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GCSE Astronomy 1627
Mark Scheme (Results)
Summer 2007

GCSE

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GCSE Astronomy 2007 - Solutions

1.		(i)	Earth	✓	
		(ii)	Saturn	✓	
		(iii)	Venus	✓	
		(iv)	Mercury	✓	**4**
2.	(a)		Rocket is a launch vehicle/is powered (1) whereas spacecraft either continues to orbit Earth or visits planets/Moon/ is unpowered (1)	✓✓	2
	(b)		To send humans (man) to the Moon (1) and return them safely/collect rock samples (1)	✓✓	2
	(c)		Any sensible reason involving long time/large distances involved	✓	
3.	(a)	(i)	Orion / The Hunter Do NOT accept 'Orion's Belt'	✓	
		(ii)	Cassiopeia	✓	
		(iii)	Taurus	✓	
		(iv)	Ursa Major / Great Bear / allow Plough or Big Dipper Do NOT accept Ursa Minor	✓	
	(b)	(i)	Orion / The Hunter Accept Orion's Belt	✓	
		(ii)	Ursa Major/Great Bear/Plough	✓	**6**
4.		(i)	scattering	✓	
		(ii)	refraction	✓	
		(iii)	reflection	✓	
		(iv)	reflection	✓	**4**
5.	(a)		ellipse	✓	
	(b)		perihelion	✓	
	(c)		In range 250 million - 350 million / 250 000 000 - 350 000 000 / standard form notation – 2 marks If in range 120 million - 180 million / 120 000 000 - 180 000 000 /standard form notation – allow 1 mark	✓✓	**2**
	(d)		S on diagram close to Y	✓	**5**
6.	(a)	(i)	Sun at 0 h (1) and 0 dec (1)	✓	
		(ii)	Arrow pointing to top left (’10 – 11 o’clock)	✓	**2**
	(b)		M in correct position	✓	
	(c)		Shaded region on either side of ecliptic	✓	
	(d)		Region where planets are found	✓	**5**
7.	(a)		Diagram showing Sun – Earth – Moon (or vice versa) on a straight line	✓	

	(b)	(i)	Gibbous (1) with terminator on RHS (1)	✓✓	**2**
	(c)		Plane (1) of Moon's orbit does not coincide with that of Earth's orbit (1). 'Too high' or 'too low' (in the sky) (1) max. 'Not always aligned' or similar (1) max.	✓✓	**2**
8.	(a)		Cooler/darker regions (1) associated with localised magnetic fields (1)	✓✓	**2**
	(b)		11 years	✓	
	(c)	(i)	number increases then decreases (1)		
		(ii)	drift to lower latitudes / towards equator (1)		**2**
					5
9.	(a)		12:05	✓	
	(b)		5 min (2) (attempt but x calc (1))	✓✓	**2**
	(c)		16 min (1) later, therefore 12:21 (1)	✓✓	**2**
	(d)		Longer (1) because Sun is lower in sky (1)	✓✓	**2**
					7
10.	(a)		Any 2 of: similar size/ irregular shape/ surface features	✓✓	**2**
	(b)		Mars and Jupiter	✓	
	(c)		Either splitting of a larger rocky object or material that failed to form a stable solid mass	✓✓	**2**
			QWC	✓	
	(d)		Any 2 of: far away /small/ too much light pollution / poor reflector Do NOT accept 'too faint'	✓✓	**2**
11.	(a)		2.5	✓	
	(b)		4.8 (2). Attempt at x calculation (4 mags difference) (1)	✓✓	**2**
	(c)		6	✓	
12.	(a)		25 (2) (if 2.5 allow 1)	✓✓	**2**
	(b)		80 mm (2) (if 160 mm allow 1)	✓✓	**2**
	(c)		Molly's	✓	
			Better resolution (achieved by larger diameter of objective)/brighter image	✓	
			QWC	✓	
					7
13.	(a)		Coma and nucleus	✓	
	(b)		Giotto	✓	
	(c)	(i)	reflection of sunlight	✓	
		(ii)	radiation pressure from Sun	✓	
		(iii)	fluorescence / excitation of ions	✓	
		(iv)	interaction with solar wind	✓	
		(v)	ion tail	✓	
					7
14.	(a)		Stars that do not set below the horizon/visible all night	✓	
	(b)	(i)	time taken for Earth to spin / star to return to observer's	✓	

			meridian		
		(ii)	23 h 56 min	✓	**2**
	(c)	(i)	58^{o}	✓	
		(ii)	32^{o}	✓	
		(iii)	yes (1) reasonable explanation (1)	✓✓	
					7
15.	(a)		Stream of charged/sub-atomic/elementary (1) particles ejected (at high speed) from the Sun (1)	✓✓	**2**
	(b)		core	✓	
	(c)	(i)	glowing 'curtain' of light (1) in the sky		
		(ii)	high N or S latitudes / Arctic / Antarctic (1)	✓✓	**2**
	(d)		charged particles interact with <u>Earth's magnetic field</u> (1) and ionise the air causing it to glow (1)	✓✓	**2**
					7
16.	(a)		white dwarf	✓	
	(b)		Star explodes (1) in a supernova (1) ejecting material into space.	✓✓	
			Core contracts/implodes and forms neutron star/pulsar / black hole (1). Any 3 reasonable and different key points.	✓	
			QWC	✓	**4**
	(c)		X-rays (1) emitted from accretion discs in binary systems (1) / multi-images of galaxies (1) due to gravitational lensing (1)	✓✓	**2**
					7
17.	(a)		Planet predicated by wobbles or perturbations in Uranus' orbit by Adams and Le Verrier. Astronomy Royal (Airy) informed but no search carried out Le Verrier informed Encke in Berlin…search successful by Galle and D'Arrest Any 2 key points.	✓✓	**2**
	(b)	(i)	2 sensible reasons for (1 for each) planetary status e.g. tradition, larger than other similar objects, orbit the Sun, has moons		
		(ii)	2 sensible reasons against (1 for each) e.g. inclination of orbit, break in pattern of planets, inclination of orbit. 'Has not cleared its orbit' (official IAU) (2)		**4**
					6
18.	(a)		Dish reflects/collects radio waves (to a focus) (1) where receiver/aerial converts radio energy into electronic signal (1) that is later (amplified and) processed (1)	✓✓✓	**3**
	(b)		Interference from mobile phone with radios waves from space / interference / radio 'noise'	✓	
	(c)		Any 3 facts about quasars e.g. point sources of light / high red shifts / v.distant (or 'early' galaxies), non-thermal radiation e.g. X-rays	✓✓✓	**3**
					7
19.	(a)		Diagram showing correct arrangement (1), Spirals / barred spirals (1) with differentiation (1), Ellipticals with differentiation (1)	✓✓✓ ✓	**4**
	(b)		Any 3 good pieces of evidence e.g. red shift of distant galaxies, 'ripples' in microwave background radiation, relative abundances of light elements (1 for each)	✓✓✓	
			QWC	✓	**4**

20.	(a)	The apparent magnitude if observed from <u>10 pc</u> (1) (Must be definition, NOT true brightness etc.	✓	
	(b)	-7.2 (2) some attempt but incorrect cal. 1	✓✓	**2**
	(c)	4 x further away so 16 times fainter (1) so 3 mags difference (1) therefore m = 5.8 (1). Incorrect answer, but ome attempt to use formula (1) max.	✓✓✓	**3**
				6