

Mark Scheme (Results)

Summer 2010

GCSE

GCSE Astronomy (1627)

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Question Number	Answer	Mark
1(a)	The Plough	1

Question Number	Answer	Mark
1(b)	Polaris	1

Question Number	Answer	Mark
1(c)	North	1

Question Number	Acceptable Answers	Reject	Mark
1 (d)	Ursa Major Great Bear	Ursa Minor Little Bear Bear Big Dipper	1

Question Number	Answer	Mark
2(a)	The Sun	1

Question Number	Answer	Mark
2(b)	The Moon	1

Question Number	Answer	Mark
2(c)	full	1

Question Number	Answer	Mark
2(d)	4 minutes	1

Question Number	Answer	Mark
2(e)	corona	1

Question Number	Answer	Mark
3(i)	radio (waves)	1

Question Number	Answer	Mark
3(ii)	radio (waves)	1

Question Number	Answer	Mark
3(iii)	X-rays	1

Question Number	Answer	Mark
3(iv)	Radio (waves)	1

Question Number	Answer	Mark
3(v)	X-rays	1

Question Number	Answer	Mark
4(a)	Any one of: <ul style="list-style-type: none"> • cooler/darker regions on 'surface' of Sun • regions of strong magnetic fields 	1

Question Number	Answer	Mark
4(b)	<ul style="list-style-type: none"> • dark central umbra (labelled) • lighter penumbra (labelled) surrounding umbra 	1 1 (2)

Question Number	Answer	Mark
4(c)	<ul style="list-style-type: none"> • Brief description of method (projection/pinhole camera/special filters) 	1

Question Number	Answer	Mark
4(d)	<ul style="list-style-type: none"> • Sketch showing an arc of gas extending from photosphere/chromosphere. 	1

Question Number	Answer	Mark
5(a)	Galileo Galilei	1

Question Number	Answer	Mark
5(b)	Uranus	1

Question Number	Answer	Mark
5(c)	Venus	1

Question Number	Answer	Mark
5(d)	Oort Cloud	1

Question Number	Answer	Mark
6(a)	<p>Any one of the following differences:</p> <ul style="list-style-type: none"> • Pluto's orbit more elliptical/elongated (than Neptune's)/greater eccentricity (of Pluto's) • Plane of Pluto's orbit is far more inclined to ecliptic • Inclination of Pluto's orbit higher 	(1)

Question Number	Answer	Mark
6(b)	<p>Any two of the following reasons:</p> <ul style="list-style-type: none"> • Pluto did not match pattern (4 rocky planets followed by 4 gas giants)/low density ice/rock • Many objects similar to Pluto were discovered beyond Neptune • Pluto is very small • Pluto has not cleared its orbit • Any of responses to 6(a) not included 	(2)

Question Number	Answer	Mark
6 (c)	<p>Any two of the following points, up to a maximum of two marks:</p> <ul style="list-style-type: none"> • discovered photographically • ...since 'object' had moved • discovered by Clyde Tombaugh • some mention of Lowell Observatory • position of planet predicted (incorrectly!) <p style="text-align: right;">(2 x 1)</p> <p>QWC mark - sensible order and good spelling/grammar</p>	<p>2</p> <p>1</p> <p>(3)</p>

Question Number	Answer	Mark
7(a) (i)	sea /seas / mare / maria	1
7(a) (ii)	any two of: <ul style="list-style-type: none"> • large (excavated) basins • filled with lava • volcanic activity 	2 (3)

Question Number	Answer	Mark
7(b) (i)	dividing line between day and night/light and dark	1
7(b) (ii)	any two of: <ul style="list-style-type: none"> • contrast / relief enhanced • due to low/shallow angle of the Sun • allows crater heights to be determined 	2 (3)

Question Number	Answer	Mark
8(a)	June	1

Question Number	Answer	Mark
8(b)	The Sun lies on the celestial equator	1

Question Number	Answer	Mark
8(c)	Any two of the following points, up to a maximum of two marks: <ul style="list-style-type: none"> • Earth's northern hemisphere is tilted towards the Sun • Sun is generally higher in the sky / above the horizon longer 	
	(2 x 1)	2
	Correctly labelled, relevant diagram	1
	QWC mark - terminology, capital letters	1
		(4)

Question Number	Answer	Mark
9(a) (i)	Elliptical / E	1
9(a) (ii)	Spiral / S / Sa / Sb / Sc	1
		(2)

Question Number	Answer	Mark
9(b)	<u>Nearby</u> cluster of (a small number of) galaxies	1

Question Number	Answer	Mark
9(c)	<p>Any two of the following differences up to a maximum of two marks:</p> <ul style="list-style-type: none"> • Quasars have high redshifts/are much more distant • Quasars emit radio waves/X-rays • Quasars appear star-like (not 'extended') • highly (most) luminous • etc. <p>(2 x 1)</p>	(2)

Question Number	Answer	Mark
10(a)	Apollo	1

Question Number	Answer	Mark
10(b)	No air/atmosphere (on the Moon)...	1
	...so not scattering of light (by atoms/molecules/particles)	1
		(2)

Question Number	Answer	Mark
10(c)	384 000 (km) 2	2
	OR (if forgot to halve)	
	768 000 (km) 1	(2)
	Ignore missing unit but penalise (-1) if incorrect unit	

Question Number	Answer	Mark
10(d)	Any two of the following purposes up to a maximum of two marks:	
	<ul style="list-style-type: none"> • Collection/return of rock samples • Deploy scientific experiments of lunar surface • Study Moonquakes • Study the solar wind • etc. 	
	(2 x 1)	(2)

Question Number	Answer	Mark
10(e)	Chemical energy stored in fuel...	1
	...is converted to (gravitational) potential energy / kinetic energy (to overcome escape velocity)	1
		(2)

Question Number	Answer	Mark
11(a)	Two bands/doughnut shaped rings of <u>charged</u> particles...	1
	...above the Earth's atmosphere/above equator	1 (2)

Question Number	Answer	Mark
11(b) (i)	<u>charged</u> (1) particles from the Sun	1
11(b) (ii)	Sun's corona	1 (2)

Question Number	Answer	Mark
11(c)	coloured streamers/light/curtains in the sky	1
	High latitudes/above the Arctic/Antarctic circle	1 (2)

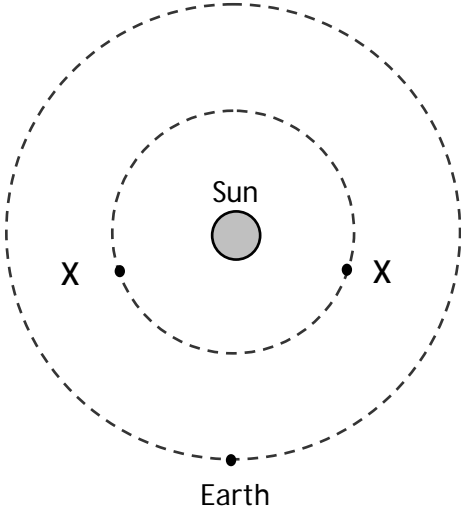
Question Number	Answer	Mark
12(a) (i)	Any two of: <ul style="list-style-type: none"> • relatively old/twice as old as the Sun • compact/rel. close together • about 100 000 stars (10^5 OR 10^6) • redder / cooler stars • etc. <p style="text-align: right;">(2 x 1)</p>	2

Question Number	Answer	Mark
12(a) (ii)	galactic halo/spherical distribution centred on galactic centre	1

Question Number	Answer	Mark
12(b) (i)	Any two of the following examples up to a maximum of two marks: <ul style="list-style-type: none"> • relatively young stars • gravitationally close together • few hundred stars • lots of gas/dust still present • etc. <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
12(b) (ii)	in the spiral arms / disc (of our galaxy)	1

Question Number	Answer	Mark
13(a)	Mercury and Venus (must have both)	1

Question Number	Answer	Mark
13(b) (i)	 <p>X shown on inner orbit close to either position 1 X shown so that Earth - X - Sun makes 90 degrees 1</p>	(2)

Question Number	Answer	Mark
13(c)	Transit	1

Question Number	Answer	Mark
13(d)	6.7 AU 2 or 5.7 AU 1 (concession) Must have unit (AU) or lose 1 mark	2

Question Number	Answer	Mark
14(a)	<p>Any two of the following advantages up to a maximum of two marks:</p> <ul style="list-style-type: none"> • clearer/less turbulent air so clearer images • far away from light/chemical pollution • above weather • IR observations possible • drier air • etc. <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
14(b)	4 1	1

Question Number	Answer	Mark
14(c)	<p>Any two of the following advantages up to a maximum of two marks:</p> <ul style="list-style-type: none"> • higher/better <u>resolution</u> • shorter observing times • etc. <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
14(d)	<p>Any two of the following disadvantages up to a maximum of two marks:</p> <ul style="list-style-type: none"> • difficult/impossible to repair • limited lifetime • possibility of meteoroid strike/ionising radiation • etc. <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
14(e)	Spacecraft/instruments emit infra-red unless cooled / causes background 'noise'	1

Question Number	Answer	Mark
15(a)	6	1

Question Number	Answer	Mark
15(b)	25 2 Allow 1 mark for 5 (times)	2

Question Number	Answer	Mark
15(c) (i)	Jupiter	1
15(c) (ii)	Largest mass/pull of gravity DO NOT ACCEPT size (ignore)	1 (2)

Question Number	Answer	Mark
16(a)	Relative brightness/ α brightest, then β etc.	1

Question Number	Answer	Mark
16(b) (i)	2.5	1
16(b) (ii)	40	1 (2)

Question Number	Answer	Mark
16(c) (i)	True brightness of star (vague statement) 1 Equal to apparent magnitude at 10 pc (formal definition) 2	2

Question Number	Answer	Mark
16(c) (ii)	α 1	2
16(c) (iii)	both are equally bright but α has smaller apparent magnitude so brighter 1	

Question Number	Answer	Mark
17(a)	<p>Any three of the following labelled features up to a maximum of three marks:</p> <ul style="list-style-type: none"> • nucleus • coma • gas tail • dust tail <p style="text-align: right;">(3 x 1)</p>	(3)

Question Number	Answer	Mark
17(b)	<p>Any two of the following differences up to a maximum of two marks:</p> <ul style="list-style-type: none"> • 'open' orbit for comet ('closed' for planet) • much longer orbital period • comets orbit the Sun in any plane (not close to ecliptic) • comets can orbit in either sense (allow direction!) • etc. <p style="text-align: right;">(2 x 1)</p> <p>REJECT not circular</p>	(2)

Question Number	Answer	Mark						
17(c)	<table style="width: 100%; border: none;"> <tr> <td style="width: 80%;">fluorescence/glowing/excitation</td> <td style="width: 10%; text-align: center;">1</td> <td style="width: 10%;"></td> </tr> <tr> <td>reflection (of sunlight)</td> <td style="text-align: center;">1</td> <td></td> </tr> </table>	fluorescence/glowing/excitation	1		reflection (of sunlight)	1		(2)
fluorescence/glowing/excitation	1							
reflection (of sunlight)	1							

Question Number	Answer	Mark
18(a) (i)	Axes labelled 1 Sketch showing repeated 1 ...sharp rise and slow decline 1	3

Question Number	Answer	Mark
18(a) (ii)	Star is expanding and contracting / pulsating / vibrating / changing size (on a regular basis) 1	1

Question Number	Answer	Mark
18(b)	Sketch showing sharp rise 1 ...and slow decline 1 Ignore any axes (tested in 18 (a) (i))	2

Question Number	Answer	Mark
19(a)	Wavelengths of light from galaxies/stars is longer/redder/Doppler-shifted (due to motion away from us).	1

Question Number	Answer	Mark
19(b)	<p>Any two of the following reasons up to a maximum of two marks:</p> <ul style="list-style-type: none"> • allows us to determine recession velocities of galaxies • provides evidence for an expanding Universe • allows cosmologists to study the Universe at different epochs <p style="text-align: right;">(2 x 1)</p> <p>QWC mark - logical order; relevance to cosmology 1</p>	(3)

Question Number	Answer	Mark
19(c)	Matter in the Universe that does not emit light/is undetected/has gravitational force/is invisible/not 'ordinary'	1

Question Number	Answer	Mark
19(d)	<p>Any two of the following reasons up to a maximum of two marks:</p> <ul style="list-style-type: none"> • allows us to determine the mass of the Universe • allows us to predict the fate of the Universe (whether it will continue to expand etc.) • explaining galactic rotation <p style="text-align: right;">(2 x 1)</p>	(2)

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