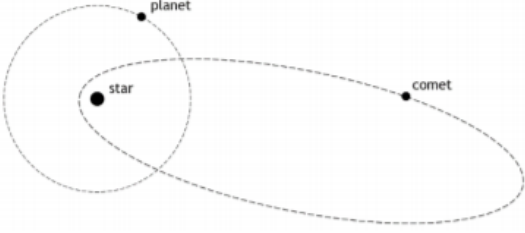


Astrophysics Past Paper Answers IGCSE Edexcel

1.

Question number	Answer	Notes	Marks
1 (a)	one mark for each correct label;;; 	allow 'Sun' for star named planet / 'Earth' for planet	3
(b)	arrow direction from moon towards Earth;	judge by eye ignore starting position of arrow	1
(c)	galaxy / universe;	accept known galaxies e.g. milky way, andromeda	1

Total for question 1 = 5 marks

2.

Question number	Answer	Notes	Marks
2 (a)	any two from: MP1. different orbital radii; MP2. different orbital path lengths; MP3. different eccentricity; MP4. different speeds; MP5. different time periods;	allow specific statements involving a comparison e.g. Mercury orbits closer to the Sun Earth travels a greater distance in its orbit Mercury's orbit is more elliptical, Sun more centralised for Earth's orbit Mercury travels faster Earth takes longer to complete an orbit	2
(b)	any two from: MP1. variable orbital radii; MP2. variable orbital speed; MP3. different planes of orbit; MP4. different eccentricity; MP5. different orbital path lengths;	allow specific statements involving a comparison e.g. distance from Earth to Sun stays constant but comet's distance changes Earth orbits at constant speed but speed of comet changes comet's orbit is more elliptical, Sun more centralised for Earth's orbit comet travels a greater distance in its orbit	2

Total for question 2 = 4 marks

3.

Question number	Answer	Notes	Marks
a	any two from: MP1. comets orbit the Sun but moons orbit planets; MP2. moons have (approximately) circular orbits but comets have elliptical orbits; MP3. a comet has variable speed but a moon's speed is (approximately) constant;	allow 'comet orbits are more elliptical'	2
b (i)	gravitational potential energy = mass x g x height;	allow rearrangements and standard symbols e.g. GPE = mgh reject 'gravity' for g	1
(ii)	substitution; rearrangement; evaluation to more than 1 significant figure; e.g. 2.2 = 0.75 x 1.6 x height (height =) 2.2 / (0.75 x 1.6) (height =) 1.83333...	award 2 marks max. if mass not converted to kg giving 0.00183	3
(iii)	2.2 (J);		1
(iv)	any three from: MP1. gravitational field strength is greater on the Earth; MP2. (therefore) hammer has a greater weight on Earth; MP3. (therefore) astronaut has to apply a greater force (to lift the hammer); MP4. hammer gains more GPE on Earth;	allow use of g = 10 in calculation condone 'gravity is more on Earth' ORA allow 'downward force greater' condone 'hammer is heavier' GPE on Earth is 15J gains MP1 and MP4	3
c	substitution; rearrangement; evaluation of time period; evaluation of number of orbits; e.g. $7.66 = \frac{2\pi \times 6780}{T}$ (T =) $\frac{2\pi \times 6780}{7.66}$ (T =) 5560 (s) (number of orbits = (24x60x60) / 5560 =) 15.5	allow method of finding total distance travelled and dividing by distance of one orbit (2πr) 5561 allow 15, 16	4

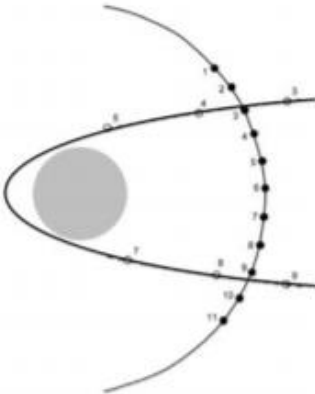
4.

Question number	Answer	Notes	Marks
(a) (i)	<p>C – Holmes;</p> <p>The only correct answer is C</p> <p>A is not correct because it's a planet</p> <p>B is not correct because it's a galaxy</p> <p>D is not correct because it's a moon</p>		1
(ii)	<p>B – Hoag's Object;</p> <p>The only correct answer is B</p> <p>A is not correct because it's a planet</p> <p>C is not correct because it's a comet</p> <p>D is not correct because it's a moon</p>		1
(b)	<p>B – Milky Way;</p> <p>The only correct answer is B</p> <p>A is not correct because it's a different galaxy</p> <p>C is not correct because it's a different galaxy</p> <p>D is not correct because it's a different galaxy</p>		1

5.

Question number	Answer	Notes	Marks
(a) i	B a 1 kg mass would weigh more on Earth than on Uranus;		1
ii	C 4 N/kg;		1
b i	conversion into s; substitution into correct equation (no mark for equation); rearrangement; evaluation; e.g. $1350 = \frac{2 \times \pi \times r}{1820 \times 60}$ $r = \frac{1350 \times 1820 \times 60}{2 \times \pi}$ $= 23\,500\,000 \text{ (m)}$	factor of 60 seen $\text{orbital speed} = \frac{2 \times \pi \times \text{orbital radius}}{\text{time period}}$ 23 462 621(m) POT error loses one mark 391 000 gains 3 marks	4
ii	A		1

6.

Question number	Answer	Notes	Marks
6 (a) (i)	Comet orbit behind Sun completed correctly;	Dashed or solid curved line	1
	(ii) X marked anywhere in grey area;	No need to label X as "Sun" X should be left of the imaginary 5-7 line, reject X placed outside the orbit	1
	e.g. 	the curve should be 'pointy' not a part of a circle, such that distance week6-week 5 > distance week 5-week4	
	(iii) Any one of the following ideas- MP1. comet was behind/near the Sun; MP2. comet was obscured/eclipsed by Sun; MP3. light from comet could not reach astronomer; MP4. Sun too bright to allow observation; MP5. we should not look directly at the Sun;	Allow labelled sketch	1
	(iv) C – week 9;		1
	(v) Any two of - MP1. Same time between observations; MP2. Different distances between observations; MP3. Speed = distance ÷ time;	Allow specific reference to 'a week' as the same time between observations	2

(vi)	<p>Any one of - Energy argument - transfer of GPE to KE (ORA);</p> <p>Force argument, e.g. pulled by the Sun's gravitational force;</p>	<p>Ignore</p> <ul style="list-style-type: none"> • unqualified 'pulled by gravity' • gravitation from other bodies 	1
(b)	<p>Substitution into given formula;</p> <p>Conversion from days to hours; Calculation; e.g. $v = 2 \times \pi \times 150\,000\,000 \div (365 \times 24)$ = 110 000 (km/hour)</p>	<p>24 seen</p> <p>107 589/108 000 (km/hour) Allow due π (ONLY) a number that rounds to 110 000</p> <p>2 582 130 = 2 (no 24 hr) 43 036 = 2 (used 60 instead of 24)</p>	3

Total 10 marks

7.

Question number	Answer	Notes	Marks
2 (a)	any suitable from: e.g. <ul style="list-style-type: none"> • asteroid; • meteor(ite); • (artificial) satellite; • a moon; • comet; • <u>named</u> planet; <ul style="list-style-type: none"> • dwarf planet e.g. Pluto; • neutron star; • white dwarf; any two suitable from: <ul style="list-style-type: none"> • (the) Universe; • galaxy; • solar system; • star / Sun; <ul style="list-style-type: none"> • <u>named</u> planet (1); • <u>named</u> planet (2); galaxy;	accept appropriate correct answers planets: <ul style="list-style-type: none"> • Mercury • Venus • Mars 'Sun and star' is 1 mark only planets should be gas giants: <ul style="list-style-type: none"> • Jupiter • Saturn • Uranus • Neptune 	4
(b) (i)	gravitational force / gravitational pull / (force of) gravity;		1
(ii)	B;		1
(iii)	single straight arrow directed towards the Sun;	judge by eye	1