

Grading Scheme
Experimental tour "Olympiad of Metropolises 2020"

No	Sub item	Question (criteria)	Overall for the question	Points	Comments
1		Ordinary and extraordinary rays	1		
	1.1	Specified correctly		1	
2		Axis direction	3		
	2.a	<i>Axis drawn correctly</i>		2	
	2.b	<i>The angles are written correctly (41 and 221 with an accuracy of 2, the angle difference is 179-181)</i>		1	
3		Ordinary or extraordinary	2		
		<i>«extraordinary»</i>		2	
4		The property of the smartphone screen	6		
	4.a	<i>«light polarization»</i>		2	
	4.b	<i>«polarization plane»</i>		2	
	4.c	<i>«directed vertically»</i>		2	
5		Screen illumination disappears	2		
		<i>«light is polarized»</i>		1	
		<i>«polarized linearly»</i>		1	
6.		«Dark Cross»	13		
	6.a	<i>«vertically»</i>		1	
	6.b	<i>«extraordinary»</i>		2	
	6.c	<i>«vertically»</i>		1	
	6.d	<i>«ordinary»</i>		2	
	6.e	<i>«elliptical»</i>		3	
	6.f	<i>e - radial</i>		2	
		<i>o - tangentially</i>		2	
7		Rings	6		
	7.a	Formula for ring number		3	
	7.b	Inequality for wavelengths		3	
8		half-wave plate	1		
	8.a	<i>Angle 45°</i>		1	
9		Peak power	2		
	9.a	<i>120 kW</i>		2	
10		Second harmonic	9		
	10.a	<i>Wavelength 532 nm</i>		1	
	10.b	<i>«horizontally»</i>		2	
	10.c	<i>«vertically» (plane only, if there is a correct arrow - all points) (correct arrow)</i>		2	
				1	
	10.d	<i>«horizontally» (plane only, if there is a correct arrow - all points) (correct arrow)</i>		2	
				1	
11		Third harmonic	13		
	11.a	<i>Wavelength 354-355 nm</i>		1	
	11.b	<i>«vertically»</i>		2	

	11.c	<i>«vertically» (plane only, if there is a correct arrow - all points) (correct arrow)</i>		2	
	11.d	<i>«extraordinary»</i>		2	
	11.e	<i>«ordinary»</i>		3	
12		Second harmonic conversion efficiency			
	12.a	<i>KDP 0.5 0,09 - 0,11% KDP 2.0 1,43 - 1,52% KD P4.0 2,7 - 2,8%</i>	3	1 1 1	
	12.b	<i>The answer is «Yes»</i>	3	3x1	
	12.c	<i>«quadratic dependence»</i>	1	1	
	12.d	<i>Double logarithmic scale A workable method to find a degree Calculation of coefficients for each KDP (degree 2, order of coefficient A)</i>	5	1 1 3x1	
13		Phase matching width	3		
	13.a	<i>Formula for calculation (if the values are correct, then this item is counted automatically) 2,0 cm – 0,93-0,94 mrad 4,0 cm – 0, 46-0,47 mrad</i>		1 1 1	
14		Second harmonic power versus length	11		
	14.a	<i>Graphs of the dependence of the second harmonic power on the first harmonic power The axes of the graphs are labeled and digitized All points are plotted Smoothing curves are presented</i>		1 1 1	
	14.b	<i>Justification of the answer Answer «No»</i>		2 1	
	14.c	<i>Reasons for difference from theory Beam divergence</i>		5	
15		Third harmonic	16		
	15.a	<i>cubic dependence</i>		2	
	15.b	<i>Degree «one and a half»</i>		2	
	15.c	<i>Double logarithmic scale Order of coefficient A Coefficient B is greater than 2, less than 3</i>		1 1 2	
	15.d	<i>Order of coefficient A Coefficient B is greater than 1, less than 1.5</i>		1 2	
	15.e	<i>Reasons for difference from theory: - filter transmission for fundamental and second harmonics</i>		5	