the third round tasks.

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
67.5 min	120 min	90 min	60 min	

7.2. If Mario goes to school at 7:15 by bike, covering 3 km in 15 minutes, and arrives to school at 7:50, how far is the school from Mario's house?

A.	**B**.	**C**.	**D**.	**E**. We do not wish to answer
6.5 km	7 km	7.5 km	It cannot be determined	

7.3. On the first tree there are twice as many birds as on the third one. When three birds fly from the first tree to the second one, there will be the same number of birds on all three trees. How many birds were on the second tree at the beginning (before birds flew over)?

A.	**B**.	**C.**	**D**.	**E**. We do not wish to answer
11	8	6	16	

CORRECT ANSWER: 20 POINTS	**ANSWER „E": 0 POINTS**	**ELSE: –4 POINTS**

7.4. How many ordered pairs (x, y) of integers x and y satisfy the equality $\dfrac{5}{x} = \dfrac{y}{10}$?

A.	**B**.	**C.**	**D**. None of the above	**E**. We do not wish to answer
3	6	12		

7.5. Rectangle *ABCD* is given and on side $\overline{AD}$ point *E* so that the ratio of area of triangle *ABE* to area of triangle *BEC* is 3 : 4. In which ratio does point *E* divide the side $\overline{AD}$ starting at point *A*?

A.	**B**.	**C.**	**D**.	**E**. We do not wish to answer
3 : 1	2 : 1	4 : 1	It cannot be determined	

7.6. Jakov calculated that he will solve all tasks from the book if every day of the remaining 25 days till the National Maths Competition he solves 6 complex tasks. After 4 days, he decided to speed up and solve 7 tasks every day. How many days before the competition will he have solved all the tasks from the book?

A.	**B**.	**C.**	**D**. None of the above	**E**. We do not wish to answer
7	3	4		

7.7. A team got 212 points in the first round of the Maths competition, and 310 in the second round. How many points do they need at least in the third round, so that their average is above 280 points?

A.	B.	C.	D.	E. We do not wish to answer
317	319	318	None of the above	

CORRECT ANSWER: 30 POINTS   ANSWER „E": 0 POINTS   ELSE: –6 POINTS

7.8. When we subtract its least factor from a prime number, we get an odd number. For how many numbers is this true?

A.	B.	C.	D.	E. We do not wish to answer
0	1	4	Infinitely many	

7.9. If we take a four-digit number and add a three-digit number that we get when we erase the thousands digit from the first number, and we get the sum 5246. For how many four-digit numbers is this true?

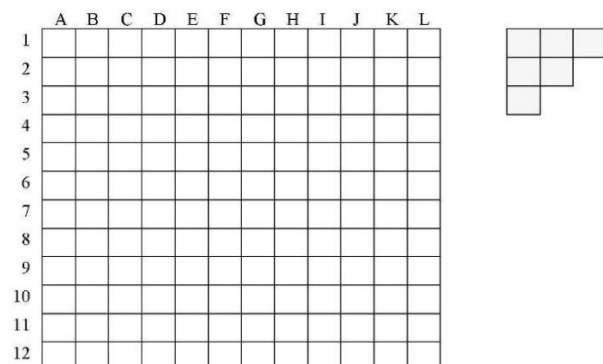| A.	B.	C.	D.	E. We do not wish to answer
3	1	2	It cannot be determined	

7.10. The diagonal $\overline{AC}$ of trapezium $ABCD$ has a length equal to the length of leg $\overline{BC}$ and base $\overline{CD}$. It divides the angle of the trapezium in vertex C in a ratio 3 : 1, where the greater angle is adjacent to the leg. What is the measure of the smallest angle in the trapezium?

A.	B.	C.	D.	E. We do not wish to answer
30º	33º	25º	36º	

7.11. There are 150 litres of wine in six barrels. In the first barrel there is three times as much wine as in the third one, in the second barrel there is half as much as in the sixth, in the fourth there is half the amount as is in the first, third and sixth together, in the fifth barrel there is four times more than in the second, and in the sixth barrel there is twice as much as in the first. How much wine is in the fourth barrel?

A.	B.	C.	D.	E. We do not wish to answer
14 litres	20 litres	22.5 litres	25 litres	

7.12. A worker wants to tile a surface with dimensions 12 x 12 (as shown on the picture) with 24 tiles of shape shown on the right. In how many ways, tiling like this, can he cover the first row of the surface?

A.	B.	C.	D.	E. We do not wish to answer
16	12	24	48	

| CORRECT ANSWER: 10 POINTS | ANSWER „E": 0 POINTS | ELSE: –2 POINTS |

8.1. Which of the given numbers is the smallest?

A.	B.	C.	D.	E. We do not wish to answer
$\dfrac{7}{2}$	$2\sqrt{3}$	$3.\dot{5}$	$3\sqrt{2}$	

8.2. What is the result of $(-10)^4 \cdot (-10^8)^3 : (-10)^5$?

A.	B.	C.	D.	E. We do not wish to answer
10^{23}	-10^{23}	-10^{15}	10^{15}	

8.3. The area of an equilateral triangle is $9\sqrt{3}$ cm². What is the length of its side?

A.	B.	C.	D.	E. We do not wish to answer
6 cm	3 cm	$3\sqrt{3}$ cm	$6\sqrt{3}$ cm	

| CORRECT ANSWER: 20 POINTS | ANSWER „E": 0 POINTS | ELSE: –4 POINTS |

8.4. Which digit is on the 2019th decimal place of number $\dfrac{169}{110}$ expressed as a decimal?

A.	B.	C.	D.	E. We do not wish to answer
6	3	5	1	

8.5. Over the hypotenuse of an isosceles right-angled triangle with the leg of length 1 cm, we construct a new isosceles right-angled triangle, so that the hypotenuse of the previous triangle is now a leg of the new triangle. We repeat this construction 15 times. What is the length of the hypotenuse of the 16th triangle?

A.	B.	C.	D.	E. We do not wish to answer
$128\sqrt{2}$ cm	128 cm	$256\sqrt{2}$ cm	256 cm	

8.6. Which of the following expressions is equal to $(x+2y)^2 - (2x-y)(x+3y) - y(x+6y)$?

A.	B.	C.	D.	E. We do not wish to answer
$8xy - x^2 - 5y^2$	$8xy - x^2 + 7y^2$	$6xy - x^2 - 5y^2$	$y^2 - 2xy - x^2$	

8.7. Which number cannot be the remainder after dividing a prime number by the number 6?

A.	B.	C.	D.	E. We do not wish to answer
1	5	4	Depends on the prime number	

CORRECT ANSWER: 30 POINTS   ANSWER „E": 0 POINTS   ELSE: –6 POINTS

8.8. What is the result of $\sqrt{2+\sqrt{3}}-\sqrt{2-\sqrt{3}}$?

A.	B.	C.	D.	E. We do not wish to answer
$\sqrt{2}$	$-\sqrt{2}$	0	$-2\sqrt{3}$	

8.9. In a rhombus with side length a, the angle between the longer diagonal and the side is 30°. What is the length of the shorter diagonal of the rhombus?

A.	B.	C.	D.	E. We do not wish to answer
$a\sqrt{3}$ cm	$\dfrac{a\sqrt{3}}{2}$ cm	$2a\sqrt{3}$ cm	None of the above	

8.10. Hansel and Gretel have 8 identical chocolates and 7 identical lollipops. In how many ways can they divide the candy amongst each other if each must get at leat two chocolates and at least three lollipops?

A.	B.	C.	D.	E. We do not wish to answer
7	15	10	8	

8.11. Line p_1 passes through points $A(2,4)$ and $B(5,6)$. Line p_2 has an x-intercept equal to 3 and the y-intercept equal to –9. What is the area of the triangle that these lines make with the x-axis?

A.	B.	C.	D.	E. We do not wish to answer
21	20	18	17.5	

8.12. What is the probability that out if all three-digit numbers we draw a number divisible by 3 or by 5?

A.	B.	C.	D.	E. We do not wish to answer
$\dfrac{8}{15}$	$\dfrac{133}{225}$	$\dfrac{118}{225}$	$\dfrac{7}{15}$	