

# Mark Scheme Summer 2009

GCSE

## GCSE Astronomy (1627)

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**1627/01 GCSE Astronomy Mark Scheme  
Summer 2009**

Question Number	Answer	Mark
<b>1 (a)</b>	Sun	<b>1</b>

Question Number	Answer	Mark
<b>1 (b)</b>	1 Astronomical Unit	<b>1</b>

Question Number	Answer	Mark
<b>1 (c)</b>	3500 km	<b>1</b>

Question Number	Answer	Mark
<b>1 (d)</b>	an ellipse	<b>1</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (a)	Mercury	Accept <ul style="list-style-type: none"> <li>• phonetic spellings, Eg mercury, Murcury</li> </ul>		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (b)	Mars	Accept <ul style="list-style-type: none"> <li>• phonetic spellings, Eg mars,</li> </ul>		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (c)	Venus	Accept <ul style="list-style-type: none"> <li>• phonetic spellings, Eg venus, Venice</li> </ul>		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
2 (d)	Jupiter	Accept <ul style="list-style-type: none"> <li>• phonetic spellings, Eg jupiter, Joopitur</li> </ul>		1

Question Number	Answer	Mark
3 (a)	Magellan	1

Question Number	Answer	Mark
3 (b)	Giotto	1

Question Number	Answer	Reject	Mark
3(c)	<p>Any two of the following examples of problems associated with human spaceflight, up to a maximum of two marks:</p> <ul style="list-style-type: none"> <li>• muscle fatigue</li> <li>• brittle bones</li> <li>• meteoroid/asteroid strike</li> <li>• boredom</li> <li>• no rescue mission</li> <li>• radiation</li> <li>• space sickness</li> <li>• communication delays</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<p>responses not related to space missions</p> <p>Eg running out of fuel, lack of oxygen, run out of food</p> <p>Gravity without clarification</p>	2

Question Number	Answer	Mark
4 (a)	full	1

Question Number	Correct Answers	Acceptable Answers	Reject	Mark
4 (b)	half-full first quarter last quarter	Accept <ul style="list-style-type: none"> <li>phonetic spellings, and answers implying half of Moon is visible</li> </ul>	Other phases Eg crescent, gibbous	1

Question Number	Answer	Mark
4 (c) (i)	S marked on Moon's orbit at top (twelve o'clock position)	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
4 (c) (ii)	C marked on Moon's orbit close to S (between 10 o'clock and 2 o'clock)	Accept <ul style="list-style-type: none"> <li>other forms of labelling (other than C)</li> </ul>	C marked at 12 o'clock	

Question Number	Answer	Reject	Mark
4(d)	Moon's rotation period (1) is equal to Moon's orbital period (1)  (2 x 1)  ACCEPT phrases such as 'it spins in the same time as it orbits' (2) 'speed' responses captured orbit (2) synchronous rotation (2) tidal locking (2)	responses not related to orbit or rotation of Moon	2

Question Number	Answer	Mark
5 (a)	Copernicus	1

Question Number	Answer	Mark
5 (b)	Newton	1

Question Number	Answer	Reject	Mark
5(c) (i)	<p>Any two of the following examples of similarities between Ceres and Pluto, up to a maximum of two marks:</p> <ul style="list-style-type: none"> <li>• spherical / shape</li> <li>• orbit the Sun</li> <li>• size</li> <li>• solid surface</li> <li>• both dwarf planets</li> <li>• similar densities</li> <li>• no atmosphere</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<p>Responses not related to objects or their orbits</p> <p>Eg 'have been discovered'</p>	2

Question Number	Answer	Reject	Mark
5(c) (ii)	<p>Any two of the following examples of differences between Ceres and Pluto, up to a maximum of two marks:</p> <ul style="list-style-type: none"> <li>• distance from Sun</li> <li>• presence/lack of moons</li> <li>• visibility from Earth (through small telescope)</li> <li>• nature/brightness of surfaces ('Pluto is dark but Ceres is bright')</li> <li>• ellipticity or orbits</li> <li>• inclination</li> <li>• Pluto much colder</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<p>Responses not related to objects or their orbits</p> <p>Eg 'were discovered in different years'</p>	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (a)	East / South-East	Accept <ul style="list-style-type: none"> <li>directions close to East (between north east and south east)</li> </ul>	<ul style="list-style-type: none"> <li>Upwards</li> <li>To the sky</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (b)	crescent	Accept <ul style="list-style-type: none"> <li>decrecent</li> </ul>	All other phases Eg full, new, half-full, gibbous	1

Question Number	Answer	Mark
6 (c) (i)	Milky Way	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (c) (ii)	Galileo	Accept <ul style="list-style-type: none"> <li>Galileo</li> <li>Galilei</li> <li>phonetic spellings, Eg galileo, gallyleo</li> </ul>		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
6 (d)	Basic 'W' or 'M' shape	Accept <ul style="list-style-type: none"> <li>stars as dots</li> <li>Cassiopeia drawn as W shape without stars drawn</li> </ul>	patterns that do not resemble W	1



Question Number	Answer	Reject	Mark
7(a)	<p>Any two of the following examples of the nature and composition of Saturn's rings, up to a maximum of two marks:</p> <ul style="list-style-type: none"> <li>• millions of individual 'chunks'</li> <li>• ice</li> <li>• rock</li> <li>• divisions (Eg Cassini)</li> <li>• split into A-ring, B-ring etc</li> <li>• shepherd moons</li> <li>• width / diameter (allow)</li> <li>• dust</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<p>Responses not related to rings</p> <p>Eg 'are asteroids', 'orbit Saturn'</p>	2

Question Number	Answer	Mark
7 (b) (i)	opposition	1

Question Number	Answer	Reject	Mark
7(b) (ii)	<p>Any three of the following examples of why Saturn is best observed here, up to a maximum of three marks:</p> <ul style="list-style-type: none"> <li>• closest to Earth</li> <li>• opposite the Sun in the sky</li> <li>• visible all night</li> <li>• brightest</li> <li>• best resolution / clarity</li> </ul> <p style="text-align: right;">(3 x 1)</p>	Responses not related to position in orbit	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8 (a) (i)	2.5	Accept <ul style="list-style-type: none"> <li>• 2.51</li> <li>• 2.512</li> <li>• two and a half</li> </ul>	2	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8 (a) (ii)	16	Accept numbers close to 16 <ul style="list-style-type: none"> <li>• 15.6</li> <li>• sixteen</li> </ul>	3 (mags difference) 15 17	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8 (b)	gamma / $\Upsilon$ (1)  appears fainter so must be further away (1) D.O.P.	Accept <ul style="list-style-type: none"> <li>• looks fainter</li> </ul>	3.4	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
8 (c)	5.4	Accept <ul style="list-style-type: none"> <li>• numbers close to 5.4</li> </ul>	6.6 5.6	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (a)	3 hours	Accept <ul style="list-style-type: none"> <li>• 3</li> <li>• 3h</li> </ul>	5 5h 10 degrees	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (b) (1)	S drawn at 0 h and 0 °	Accept <ul style="list-style-type: none"> <li>• dot or 'Sun' at this position with no label</li> </ul>		1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (b) (ii)	line drawn from top left to bottom right (1)  passing through 0 h and 0 degrees or S (1)	Accept <ul style="list-style-type: none"> <li>• wide line</li> </ul>	line not passing through 0 h and 0 °	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (c)	First Point of Aries	Accept <ul style="list-style-type: none"> <li>• phonetic spellings</li> <li>• Spring equinox</li> <li>• vernal equinox</li> </ul>	<ul style="list-style-type: none"> <li>• First Point of Libra</li> <li>• First Point of Pisces</li> <li>• Spring</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
9 (d)	5 ° South (must be included or implied)	Accept <ul style="list-style-type: none"> <li>• - 5°</li> <li>• -5</li> <li>• 5 south</li> <li>• angles between 4 and 6 degrees</li> </ul>	<ul style="list-style-type: none"> <li>• 5</li> <li>• +10</li> <li>• 10 degrees</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>10 (a)</b>	refraction of light (1)  through Earth's atmosphere (1)	light passes through (1)	other properties of light Eg <ul style="list-style-type: none"> <li>• reflection</li> <li>• diffraction</li> </ul>	<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>10 (b)</b>	Sun / photosphere has right <u>temperature</u> (1)  to emit more yellow than others (1)	Accept <ul style="list-style-type: none"> <li>• hotness</li> <li>• any association of colour to temperature</li> </ul>		<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>10 (c)</b>	No air / atmosphere on Moon (1)  so (sun)light can not be scattered (1)	Accept <ul style="list-style-type: none"> <li>• so sky can not be blue</li> </ul>	<ul style="list-style-type: none"> <li>• It is always night</li> <li>• reference to Dark Side of Moon</li> </ul>	<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
11 (a)	blindness / eye damage(1)  due to intense heat / radiation / light (1)	<ul style="list-style-type: none"> <li>• damage to retina</li> <li>• Sun is very bright</li> </ul>		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
11 (b) (i)	Method: projection or use of special filters(1)  Brief description of method (1)	Accept <ul style="list-style-type: none"> <li>• telescope projection</li> <li>• binocular projection</li> <li>• pinhole camera projection</li> </ul>	<ul style="list-style-type: none"> <li>• use sunglasses</li> </ul>	2

Question Number	Answer	Reject	Mark
11 (b) (ii)	Any two of the following examples of solar features, up to a maximum of two marks: <ul style="list-style-type: none"> <li>• photosphere</li> <li>• sunspots (groups)</li> <li>• solar flares</li> <li>• prominences</li> <li>• limb darkening</li> <li>• CME</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<ul style="list-style-type: none"> <li>• Corona</li> <li>• Chromosphere</li> </ul>	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
11 (c) (i)	Corona	Accept <ul style="list-style-type: none"> <li>• phonetic spellings</li> </ul>	<ul style="list-style-type: none"> <li>• Chromosphere</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
11 (c) (ii)	X-ray	Accept <ul style="list-style-type: none"> <li>• phonetic spellings</li> </ul>		1

Question Number	Answer	Reject	Mark
12 (a)	<p>Any one of the following advantages of HST, up to a maximum of one mark:</p> <ul style="list-style-type: none"> <li>• in space / above atmosphere</li> <li>• clear skies</li> <li>• 24 hour observations</li> <li>• both hemispheres visible</li> </ul> <p style="text-align: right;">1</p> <p>Any one of the following disadvantages of HST, up to a maximum of one mark:</p> <ul style="list-style-type: none"> <li>• difficult to repair</li> <li>• accessibility</li> <li>• may be struck by meteoroids / space debris</li> </ul> <p style="text-align: right;">1</p> <p>QWC mark - clear distinction pros/cons</p> <p style="text-align: right;">1</p>	<ul style="list-style-type: none"> <li>• size</li> <li>• too small</li> <li>• might fall to Earth</li> </ul>	3

Question Number	Answer	Reject	Mark
12 (b)	<p>Any two differences between reflectors and refractors, up to a maximum of two marks:</p> <ul style="list-style-type: none"> <li>• objective (lens / mirror)</li> <li>• size (diameter)</li> <li>• method of use ('look through' / 'look in from the side')</li> <li>• cost</li> <li>• spherical aberration</li> </ul> <p style="text-align: right;">(2 x 1)</p>	Differences not dealing with structure of use	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
12 (c) (i)	9	Accept • nine	<ul style="list-style-type: none"> <li>• 3</li> <li>• three</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
12 (c) (ii)	better / higher resolution / clarity		<ul style="list-style-type: none"> <li>• responses to do with brightness</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
13 (a)	Between orbits of Mars and Jupiter (must have both planets)	Accept <ul style="list-style-type: none"> <li>• phonetic spellings</li> <li>• between Mars and Jupiter</li> </ul>	<ul style="list-style-type: none"> <li>• other planets</li> <li>• Asteroid Belt</li> </ul>	1

Question Number	Answer	Reject	Mark
13 (b)	Any two reasons why asteroids are too faint, up to a maximum of two marks: <ul style="list-style-type: none"> <li>• too far away (distance)</li> <li>• size (diameter)</li> <li>• low / poor reflectivity / albedo</li> <li>• surfaces are too dark</li> <li>• etc.</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<ul style="list-style-type: none"> <li>• not bright enough</li> <li>• too much light pollution</li> <li>• the sky might not be dark enough</li> </ul>	2

Question Number	Answer	Reject	Mark
13 (c)	Any two examples of collisions, up to a maximum of two marks: <ul style="list-style-type: none"> <li>• craters on Moon / Mercury / asteroids</li> <li>• comet crash into Jupiter</li> <li>• tilt of Uranus / backward spin of Venus</li> <li>• large craters on Earth (Eg Arizona Meteor Crater)</li> <li>• Projects (Spaceguard) have detected NEOs and PHOs</li> <li>• etc.</li> </ul> <p style="text-align: right;">(2 x 1)</p>	<ul style="list-style-type: none"> <li>• extinction of Dinosaurs</li> </ul>	2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>14 (a)</b>	Beyond Pluto/Neptune (1)  many icy/rocky bodies (1)	Accept <ul style="list-style-type: none"> <li>• phonetic spellings</li> <li>• beyond the planets</li> <li>• cometary nuclei</li> <li>• in elliptical plane</li> </ul>	<ul style="list-style-type: none"> <li>• outside the Solar System</li> <li>• asteriods</li> </ul>	<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>14 (b) (i)</b>	Elongated ellipse (1)  with Sun roughly at focus (1)		<ul style="list-style-type: none"> <li>• incomplete ellipse</li> <li>• Sun at 'centre' of ellipse</li> </ul>	<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>14 (b) (ii)</b>	P on comet's orbit at closest point to Sun (1)	Accept <ul style="list-style-type: none"> <li>• perihelion</li> </ul>	<ul style="list-style-type: none"> <li>• outside the Solar System</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>14 (c)</b>	25	<b>1</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>14 (d)</b>	Away from the Sun (1)	Accept <ul style="list-style-type: none"> <li>• opposite direction from the Sun</li> </ul>	<ul style="list-style-type: none"> <li>• behind the comet</li> <li>• backwards</li> <li>• behind the comet, away from the Sun</li> </ul>	<b>1</b>



Question Number	Correct Answer	Acceptable Answers	Reject	Mark
14 (e)	<p>Comets leave a wake of debris / meteor stream (1)</p> <p>...that burns up in the Earth's atmosphere as the Earth intercepts the stream (1)</p> <p>QWC mark - punctuation (1)</p>	<ul style="list-style-type: none"> <li>any general association of cometary debris</li> <li>any interaction/burning between particles and atmosphere</li> </ul>		3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
15 (a)	Death (1)	Accept <ul style="list-style-type: none"> <li>post-Main Sequence</li> </ul>	<ul style="list-style-type: none"> <li>Red Giant</li> <li>supernova</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
15 (b)	White Dwarf (1)	Accept <ul style="list-style-type: none"> <li>dwarf</li> </ul>	<ul style="list-style-type: none"> <li>Red Dwarf</li> <li>Brown Dwarf</li> <li>Black Dwarf</li> <li>Black Hole</li> <li>neutron star</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
15 (c)	Obtain a spectrum of shell (1)  Observe blue / Doppler shift in spectral lines (1)  QWC mark - logical flow (1)	<ul style="list-style-type: none"> <li>any general method of obtaining spectrum</li> <li>red shift</li> </ul>		3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
15 (d)	Correct axes brightness / intensity / luminosity versus time along bottom (1)  correct shape (sharp rise and slow / gentle decline) ie asymetry (1)		<ul style="list-style-type: none"> <li>time axis plotted vertically</li> </ul>	2



Question Number	Correct Answer	Acceptable Answers	Reject	Mark
<b>16 (d)</b>	Orion is a seasonal / winter constellation (1)  so aligned with Sun in summer / June (2)	General awareness of Orion not being visible all year round  General awareness that Orion would be a 'daytime' constellation	<ul style="list-style-type: none"> <li>• it is too faint</li> <li>• it would be below the horizon</li> <li>• it would be in the south</li> </ul>	<b>2</b>

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
17 (a) (i)	South		<ul style="list-style-type: none"> <li>any other direction Eg south-east</li> <li>Upwards</li> </ul>	1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
17 (a) (ii)	3 (days)			1

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
17 (a) (iii)	2 degrees corresponds to 8 min (1)  ...16:56 (1)	16:40 scores just 1 mark		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
17 (b)	Necessary for everyday / civil purposes (1)  ...so that noon, dawn, sunset etc. have similar local times no matter where we are in the world (1)			2

Question Number	Answer	Reject	Mark
<b>18 (a)</b>	<p>Any three of the following key facts on CMB radiation, up to a maximum of three marks:</p> <ul style="list-style-type: none"> <li>• 'echo' of Big Bang</li> <li>• microwave/radio region of EM spectrum</li> <li>• detectable all over sky</li> <li>• detectable at all times of day</li> <li>• corresponds to temp. of 3 K</li> <li>• etc.</li> </ul> <p style="text-align: right;">(3 x 1)</p>	Obvious responses (Eg 'it is background radiation')	<b>3</b>

Question Number	Answer	Reject	Mark
<b>18 (b)</b>	<p>Any three of the following major discoveries by radio telescopes, up to a maximum of three marks:</p> <ul style="list-style-type: none"> <li>• pulsars</li> <li>• structure / rotation of Milky Way</li> <li>• radio galaxies</li> <li>• quasars</li> <li>• molecular clouds</li> <li>• neutral H regions</li> <li>• surface of Venus</li> <li>• CMB</li> </ul> <p style="text-align: right;">(3 x 1)</p>		<b>3</b>

Question Number	Answer	Reject	Mark
19 (a)	Any three of the following types of galaxy, up to a maximum of three marks: <ul style="list-style-type: none"> <li>• spiral (S)</li> <li>• barred spiral (SB)</li> <li>• irregular</li> <li>• <u>dwarf</u> elliptical</li> <li>• lenticular</li> </ul> <p style="text-align: right;">(3 x 1)</p>	Milky Way or any other named galaxy  E, SB etc	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
19 (b)	10 Mpc = 10 000 000 pc (1)  use of formula (1)  correct answer: 9.6 (1)	If candidate fails to convert 10 Mpc into pc, thus gaining an answer - 20.4 <u>with working</u> ...  ..award (2)	-20.4 without working	3

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
20 (a)	Show working (1)  correct answer: 2 200 000 (2 154 700) (ignore sig. figs) (1)	<ul style="list-style-type: none"> <li>• <math>2.2 \times 10^6</math> (2)</li> <li>• 2.2 million</li> </ul>		2

Question Number	Correct Answer	Acceptable Answers	Reject	Mark
20 (b)	Attempt to convert 460 pc into km ( $1.42 \times 10^{16}$ km) (1)  Attempt to convert $1.42 \times 10^{16}$ km into l.y. (1500 l.y.) (1)  correct answer: 1500 years (1502.36 years) (1)	ignore large numbers of sig. figs.  1500 y (3)  1500 (3)	1500 light years (2 max)	3

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