

Mark Scheme

Q1.

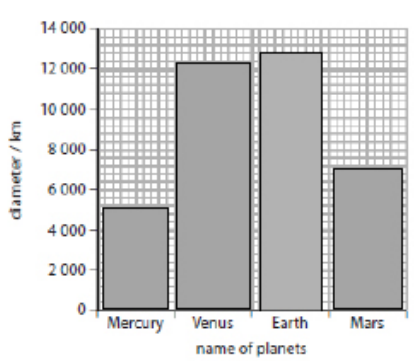
	Answer	Acceptable answers	Mark
	D		(1)

Q2.

Question Number	Answer	Additional guidance	Mark
(i)	gravitational / centripetal (1)	accept gravity / weight / gravitational field strength	(1) AO 2 1

Question Number	Answer	Additional guidance	Mark
(ii)	arrow from the satellite towards the centre of Earth – by eye (1)	direction must be clear	(1) AO 2 1

Q3.

	Answer	Acceptable answers	Mark
(i)	 <p>A bar chart showing the diameter of four planets. The vertical axis is labeled 'diameter / km' and ranges from 0 to 14,000 with major grid lines every 2,000 units and minor grid lines every 100 units. The horizontal axis is labeled 'name of planets' and lists Mercury, Venus, Earth, and Mars. The bars represent the following approximate diameters: Mercury (4,800 km), Venus (12,100 km), Earth (12,800 km), and Mars (6,800 km).</p>		(2)

	Mercury 4 900 km Venus 12 100 km Mars 6 800 km Three correct (2) One or two correct (1) + or - one square Judge by eye		
(ii)	Correct information from table 1.52 (1) Conversion to kilometres (1.52) × 150 000 000 (1)	Seen anywhere in the answer Incorrect information shown to be used correctly (1) Correct answer, no working scores full marks 228 000 000 / 2.28×10^8 (km) 228 to any power of 10, allow 1 mark if no other mark awarded. 225 000 000 / 2.25×10^8 (km), allow max 1 mark if no working shown.	(2)

Q4.

Question Number	Answer	Additional guidance	Mark
(i)	examples: planets have moons (1) the Earth rotates (spins) (1) planets orbit the Sun (1) Pluto is no longer a planet (1) orbits are elliptical (not circular) (1) there are more planets than previously thought (1) ours is not the only solar system (1) Earth is {round/spherical/not flat} (1) planets are not wandering stars.	answers must be to do with the solar system	(1)

Question Number:	Answer	Additional guidance	Mark
(ii)	<p>smooth curve drawn on the graph (1)</p> <p>horizontal line drawn from 4.6 Earth years to intercept the drawn line/curve (1)</p> <p>EITHER: their reading from line / curve (1)</p> <p>OR</p> <p>430±30 (million km) (1)</p>	<p>accept curve up to Mars followed by a straight line</p> <p>plot point at year length = 4.6</p> <p>reading on distance axis ± half small square from their graph</p> <p>award full marks for the correct answer without working</p>	(3)

Q5.

Question Number	Indicative Content	Mark
QWC *	<p>A description including some of the following points</p> <p>evidence for</p> <ul style="list-style-type: none"> idea of Sun, Moon, stars or planets moving across the sky (not just orbiting) in the same direction pattern is repeated appear to be going around the Earth same every day <p>evidence against</p> <ul style="list-style-type: none"> moons of {Jupiter/ other planet (with moons)} appear to {orbit/ go around} {Jupiter/ other planet} movement of Sun etc. not quite the same each day planets do not move in a simple path retrograde (west-east) motion of planets <p>If no other marks scored</p> <ul style="list-style-type: none"> heliocentric model = Level 1 	(6)

Level	0	No rewardable content
1	1 - 2	<ul style="list-style-type: none"> a limited description stating one fact for or against e.g. for – the Sun / stars move across the sky OR against - Jupiter has moons OR against - (Galileo) produced the {heliocentric / sun-centred} model the answer communicates ideas using simple language and uses limited scientific terminology e.g. some correct names for the moving objects spelling, punctuation and grammar are used with limited accuracy
2	3 - 4	<ul style="list-style-type: none"> a simple description involving (linked) facts e.g. the Sun and stars move across the sky AND do the same thing each day OR moons orbit Jupiter OR one fact for AND one against e.g. the sun moves across the sky but changes from day to day the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately e.g. correct names for the moving objects spelling, punctuation and grammar are used with some accuracy
3	5 - 6	<ul style="list-style-type: none"> a detailed description of arguments for AND against, including at least one link. e.g. the Sun and stars move across the sky. Galileo observed moons, which orbit Jupiter. the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately spelling, punctuation and grammar are used with few errors

Q6.

	Answer	Acceptable answers	Mark
(i)	<p>An explanation linking three of the following:</p> <ul style="list-style-type: none"> the (objective) lens (1) collects light (from Jupiter) (1) focuses/converges/refracts the light (1) (objective) produces a real image (1) (at the) focal point (1) (Image is viewed by the) eyepiece lens (1) (Eyepiece) produces a virtual image (1) 	<p>Marks can be awarded for a labelled diagram</p>	(3)
(ii)	<p>An explanation linking the following: (the geocentric model)</p> <ul style="list-style-type: none"> has the Earth at the centre of the Universe/solar system / everything orbits the Earth (1) <p>(but Galileo observed)</p> <ul style="list-style-type: none"> moons of Jupiter (1) 	<p>Accept alternative argument:</p> <p>Galileo observed moons/stars/objects Orbiting/going round Jupiter</p>	(3)

	<ul style="list-style-type: none"> • (so) not all things orbit the Earth/ geocentric model is wrong (1) 	(this) suggested that not everything orbits the Earth	
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Q7.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	B red giant (1)		(1)

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	C the Milky Way (1)		(1)

Question Number	Answer	Acceptable answers	Mark
(a)(iii)	D Proxima Centauri (1)		(1)

Question Number	Answer	Acceptable answers	Mark
(b)	description to include: <ul style="list-style-type: none"> • method (1) • relevant detail (1) 	Telescope (inc. radio telescopes) Lander (e.g. robots/drones) Orbiter / Satellite has camera / takes photos / collecting samples (e.g rocks) / analyse atmosphere / climate / signs of water / gases that will support life / can test for water/nutrients ignore repeat of stem	(2)

Question Number	Answer	Acceptable answers	Mark
(c)(i)	explanation linking two from: <ul style="list-style-type: none"> (on Earth) image is distorted / image not bright enough (ORA) (1) planets very small / far away (1) atmosphere (in way) / light pollution (1) can detect different parts of em spectrum (that are not detectable on Earth) (1) can keep it pointed at the same spot more easily (1) 	Reverse arguments apply throughout (above atmosphere gives) more defined / clearer / better image obscured by clouds waves can be detected (that are not detectable on Earth) not affected by Earth's rotation	(2)

Question Number	Answer	Acceptable answers	Mark
(c)(ii)	Suggestion: <ul style="list-style-type: none"> planet takes 150 days to orbit the star (1) 	has 150 days in a year	(1)

Q8.

	Answer	Acceptable answers	Mark
(a)(i)	D		(1)
(a)(ii)	moons (1) heliocentric (1)	must be in correct order	(2)
(a)(iii)	A description including two of the following points Reflecting telescope has mirror(s) (1) Galilean telescope has only lenses (1) Reflecting telescope can gather more light / can have a larger objective (1) Image viewed from the side of reflecting telescope (1) Image viewed from end of Galilean telescope. (1)	refracting telescope reverse argument	(2)
(b)(i)	5 (cm) (1) 8 (cm) (1)	+5 -5 0.08 m 80 mm	(2)
(b)(ii)	B		(1)

Q9.

	Answer	Acceptable answers	Mark
(a)(i)	<input checked="" type="checkbox"/> D ROS		(1)
(a)(ii)	<input checked="" type="checkbox"/> C changes changes		(1)
(b)(i)	<p>An explanation linking three of the following:</p> <ul style="list-style-type: none"> • the (objective) lens (1) • collects light (from Jupiter) (1) • focuses/converges/refracts the light (1) • (objective) produces a real image (1) • (at the) focal point (1) • (Image is viewed by the) eyepiece lens (1) • (Eyepiece) produces a virtual image (1) 	Marks can be awarded for a labelled diagram	(3)
(b)(ii)	<p>An explanation linking the following: (the geocentric model)</p> <ul style="list-style-type: none"> • has the Earth at the centre of the Universe/solar system / everything orbits the Earth (1) <p>(but Galileo observed)</p> <ul style="list-style-type: none"> • moons of Jupiter (1) • (so) not all things orbit the Earth/ geocentric model is wrong (1) 	<p>Accept alternative argument:</p> <p>Galileo observed moons/stars/objects Orbiting/going round Jupiter</p> <p>(this) suggested that not everything orbits the Earth</p>	(3)
(c)	<p>$2100/500 = 4.2$ (1)</p> <p>$4.2 \times 150 = 630$ (million km) (1)</p> <p>Accept ratios as speed is constant</p> <p>$150/500 = \text{distance to Jupiter}/2100$</p> <p>OR</p> <p>Distance to Jupiter = $(150/500) \times 2100$</p> <p>Either for 1 mark</p>	<p>Power of 10 error maximum of 1 mark</p> <p>(speed of light) about $150\,000\,000 \div 500 = 300\,000$ (km/s) (1)</p> <p>(distance to Jupiter)= $300\,000 \times 2100$</p> <p>= $630\,000\,000$</p> <p>km (1)</p> <p>/ = 630 (million km)</p> <p>An answer with no calculation of 630 (million km) gains 2 marks If an answer of 630 million/ 630 000 000 is</p>	(2)

	given with correct working award both marks	
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