

Mark Scheme (Results)

June 2008

GCSE

GCSE Astronomy (1627/01)

Question Number	Answer	Mark
1(a)	time taken for Earth to rotate once ✓	1

Question Number	Answer	Mark
1(b)	time taken for the Earth to orbit the Sun ✓	1

Question Number	Answer	Mark
1(c)	from West to East ✓	1

Question Number	Answer	Mark
1(d)	4 (min) ✓	1

(Total 4 marks)

Question Number	Answer	Mark
2(a)(i)	microwaves ✓	1

Question Number	Answer	Mark
2(a)(ii)	radio waves ✓	1

Question Number	Answer	Mark
2(b)	corona ✓	1

Question Number	Answer	Mark
2(c)	2 lines drawn starting at point of entry into prism ✓ line(s) with correct divergence below red ✓	2

(Total 5 marks)

Question Number	Answer	Mark
3(a)(i)	aircraft ✓	1

Question Number	Answer	Mark
3(a)(ii)	meteor ✓	1

Question Number	Answer	Mark
3(a)(iii)	Cassiopeia ✓	1

Question Number	Answer	Mark
3(b)	Satellite <u>reflects</u> light from / illuminated by the Sun ✓ and enters Earth's shadow (so no light can be reflected) / is no longer illuminated ✓	2

(Total 5 marks)

Question Number	Answer	Mark
4(a)(i)	380 000 km ✓	1

Question Number	Answer	Mark
4(a)(ii)	150 million km ✓	1

Question Number	Answer	Mark
4(b)	ellipse / elliptical (NOT edipse) ✓	1

Question Number	Answer	Mark
4(c)	the average (mean) ✓ distance between the Earth and the Sun ✓	2

(Total 5 marks)

Question Number	Answer	Mark
5(i)	Miranda ✓	1

Question Number	Answer	Mark
5(ii)	Triton (NOT Titan) ✓	1

Question Number	Answer	Mark
5(iii)	Io ✓	1

Question Number	Answer	Mark
5(iv)	Titan (NOT Triton) ✓	1

(Total 4 marks)

Question Number	Answer	Mark
6(a)	drawbacks include: filters out most electromagnetic radiation; dims light from stars; scintillation; refraction of light from stars; light pollution (e.g. daylight); clouds prevent observations (too cloudy) - any two ✓✓	2

Question Number	Answer	Mark
6(b)	any two of: water on surface; life; rain forests etc., relatively large Moon; oxygen/nitrogen atmosphere ✓✓	2

Question Number	Answer	Mark
6(c)	crescent / decrescent ✓	1

(Total 5 marks)

Question Number	Answer	Mark
7(a)	Dividing (imaginary) line between lit/illuminated and unlit/dark surface of the Moon ✓	1

Question Number	Answer	Mark
7(b)	Full ✓	1

Question Number	Answer	Mark
7(c)	rotation period ✓ = orbital period ✓ (or: synchronous / captured rotation / tidal breaking 1✓ only)	2

Question Number	Answer	Mark
7(d)	One libration: e.g. elliptical orbit / inclination ✓	1

(Total 5 marks)

Question Number	Answer	Mark
8(a)	Diagram shows Moon in between Earth and Sun (on straight line) ✓	1

Question Number	Answer	Mark
8(b)(i)	corona ✓	1

Question Number	Answer	Mark
8(b)(ii)	Rest of sky is too bright / photosphere is too bright ✓ and so hardly any contrast / reference to 'brighter..' ✓	2

Question Number	Answer	Mark
8(c)(i)	thin ring drawn ✓ (ignore any corona drawn)	1

Question Number	Answer	Mark
8(c)(ii)	Moon is slightly further away from Earth (due to its elliptical orbit) ✓ and so appears smaller and/or does not cover all of the full disc of the Sun ✓ (condone Earth slightly closer to Sun ✓ therefore Sun appears larger ✓)	2

(Total 7 marks)

Question Number	Answer	Mark
9(a)(i)	S labelled at RA = 6 h (top of dashed line) ✓	1

Question Number	Answer	Mark
9(a)(ii)	2 lines drawn either side of ecliptic ✓ that are 'parallel with' and a few (nearly ten) degrees either side of ecliptic ✓	2

Question Number	Answer	Mark
9(b)	<u>25</u> / +25 / 25 N / 25° N ✓	1

Question Number	Answer	Mark
9(c)	suitable explanation in terms of latitude and/or dec / calculation of co-latitude ✓ clear explanation ✓	2

(Total 6 marks)

Question Number	Answer	Mark
10(a)	Sun at centre (of the 'Universe') ✓	1

Question Number	Answer	Mark
10(b)	Copernicus ✓	1

Question Number	Answer	Mark
10(c)	Moons of Jupiter ✓ and phases/relative size of Venus ✓	2

Question Number	Answer	Mark
10(d)	Any 2 key facts about Saturn's rings e.g. composed of billions of individual particles; mostly rock (and ice); 'gaps'/divisions within the rings; diameter or thickness ✓✓	2

Question Number	Answer	Mark
10(e)	Any one: Milky Way's 'structure'; mountains/craters on the Moon ✓ (Allow ecf with (c) but must be different from (c))	1

(Total 7 marks)

Question Number	Answer	Mark
11(a)	Any two of: Jupiter has large(st) mass / and so greatest gravitational pull / largest size ✓✓	2

Question Number	Answer	Mark
11(b)	Any three pieces of evidence e.g. heavy cratering on Moon/Mercury; origin of Moon; unusual appearance of Miranda or other moons; asteroid belt; mass extinction events e.g. dinosaurs ✓✓✓	3

Question Number	Answer	Mark
11(c)(i)	aphelion ✓	1

Question Number	Answer	Mark
11(c)(i)	100 ✓	1

(Total 7 marks)

Question Number	Answer	Mark
12(a)	Gravitational collapse ✓ of nebula/cloud of gas and dust ✓ Fragmentation ✓ and rise in temperature of protostars / fusion occurs ✓ / further collapse halted ✓ (any 3)	3

Question Number	Answer	Mark
12(b)	(Once fuel is depleted) star will expand to become a Red Giant ✓ Subsequent expansion of outer layers/expanding shell of gas/planetary nebula ✓ Core collapses to firm white dwarf ✓ and cools to be black dwarf ✓ (any 3) If supernova / neutron star / black hole mentioned, 2 max QWC mark ✓	4

(Total 7 marks)

Question Number	Answer	Mark
13(a)	The point from which the meteors appear to diverge ✓	1

Question Number	Answer	Mark
13(b)	No air/atmosphere ✓ and so no friction (that would cause meteoroids to burn up) ✓	2

Question Number	Answer	Mark
13(c)	Location (stated or by inference) ✓ i.e. meteoroids are in solar orbit/entering atmosphere but meteorites are rocks that have landed on Earth: elaboration ✓	2

(Total 5 marks)

Question Number	Answer	Mark
14(a)	Sun emits huge amount of light/heat/eye damage/blindness - any one ✓	1

Question Number	Answer	Mark
14(b)	Diagram showing solar projection or using special filters ✓ Description of diagram ✓	2

Question Number	Answer	Mark
14(c)	<u>Fusion</u> ✓ of light/hydrogen nuclei into heavier/helium nuclei ✓ (ignore atoms here) QWC (terminology and logic) (not given if reference to 'atoms') ✓	3

Question Number	Answer	Mark
14(d)	Photosphere ✓	1

(Total 7 marks)

Question Number	Answer	Mark
15(a)	3 magnitudes difference ✓ and so brightness ratio is 16 ✓	2

Question Number	Answer	Mark
15(b)	10 Mpc = 10 000 000 pc (i.e. change of unit) ✓ Correct substitution in formula ✓ $M = -15.5$ ✓ If $M = 14.5$ 1✓ only	3

(Total 5 marks)

Question Number	Answer	Mark
16(a)	Light collected by telescope is split by prism/diffraction grating ✓ ..into a spectrum ✓ QWC mark (sentences, capital letters etc.)✓	3

Question Number	Answer	Mark
16(b)	Dark lines (on continuous coloured background) ✓	1

Question Number	Answer	Mark
16(c)	any 2 from: chemical composition; temperature; spectral type; (radial) velocity; rotation period; magnetic fields ✓✓	2

(Total 6 marks)

Question Number	Answer	Mark
17(a)	Radio ✓	1

Question Number	Answer	Mark
17(b)	Magellan ✓	1

Question Number	Answer	Mark
17(c)	Dense atmosphere did not permit light to penetrate ✓	1

Question Number	Answer	Mark
17(d)	Correct substitution ✓ total distance = 540 km ✓ halved (ecf): 270 km ✓ (MAX 2 if no unit)	3

(Total 6 marks)

Question Number	Answer	Mark
18(a)	Reference to observing spiral arms ✓ of our galaxy ✓ If 'too faint' etc., max 1✓	2

Question Number	Answer	Mark
18(b)	light pollution/street lights/Moon/poor seeing/sports stadium lights etc. ✓ any one NOT buildings / clouds	1

Question Number	Answer	Mark
18(c)	General side view of MW with central bulge ✓ and good symmetry ✓ (No marks awarded for plan view) SS roughly 2/3 way out from centre ✓ OC in spiral arms ✓ G in centre or halo ✓	5

(Total 8 marks)

Question Number	Answer	Mark
19(a)	Any two different pieces of evidence: dimming of a star (transit)/ dust clouds/IR observations of discs/'wobbles' in positions of stars/...on regular basis ✓✓ Detail/elaboration ✓	3

Question Number	Answer	Mark
19(b)	Attempt at using formula ✓ Correct substitution into formula ✓ $T = 320$ (days) ✓	3

(Total 6 marks)

Question Number	Answer	Mark
20(a)(i)	4 (allow 0.2 either side) days ✓	1

Question Number	Answer	Mark
20(a)(ii)	P: <u>dimmer</u> star in front of <u>brighter</u> star ✓ S: <u>brighter</u> star in front of <u>dimmer</u> star ✓ (stated or on diagram) Diagram showing or inferring position of 'observer' ✓	3

Question Number	Answer	Mark
20(b)	Double star is an optical/line of sight effect in which stars only appear to be close together ✓ Binary star consists of two stars physically/gravitationally bound/in common orbit ✓	2

Question Number	Answer	Mark
20(c)(i)	sharp rise and 'steady' fall ✓ shown on diagram	1

Question Number	Answer	Mark
20(c)(ii)	Determine time period of Cepheid variable ✓ Use period-luminosity law/calibration to determine (mean) M ✓ Use distance modulus formula and mean m to calculate d ✓	3

(Total 10 marks)

TOTAL 120 MARKS