Round **Theo**

Group **α**

язык / language **English**

Evaluation criteria for problem № 1
of jury member Shumeiko Aleksandr (KG)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
1		Correct distance from Mars, $A = L^2/R = 1,1$ million km	1
2		Idea to compate this distance with the sitze of the Hill sphere	1
3		Distance to the positions of the Lagrange points	2
4		Conclusion $A > 1$	1
5		Conclusion „the situation is impossible"	1
(6)		A figure that is needed to accompany the solution	2
(7)	if wrong	(IF wrong issue about possibility) Calculation of a hypothetical period of the satellite	1
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

8

Jury member signature _____

Round **Theo**

Group **α**

язык / language **English**

Evaluation criteria for problem № 2
of jury member Romualda Lazauskaitė (Lithuania)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points	
1	L, J	Angular momentum $L = const$ Formula of moment of inertia	1	
2	Exp	Explanation of the process, measurements in graph	2	
3	Concl	Conclusion from explanation: period decrease, $\Delta h = -$ ...	1	
4	Calc	correct calculations	2	
5	Negl	Mentioned what can neglect	1	
6	Result	Correct final result	1	
		Equivalent correct parts of other ways of solution		8
		Extra conclusions or correct additions (add. to 8 pt)		

Jury member signature _____

Round **Theo**

Group **α**

язык / language **English**

Evaluation criteria for problem № 2
of jury member Andrew Simon (Ukraine)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
1		Correct estimation of st from graph	1
2		Described nature of the phenomen	2
3		Using angular momentum	1
4		Make conclusions about sign of ω_h	1
5		Using correct values for calculations	1
6		Correct formula	1
7		Correct answer	1
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

Jury member signature _____

Evaluation criteria for problem № 3
of jury member Stoian Lucian (ROMANIA)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
1.		- paths of comets are one the same elipse - movements of comets obey the laws kepler - at aphelion comets can not be seen beacause of limited resolution of the eye	1p.
		$a = \sqrt[3]{T^2}$ 0,4p. $a = 2,08$ AU 0,2p $A = a_{ceres} = 2,8$ AU (or. 2,7 AU) – distance Sun – comets at aphelion	
		$P = 2a - A$ – distance Sun – comets at perihelion, 0,4p $P = 1,36$ AU – 0,2p	
		$V_A \cdot A = V_p \cdot P$ 0,4p (kepler's second law) $L_A \cdot A = L_p \cdot P$ 0,4p	
2.		$\alpha = \frac{L_A}{A - 1AU}$ 0,4p angular distance as seen from Earth aphelion $\beta = \frac{L_P}{1 - 1AU}$ 0,4p – " – perihelion	4p
		$\beta = \alpha \cdot \frac{A}{P} \cdot \frac{A - 1AU}{P - 1AU}$ 0,4p.	
		$\alpha < \delta$ 0,2p $\delta \simeq 1' \div 2'$ angular resolution for human eye 0,2p.	
3.		$\beta = \alpha \cdot \frac{A}{P} \cdot \frac{A - 1UA}{P - 1UA} \simeq 10,3' \simeq 10' - 2p.$	2p.
4		For corect picture. 1p. Observation: And if it missing figure is given but all algebraic calculations are corect	1p
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

Jury member signature _____

Evaluation criteria for problem № 3
of jury member Mikhail Kuznetsov (ML)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
1	III-d Kepler Law	a) $T^2/a^3 = 1 \Rightarrow a = 2,08 \approx 2,1$ a.u → 1pt b) $T = \frac{2\pi a}{v}$; $v = \sqrt{\frac{GM}{a}}$ → 0,5pt c) wrong formulae or not used III-d law → 0pt	
2	q - Perigelion	a) $q = a(1-e) = 2a - Q$ with right calcul. → 1pt b) If some calculation mistake → 0,5pt c) wrong formulae or now answer → 0pt	
3	Q - Aphelion	a) $Q \in [2,5 - 3,5$ a.u] → 0,5pt b) $Q \notin [2,5 - 3,5$ a.u] → 0pt	
4	Opposition on perigelion	a) calculate synodic period or conclude that from 1,5 year comet will be in opposition → 1pt b) Use q because it is the min distance or without assumptions → 0,5pt c) no use q → 0pt	
5	II-d Kepler Law	a) correct use → 2pt b) use with mistake → 1pt c) conclude Δ between comet must change → 0,5pt d) Δ between comets in q and Q not change → 0pt	
6	Naked eye	a) $\alpha \in [1'; 2']$ → 0,5pt b) $\alpha \notin [1'; 2']$ → 0pt	
7	Angular distance	a) $\beta_Q = L_Q/Q$ - 1 a.u; $\beta_q = L_q/q$ - 1 a.u. $\frac{\beta_Q}{\beta_q} = \frac{q(s-1)}{Q(Q-1)}$ → 1pt b) α [rad] $= \frac{R}{L} = \arctan(\frac{R}{L})$ → 0,5pt c) no correct or now formulae → 0pt	
8	Final answer	a) $\beta_q \approx 10,3'$ or another correct with $Q \in [2,5; 3,5$ a.u] → 1pt b) $\beta_q >$ naked eye limit → 0,5pt c) $\beta_q <$ naked eye limit → 0pt	
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

Jury member signature Кузнецов

Round **Theo**

Group **B**

язык / language **English**

Evaluation criteria for problem № 4
of jury member V. NAGNIBEDA (RU) country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
	1	Evening – 1 pt The comet goes from the right side of Moon – 1 pt	2
	2	The constellations: Gemini, Cancer	1
	3	The Moon in the north-west – 1 Greek army saw the event – 1	2
	4	Artistic drawing with correct position of the Moon+comet	1
	5	Full solution and dates of June 7-9 – 2pt partial solution – 1pt	2
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

Jury member signature V. Nagnibeda

Evaluation criteria for problem № 5
of jury member BAN (CN)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points
1		Using the distance of the Sun	1
2		Using the distance of the earth	1
3		Using the sizes of the objects	1
4		Thinking about the albedo of the objects	1
5		The right formula	2
6		Final result from the data used	1
7		Correct accuracy in the answer	1
		Using wrong distance of main belt and Kuiper belt will get apart of point No.1	
		Only thinking about the relationship of distance and size will get part of point No.5	
		Thinking about the resolution of the telescope will get part of point No.5	
		Equivalent correct parts of other ways of solution	8
		Extra conclusions or correct additions (add. to 8 pt)	

8

Jury member signature BAN

Round **Theo**

Group **α**

язык / language **English**

Evaluation criteria for problem № 5
of jury member VALENTINI GAETANO (IT)
country

№	Abbreviation (if used in table)	Explanations of gradating sub-points	N of points	
		USING THE DISTANCE FROM THE SUN (0.5 FOR EACH DISTANCE)	1	
		USING THE DISTANCE FROM THE EARTH (0.5 FOR EACH DISTANCE)	1	
		USING THE RATIO OF SIZE BODY	1	
		USING THE ALBEDO EFFECT ON L (0.5 IF USE ONLY ONE GOOD VALUE)	1	
		USING FORMULA < RATIO OF PARAMETER / ANGULAR RESOLUTION OF TELES.	2	
		RESULT	1	
		ACCURACY (1 digit)	1	
		Equivalent correct parts of other ways of solution	8	8
		Extra conclusions or correct additions (add. to 8 pt)		

Jury member signature _____