



Mark Scheme (Results)

June 2023

Pearson Edexcel
GCSE Astronomy 1AS0/01
Paper 1

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June 2023

Publications Code 1AS0_01_2306_MS

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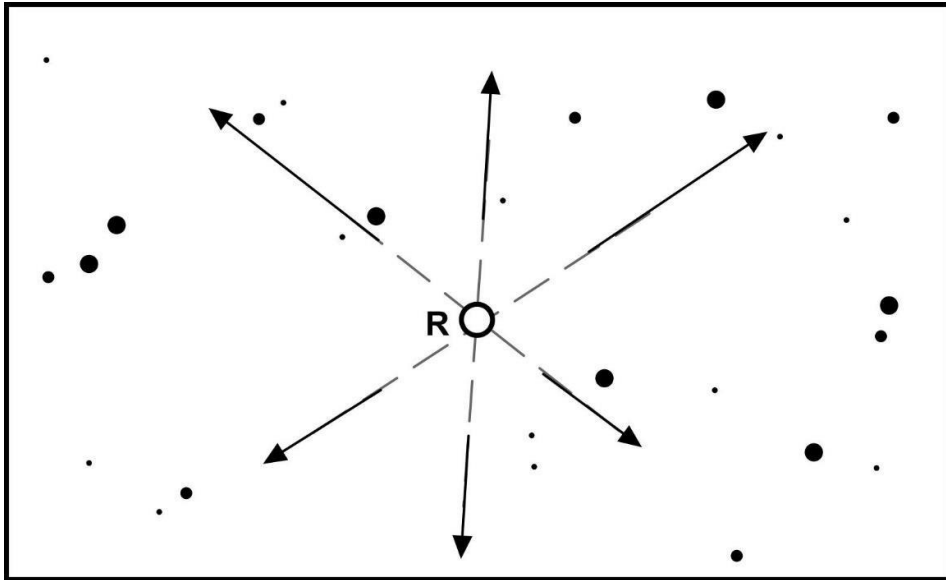
General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Paper 1 Naked-eye Astronomy

Question number	Answer	Mark
1(a)	(i) B Orion (ii) A Cassiopeia (iii) C Southern Cross (iv) C Southern Cross	(1) (1) (1) (1)

Question number	Answer	Mark
1(b)	(i) Figure completed with at least three rays emerging from common radiant. Arrowheads not required. Ignore sporadics. (ii) R correctly labelled	(1) (1)



Question number	Answer	Mark
2(a)	D an aurora	(1)
(b)	A celestial sphere	(1)
(c)	D zenith	(1)
(d)	C being able to see 59% of the Moon's surface	(1)
(e)	B Equator	(1)
(f)	B sidereal day	(1)
(g)	B it is on the ecliptic	(1)

Question number	Answer	Mark
3(a)	<p>(i) Light rays change direction on entering Earth's atmosphere. Use of term 'refraction'.</p> <p>(ii) (more) Blue light does not pass through the atmosphere. Use of term 'scattered'.</p>	<p>(1) (1)</p> <p>(1) (1)</p>

Question number	Answer	Mark
3(b)	<p>(i) Volcanoes / meteor(s) (NOT: meteoroid/meteorite) / space debris / comets / specific terrestrial source of dust particles ('pollution' is insufficient).</p> <p>(ii) No sunset / Sun in sky all night / Sun is circumpolar. (Due to) Earth's axial tilt / High (northerly) latitude / Above Arctic Circle.</p>	<p>(1) (1)</p> <p>(1) (1)</p>

Question number	Answer	Mark
4(a)	i) Water level bulge. Pair of symmetrical bulges. Earth rotating once (in 24h).	(1) (1) (1)
	ii) Low tide = 08:06 Calculation of 11h 42m or 5h51m	(2) (1)

Question number	Answer	Mark
4(b)	i) C the high tides are getting higher, and the low tides are getting lower.	(1)
	ii) First or Last quarter.	(1)
	iii) Phase increasing / decreasing. To a Full/New Moon (Allow ECF from 4bii)	(1) (1)

Question number	Answer	Mark
5(a)	i) Religious reasons / calendar / superstition / agricultural / <i>Accept:</i> timekeeping.	(1)
	ii) B midwinter sunset.	(1)
	iii) Alignment of stars/constellations with Earth (e.g. cardinal points (NESW)) changes over time 'Stars change position' insufficient.	(1)
	Precession.	(1)

Question number	Answer	Mark
5(b)	i) Allow answers in range 10 th – 24 th June.	(1)
	ii) Seasonal variation affects altitude of Sun in pattern.	(1)
	Equation of Time affects azimuth/east-west position of Sun in pattern.	(1)
	iii) 58¼° (N not required) Correct use of 23½° ($55\frac{1}{4} - 23\frac{1}{2} = 31\frac{3}{4}$) Correct use of 90° – e.g. ($90 - 31\frac{3}{4} = 58\frac{1}{4}$)	(3) (1) (1)

Question number	Answer	Mark
6(a)	Y axis labelled with appropriate scale. Points plotted correctly. Straight line of best fit through points.	(1) (1) (1)

Question number	Answer	Mark
6(b)	Indicative Content: <ul style="list-style-type: none"> • Shadow cast on grass. • Human assessment of shadow is inaccurate. • Weather and cloud can have significant effect. • Results given to unwarranted precision. • Differences in times are small. • Sundial is aligned with magnetic north. 	(6)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	<ul style="list-style-type: none"> • A few inadequacies in the data are noted. • A few shortcomings of the method used are identified. • Some mention of relevant astronomical theory is made. • At least one feasible suggestion for improving the method is made.
Level 2	3-4	<ul style="list-style-type: none"> • The major inadequacies in the data are noted. • These are each linked to a particular shortcoming of the method used are identified. • Relevant astronomical theory is used. • Feasible suggestions for improving the method are made.
Level 3	5-6	<ul style="list-style-type: none"> • All inadequacies in the data are noted. • These are each linked to a particular shortcoming of the method used are identified. • Relevant astronomical theory is used to justify each of the above points. • Detailed suggestions for improving the method are made by systematically addressing each of the identified issues.

Question number	Answer	Mark
7(a)	Closer to the Sun than the Earth.	(1)

Question number	Answer	Mark
7(b)	i) C Position C ii) B Position B iii) Venus	(1) (1) (1)

Question number	Indicative content	Mark
7(c)	Indicative Content: <ul style="list-style-type: none"> • Safety use of filters etc. • Brightness of Sun – observing near sunrise or sunset. • Small and unreflective nature of Mercury. • Need to observe near elongation to observe crescent phase. • Need to select specific days in advance as Mercury too close to Sun for much of its orbit. • (very) occasional possibility of observing Mercury in transit. 	(6)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	<ul style="list-style-type: none"> • Presents a simple observing programme showing some awareness of the phenomenon under investigation. • Identifies some feasible parameters such as location and observing times. • No evidence of awareness of need for repeated observations or observation over an extended time period to achieve reliable data.
Level 2	3-4	<ul style="list-style-type: none"> • Presents a sound observing programme showing clear awareness of the phenomenon under investigation • Identifies a number of feasible parameters such as location and observing times. • Shows awareness of need for repeated observations or observations over an extended time period to achieve reliable data.

Level 3	5-6	<ul style="list-style-type: none"> • Presents a detailed observing programme showing a thorough understanding of the phenomenon under investigation. • Identifies all relevant parameters such as location and observing times. • Shows a clear understanding of the need for repeated observations or observation over an extended time period to achieve reliable data and reflects this clearly in their design.

Question number	Answer	Mark
7(d)	One mark for each correct row. B Eclipsed ONLY C Eclipsed and Occulted ONLY D Occulted ONLY (as shown below)	(3)

Point in orbit	Visible	Eclipsed	Occulted
A	✓		
B		✓	
C		✓	✓
D			✓

Question number	Answer	Mark
8(a)	i) impact (from another (small) body) leaving a crater / rays of debris.	(1)
		(1)
	ii) Any one from: No atmosphere/wind. No (flowing) water. No surface tectonic activity.	(1)
	iii) X near the Sea of Tranquillity <i>X above and to the left of any obvious sea</i>	(1)
		(1)

Question number	Answer	Mark
8(b)	Any two different observable features of Earth-Moon system, e.g. <ul style="list-style-type: none"> • Relative size of Earth and Moon. • Similarities in composition of Moon and Earth. • Small size of lunar core. • Large size of Earth's core. • Specific possible impact crater on Earth. 	(2)

Question number	Answer	Mark
8(c)	i) 1 st to 2 nd contact = 1:34, 1 st to 3 rd contact = 4:38 or: 3 rd to 4 th contact = 1:33, 2 nd to 4 th contact = 4:37	(1)
	Earth/Moon ratio = 2.957 14 000km / 2.957 = 4735km (Accept any answer rounding to 4700km)	(1)
		(3)
	ii) (4735 (their (i)) - 3500) / 3500 x 100 = 35% <i>Allow:</i> correct calculation with more precise value for Moon's radius than F&DS, e.g.: (4735 - 3479) / 3479 = 36%. <i>Allow:</i> error carried forward.	(1)
		(2)

Question number	Answer	Mark
9(a)	(i) Any two from: Island location / no obstructions on horizon. Remote location. Rural/non-urban areas/low light pollution. Close to equator (only a small part of celestial sphere invisible).	(2)
	(ii) $74^{(o)}$	(1)
	(iii) Calculation of co-latitude (74°) or co-declination ($12^{\circ} 12'$). Mention of alignment of horizon with celestial sphere.	(1)
	Comparison of (co-)latitude and co-(declination), e.g. $77^{\circ} 48' > 74^{\circ}$.	(1)
	(iv) Pole Star not visible / No bright star near south celestial pole.	(1)

Question number	Answer	Mark
9(b)	$= 22.75^{\circ}$ $1^{\circ} = 4$ mins (or equivalent) Long = $22.75 / 4 = 5.7^{\circ}$	<i>Any 1</i>
	W	(2) (1)

Question number	Answer	Mark
9(c)	Measure angular distance between Moon and a bright star.	(1)
	Compare with tables to determine GMT.	(1)
	Compare GMT with local solar time.	(1)

Question number	Answer	Mark
10(a)	A The Earth was at the centre.	(1)

Question number	Answer	Mark
10(b)	Earth at centre. Planet orbiting in epicycle. Apparent motion of planet for observer on Earth (Retrograde) loops.	(1) (1) (1) (1)

Question number	Answer	Mark
10(c)	<p>i) Statement of $T^2=r^3$ $2.22^3 (= 10.941)$ $\sqrt{10.941} = 3.3077$</p> <p>ii) October/November 2018 $3.3/2 = \mathbf{1.65}$ years (March 2017 + 1.65 years = October / November 2018)</p> <p>iii) October Idea of two orbits to reach 2023.</p> <p>iv) 1.9 years (or equivalent) <i>Any 1 from:</i> T^2/r^3 reduces to 1/3. 3.647</p>	(1) (1) (1) (2) (1) (2) (1)