

## Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
	<p>An answer that combines points of analysis to come to a conclusion:</p> <p>Day length = 12h so Equinox (1)</p> <p>Day length increasing so must be Vernal/Spring (Equinox) (1)</p> <p>So the date must be March 21st (1)</p>	<p>Accept: <math>\pm 1</math> day from March 21st, Spring/Vernal Equinox</p> <p>Reject: First Point of Aries</p>	<b>(3)</b>

Q2.

Question number	Answer	Additional guidance	Mark
	<p>(i) <math>20^\circ</math>  <i>Any 1 from:</i>  <math>13:20 - 12:00 = 1\text{h } 20\text{m}</math>  <math>1\text{h } 20\text{m} \times 15 (= 20^\circ)</math></p>	(ignore any indication of +/- or direction of longitude difference)	<b>(2)</b>
	<p>(ii) <math>150^\circ</math>  <b>W</b></p>	<p>(allow <math>+150^\circ</math>)            Allow ECF from (i)</p>	<p><b>(1)</b>  <b>(1)</b></p>

Q3.

Question number	Answer	Additional guidance	Mark
(i)	29.5 days	Reject: one month, 29 days, 30 days	<b>(1)</b>

Question number	Answer	Additional guidance	Mark
(ii)	27.3 days	Reject: one month, 27 days, 28 days	(1)

Q4.

Question number	Answer	Mark
	<p>(i) <b>C</b> Always be above the horizon  A is incorrect because this is not the behaviour of a circumpolar object.  B is incorrect because this is not the behaviour of a circumpolar object.  D is incorrect because this is not the behaviour of a circumpolar object.</p> <p>(ii) <b>C</b> 21<sup>st</sup> September  A is incorrect because it is the date of the Spring Equinox  B is incorrect because it is the date of the Summer Solstice  D is incorrect because it is the date of the Winter Solstice</p>	<p>(1) (1)</p>

Q5.

Question number	Indicative content	Mark
	<p><b>Marking instructions</b> Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below.</p> <p><b>Indicative content guidance</b> The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include:</p> <ul style="list-style-type: none"> <li>• The observations should take place over many months. As libration is a gradual effect, it will take time to observe slight changes in amount of lunar disc visible.</li> <li>• The observation should concentrate on the edges of the lunar disc (limb), as the effects will be more noticeable here.</li> <li>• Detailed drawings of features near the east and west limb will be required, in terms of longitude, so that the findings can be cross-referenced.</li> <li>• Detailed drawings of features near the north and south limb will be required, in terms of lunar latitude, so that the findings can be cross-referenced.</li> <li>• Need to observe the full Moon when it is rising and setting (diurnal libration), as it appears larger so features are easier to observe.</li> <li>• The ideal location for the observations is one of moderate latitude, so the Moon is high in the sky.</li> </ul>	(6)

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–2	<ul style="list-style-type: none"> <li>• A plan of the observational procedures may be attempted but with limited analysis of the scientific information/ideas. Generalised comments made. (AO3)</li> <li>• The plan is incomplete and contains basic information with some attempt made to show linkages to the given context. Lines of reasoning may be attempted but are incomplete or lack clarity. (AO3)</li> </ul>
Level 2	3–4	<ul style="list-style-type: none"> <li>• A plan of the observational procedures is given with occasional evidence of analysis of the scientific information/ideas and attempts to synthesise and integrate relevant knowledge. (AO3)</li> <li>• The plan is adequate and shows some linkages and lines of scientific reasoning with some structure. (AO3)</li> </ul>
Level 3	5–6	<ul style="list-style-type: none"> <li>• A plan of the observational procedures is given which is supported throughout by evidence from the analysis of the scientific information/ideas and demonstrates the skills of synthesising and integrating relevant knowledge throughout the response. (AO3)</li> <li>• The plan is comprehensive and shows a well-developed, sustained line of scientific reasoning which is clear, coherent and logically structured. (AO3)</li> </ul>

Q6.

Question number	Answer	Mark
(i)	A	(1)

Question number	Answer	Mark
(ii)	D	(1)

Question number	Answer	Mark
(iii)	C	(1)

Q7.

Question number	Answer	Acceptable Answers	Marks
	<p><b>B Full</b></p> <p><b>The only correct answer is B</b></p> <p>A is not correct because the Moon is not opposite the Sun at this phase</p> <p>C is not correct because the Moon is not opposite the Sun at this phase</p> <p>D is not correct because the Moon is not opposite the Sun at this phase</p>		1

Q8.


Question number	Answer	Notes	Marks
	<b>B 21<sup>st</sup> March</b>		1

Q9.

Question number	Answer	Mark
(i)	<p>An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (2 marks):</p> <p>The superior planets take longer to orbit the Sun than the Earth does/the Earth’s orbital period is less than the orbital period of superior planets (1)</p> <p>so they will return to same position in relation to the Earth before they complete a single orbit (1)</p> <p>which means that the superior planets have multiple smaller synodic periods within the time it takes to complete one larger sidereal period (1)</p>	(3)

Question number	Answer	Mark
(ii)	<p>An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (1 mark):</p> <p>A value of 500 AU is towards the edge of the Solar System (1)</p> <p>So the object will not have progressed in its orbit much in the time it takes the Earth to orbit the Sun (1 year) (1)</p>	(2)

Q10.

Question number	Answer	Mark
	<p>The moon should be drawn halfway between new moon and half-full moon</p>  <p>Day 3</p>	(1)

Q11.

Question number	Answer	Mark
	Summer/Mid-summer Solstice  'Midsummer's Day' therefore scores <b>1</b> .	<b>(1)</b> <b>(1)</b>