

Centre No.						Paper Reference					Surname	Initial(s)		
Candidate No.						1	6	2	7	/	0	1	Signature	

Paper Reference(s)

**1627/01**

# Edexcel GCSE

## Astronomy

### Paper 01

Friday 18 June 2010 – Morning

Time: 2 hours

Examiner's use only

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Team Leader's use only

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**Materials required for examination**

Calculator

**Items included with question papers**

Nil

Question Number	Leave Blank
1	
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Total	

**Instructions to Candidates**

In the boxes above, write your centre number, candidate number, your surname and initial(s) and your signature.

Answer ALL questions in the spaces provided in this book. Do not use pencil. Use blue or black ink. Show all stages in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Some questions must be answered with a cross in a box (☒). If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).

**Information for Candidates**

The marks for the various parts of questions are shown in round brackets: e.g. (2).

There are 20 questions in this question paper. The total mark for this paper is 120.

There are 32 pages in this question paper. Any blank pages are indicated.

**Advice to Candidates**



This symbol shows where the quality of your written answer will also be assessed.

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1. Figure 1 shows a well-known group of stars.

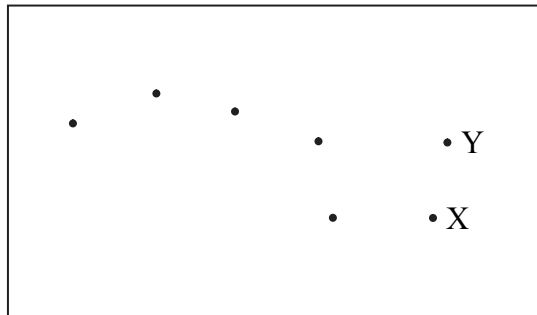


Figure 1

(a) What is a common name of this group of stars? Put a cross (☒) in the correct box.

Cassiopeia

Orion

The Plough

The Summer Triangle

(1)

(b) What is the name of the star that X and Y point to? Put a cross (☒) in the correct box.

Betelgeuse

Polaris

Rigel

Sirius

(1)

(c) In which direction would you be facing if you were observing this pattern of stars? Put a cross (☒) in the correct box.

North

South

East

West

(1)

(d) In which constellation is this group of stars located?

.....

(1)

(Total 4 marks)

Q1

3

Turn over



N 3 6 4 9 7 A 0 3 3 2

Leave  
blank

2. (a) Which of these is the **largest** in size? Put a cross (☒) in the correct box.

The Earth

Jupiter

The Sun

Venus

(1)

(b) Which of these is **closest** to the Earth? Put a cross (☒) in the correct box.

The Moon

Mars

The Sun

Venus

(1)

(c) What is the phase of the Moon during a **lunar** eclipse? Put a cross (☒) in the correct box.

crescent

full

gibbous

new

(1)

(d) For approximately how long does a total **solar** eclipse last? Put a cross (☒) in the correct box.

4 seconds

4 minutes

4 hours

4 weeks

(1)



(e) Which part of the Sun can easily be seen during a total **solar** eclipse? Put a cross (☒) in the correct box.

chromosphere

core

corona

photosphere

Leave  
blank

(1) Q2

(Total 5 marks)

5

Turn over



Leave  
blank

3. Four regions of the electromagnetic spectrum are listed below.

**infra-red**

**radio waves**

**ultra-violet**

**X-rays**

Which region:

(i) is emitted in regular bursts by pulsars?

.....

(ii) was used on the Magellan mission to map the surface of Venus?

.....

(iii) is emitted by the Sun's very hot corona?

.....

(iv) led to the discovery of quasars?

.....

(v) is emitted from accretion discs surrounding black holes?

.....

**Q3**

**(Total 5 marks)**



Leave  
blank

4. (a) What are sunspots?

.....  
.....

(1)

(b) In the space below, sketch and label a typical sunspot.

(2)

(c) Describe briefly **one** safe method for observing the Sun.

.....  
.....  
.....

(1)

(d) Draw a sketch of a typical solar prominence.

(1)

Q4

(Total 5 marks)

7

Turn over



Leave  
blank

5. (a) Who discovered the principal satellites of Jupiter? Put a cross (☒) in the correct box.

Galileo Galilei

Johannes Kepler

Isaac Newton

Tycho Brahe

(1)

(b) What was discovered by William Herschel in 1781? Put a cross (☒) in the correct box.

Halley's Comet

Uranus

Neptune

Saturn's Rings

(1)

(c) Which of these planets has the hottest surface? Put a cross (☒) in the correct box.

Earth

Jupiter

Mars

Venus

(1)

(d) Where do most long period comets originate? Put a cross (☒) in the correct box.

Asteroid Belt

Kuiper Belt

Oort Cloud

Zodiacal Band

(1)

Q5

(Total 4 marks)





Leave  
blank

6. (a) State **one** difference between the orbit of Pluto and the orbit of Neptune.

.....  
(1)

(b) State **two** reasons why Pluto has recently been regarded by astronomers as a new type of object in the Solar System.

1 .....

.....

2 .....

.....

(2)

(c) Outline briefly the discovery of Pluto.



.....

.....

.....

.....

(3)

Q6

(Total 6 marks)



Leave blank

7. A group of students were observing a gibbous Moon with binoculars.

(a) The students noticed that the Moon had large, dark grey areas and lighter areas on its surface.

(i) What is the general name for the large, dark grey areas?

.....

(ii) How do astronomers think that these features were formed?

.....

.....

.....

(3)

(b) The students also observed some craters near the Moon's terminator.

(i) What is the terminator?

.....

(ii) Explain why it is useful to observe craters that are located near the Moon's terminator.

.....

.....

.....

(3)

Q7

(Total 6 marks)



Leave  
blank

8. (a) In which month does the Summer Solstice occur? Put a cross (☒) in the correct box.

May

June

July

August

(1)

(b) What is the astronomical significance of an equinox? Put a cross (☒) in the correct box.

The Sun lies on the celestial equator.

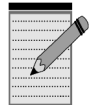
The Moon lies on the celestial equator.

The Sun is furthest from the celestial equator.

The Moon is furthest from the celestial equator.

(1)

(c) Explain with the aid of a diagram why it is generally warmer in the northern hemisphere during July rather than during January.



.....

.....

.....

.....

(4)

Q8

(Total 6 marks)



9. Figures 2 and 3 show two galaxies.

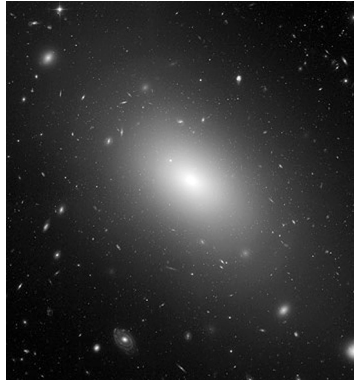


Figure 2



(Source: NASA)

Figure 3

(a) State the **type** of galaxy in:

(i) Figure 2.....

(ii) Figure 3.....

(2)

(b) Both galaxies are members of our Local Group. What is meant by the Local Group?

.....  
.....

(1)

(c) State **two** ways in which quasars differ from typical galaxies.

1 .....

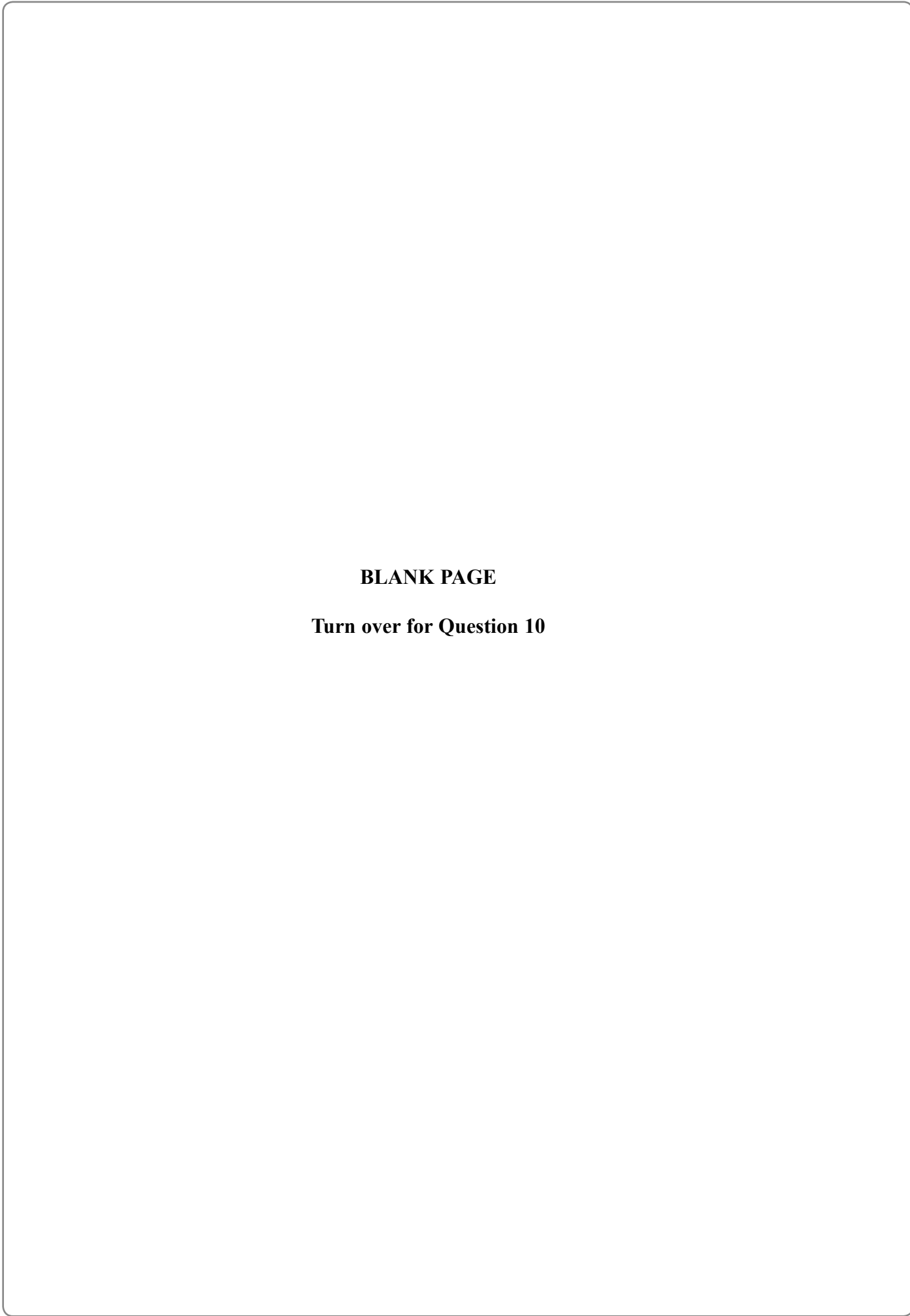
2 .....

(2)

(Total 5 marks)

Q9





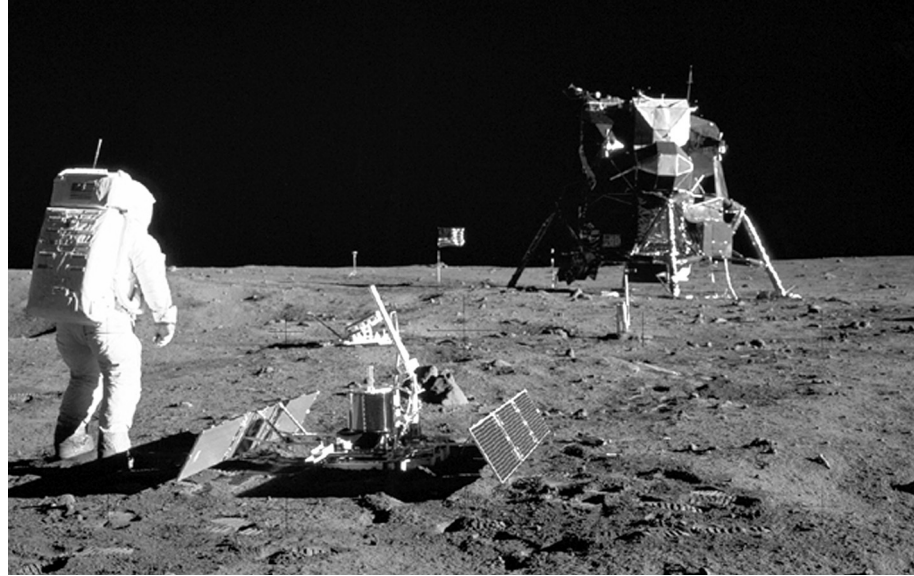
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N 3 6 4 9 7 A 0 1 3 3 2



10. Figure 4 shows an astronaut on the surface of the Moon with an instrument from the Scientific Experiments Package.



(Source: NASA)

**Figure 4**

(a) What was the name of the space programme to land men on the Moon?

..... (1)

(b) Explain briefly why the sky on the Moon appears black.

.....  
.....  
..... (2)



Leave blank

(c) One of the scientific instruments left on the Moon was a special mirror. This allowed a laser light from Earth to be reflected back.

If a laser light sent from Earth to the Moon returned in 2.56 s, calculate the distance from the Earth to the Moon in km.

Use the formula: speed = distance / time. The speed of light is  $3.0 \times 10^5$  km/s.

.....  
.....  
.....  
(2)

(d) State **two** other scientific purposes of this space programme.

1 .....  
2 .....  
(2)

(e) Explain the energy requirements involved in launching a spacecraft.

.....  
.....  
.....  
(2)

(Total 9 marks)

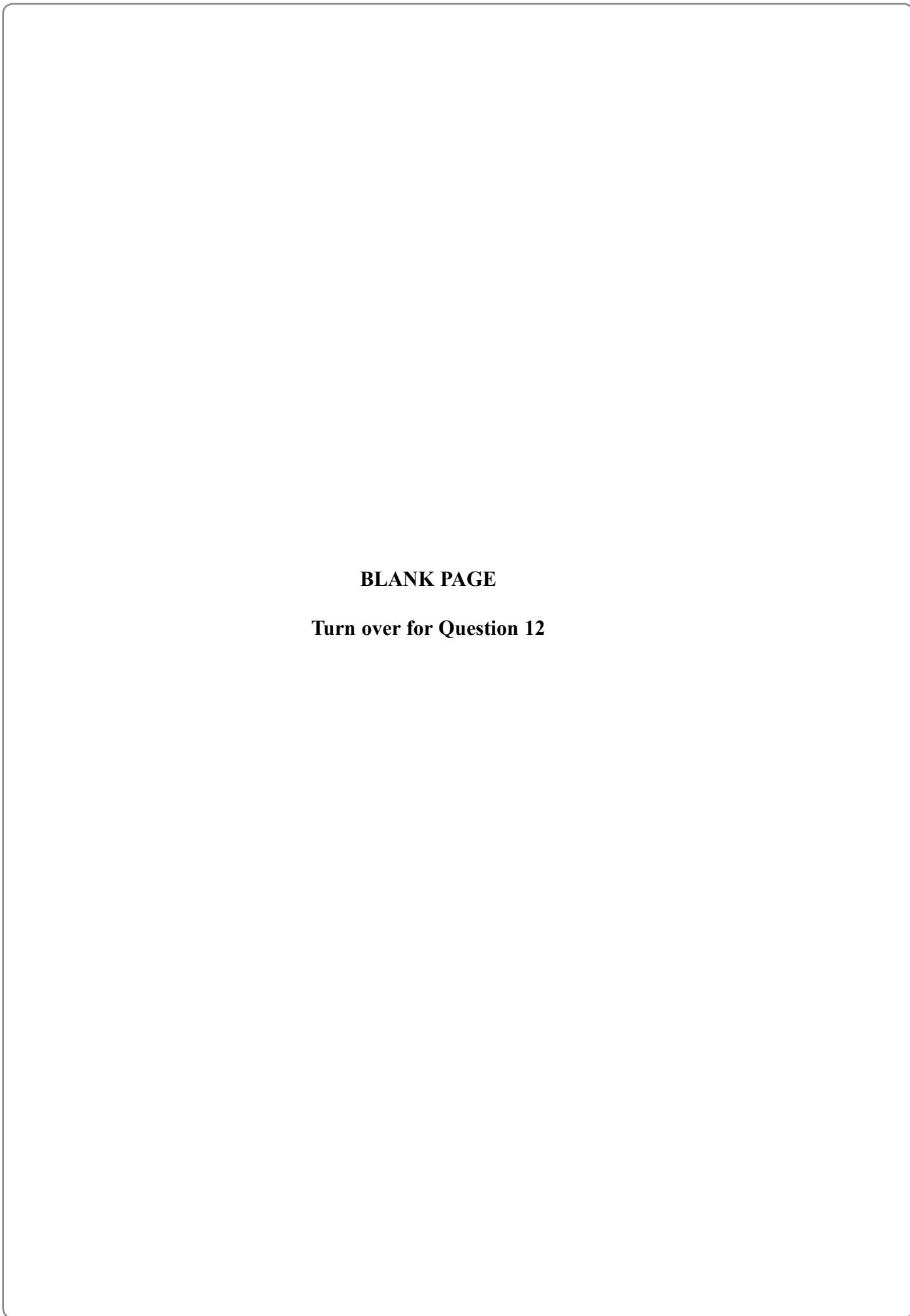
Q10



<p><b>11. (a)</b> Describe the nature and location of the Van Allen Belts.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><b>(2)</b></p> <p><b>(b)</b> The Van Allen Belts are influenced by the solar wind.</p> <p><b>(i)</b> What is the solar wind?</p> <p>.....</p> <p>.....</p> <p><b>(ii)</b> From which part of the Sun does the solar wind originate?</p> <p>.....</p> <p style="text-align: right;"><b>(2)</b></p> <p><b>(c)</b> The solar wind is also responsible for aurorae. Describe the nature and location of aurorae.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><b>(2)</b></p> <p style="text-align: right;"><b>(Total 6 marks)</b></p>	<p>Leave blank</p> <p><b>Q11</b></p> <input data-bbox="1612 1662 1654 1736" type="text"/>
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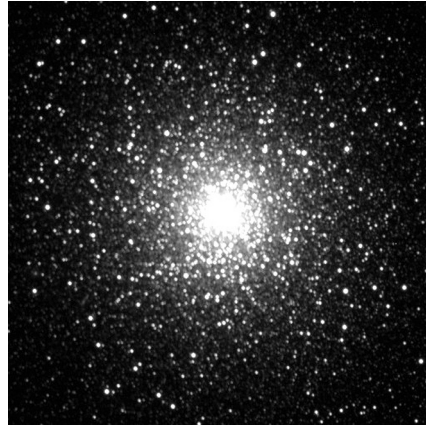


N 3 6 4 9 7 A 0 1 7 3 2



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12. (a) Figure 5 shows a globular cluster.



(Source: NASA)

**Figure 5**

(i) State **two** facts about the stars in a globular cluster.

1 .....

2 .....

(ii) Where are globular clusters located?

.....

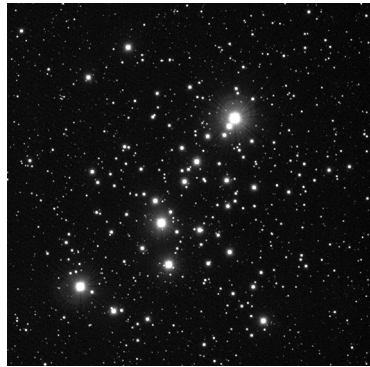
.....

**(3)**



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(b) Figure 6 shows an open cluster.



(Source: NASA)

**Figure 6**

(i) State **two** facts about the stars in an open cluster.

1 .....

2 .....

(ii) Where are open clusters located?

.....

.....

**(3)**

**Q12**

**(Total 6 marks)**



13. (a) Name the **two inferior** planets.

.....  
(1)

(b) On Figure 7, show one position of an inferior planet when it is at **greatest elongation**. Use a cross (X).

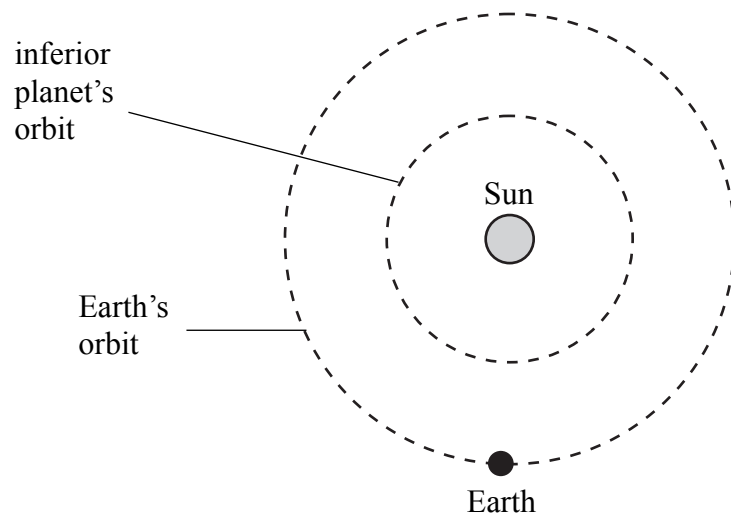


Figure 7

(2)

(c) On some occasions, an inferior planet can be seen crossing the disc of the Sun. What is the name of such an event?

.....  
(1)

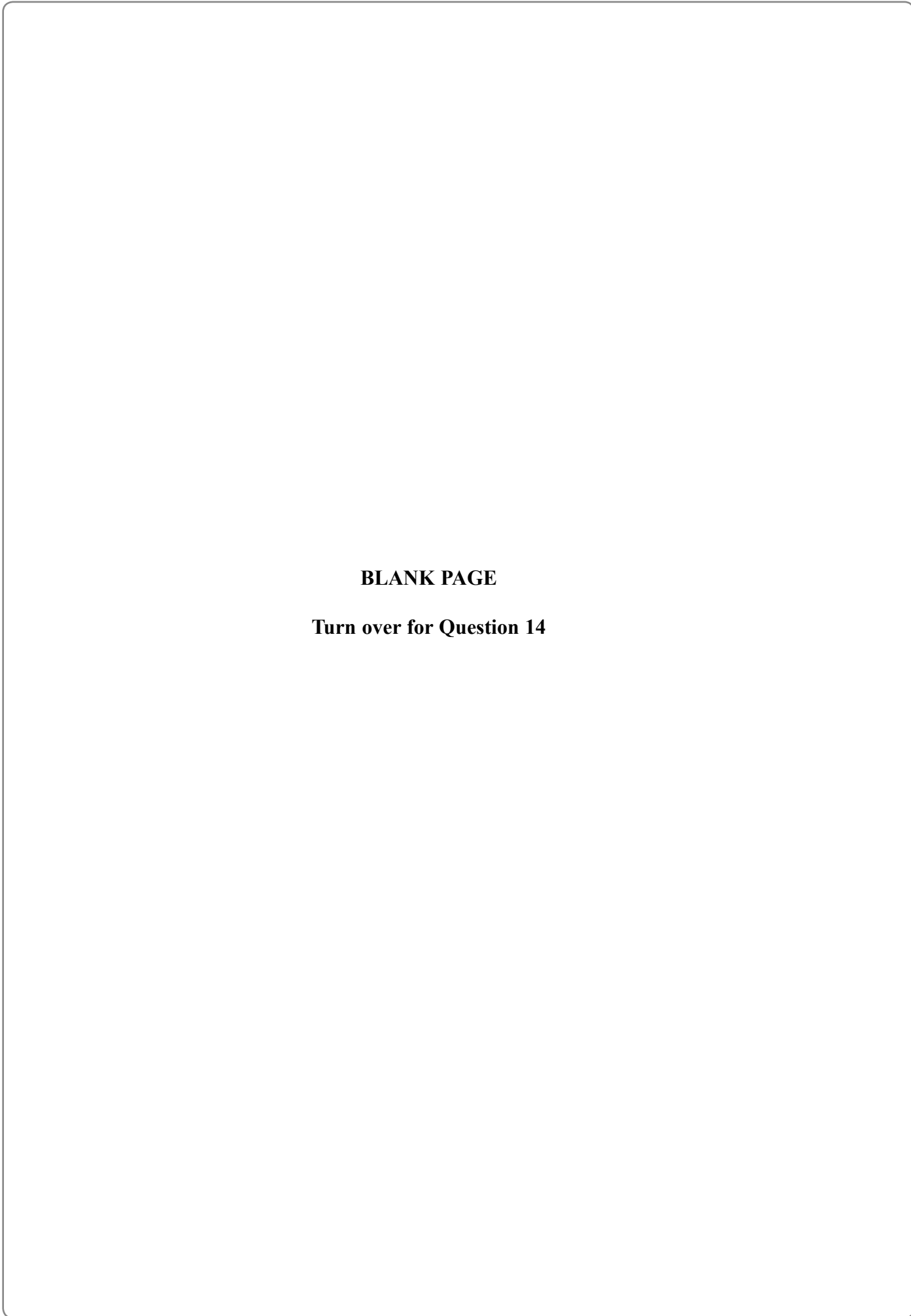
(d) When a **superior** planet is at opposition, it is 4.7 AU from Earth. How far is the planet from Earth when it is at conjunction?

.....  
.....  
(2)

(Total 6 marks)

Q13





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**Turn over for Question 14**



N 3 6 4 9 7 A 0 2 1 3 2



14. Figure 8 shows a number of telescope domes at the European Southern Observatory's La Silla site in Chile. The observatory hosts some of the world's largest telescopes.



(Source: ESO/H Zodet)

**Figure 8**

(a) State **two** advantages to astronomers of locating an observatory on top of a high mountain compared with locating one at sea level.

1 .....

2 .....

**(2)**

(b) How much more light does a 10 metre telescope collect compared with a 5 metre telescope?

.....

**(1)**

(c) State **two** further advantages to astronomers of using a 10 metre telescope compared with a 5 metre telescope.

1 .....

2 .....

**(2)**





<p>(d) NASA is planning to launch the James Webb Space Telescope into an orbit around the Earth in 2013. State two major <b>disadvantages</b> of an observatory in space.</p> <p>1 .....</p> <p>2 ..... (2)</p> <p>(e) The James Webb Space Telescope will be an infra-red telescope. Why will it be necessary to cool the telescope?</p> <p>.....</p> <p>..... (1)</p> <p style="text-align: right;"><b>(Total 8 marks)</b></p>	<p>Leave blank</p> <p><b>Q14</b></p> <div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto;"></div>
Empty space for student answers	Empty space for marking



N 3 6 4 9 7 A 0 2 3 3 2



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blank

15. (a) How many times is the gravitational field strength of the Earth greater than that of the Moon? Put a cross (☒) in the correct box.

2 ☒

3 ☒

5 ☒

6 ☒

(1)

(b) When a short period comet is at perihelion, it is 1.5 AU from the Sun. When the comet is at aphelion, it is 7.5 AU from the Sun. How many times greater is the Sun's pull of gravity on the comet when it is at perihelion compared with aphelion?

.....

.....

(2)

(c) In 1994, Comet Shoemaker-Levy broke into several fragments which then collided with a planet.

(i) Name the planet.

.....

(ii) What property of this planet made it the most likely candidate for such an impact?

.....

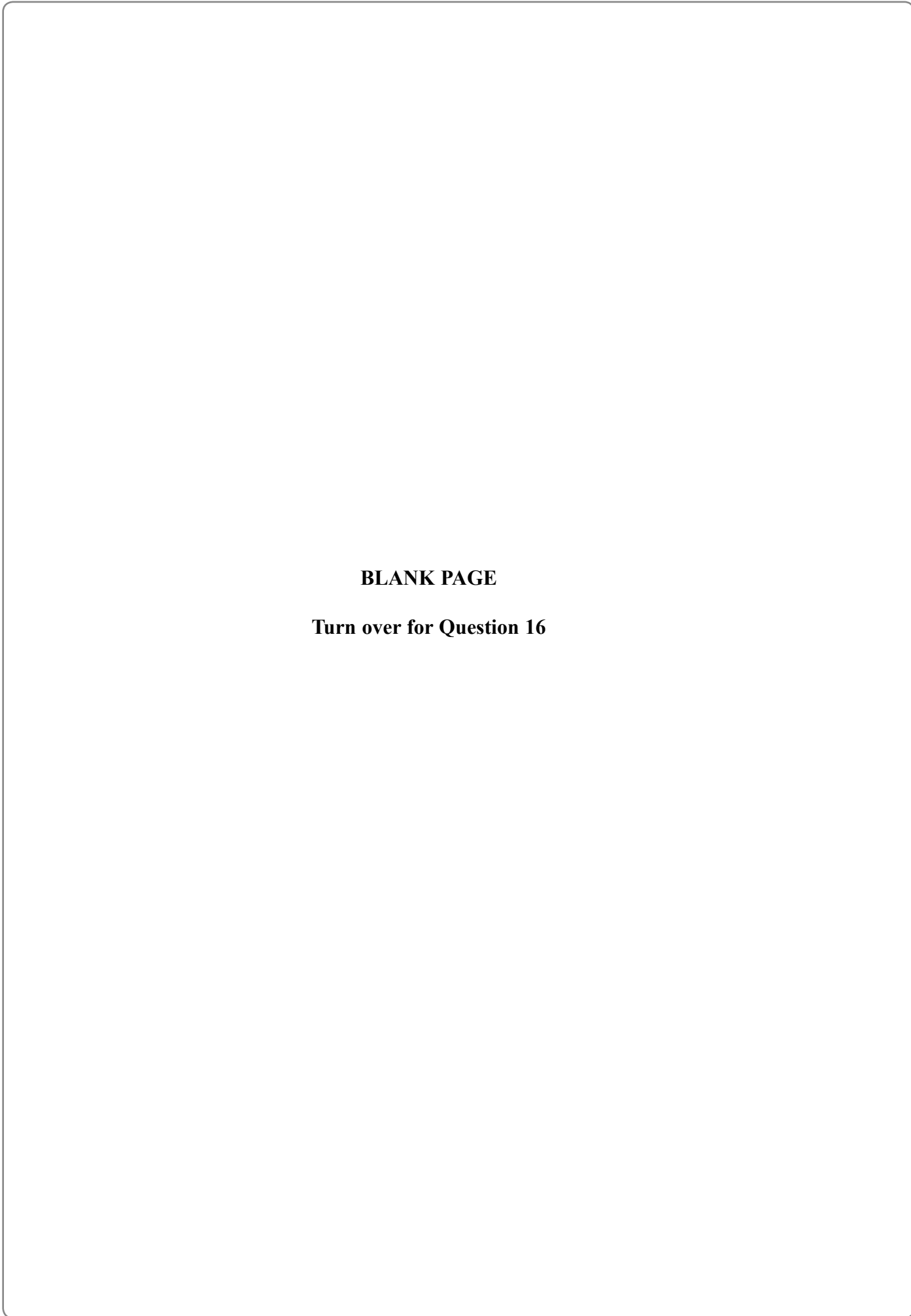
(2)

Q15

(Total 5 marks)







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N 3 6 4 9 7 A 0 2 5 3 2



16. Figure 9 shows three stars in a particular constellation.

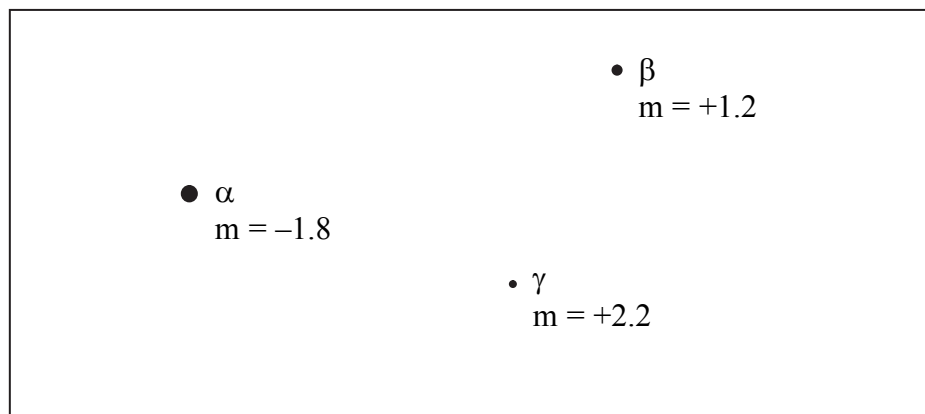


Figure 9

(a) What is the significance of the letters  $\alpha$ ,  $\beta$  and  $\gamma$ ?

.....  
.....

(1)

(b) How many times brighter than star  $\gamma$  is:

(i) star  $\beta$ ?

.....

(ii) star  $\alpha$ ?

.....

(2)





<p>(c) Stars <math>\alpha</math> and <math>\gamma</math> have the same absolute magnitude.</p> <p>(i) Explain the meaning of the term <b>absolute magnitude</b>.</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>(ii) State which of the two stars is closer to Earth.</p> <p>.....</p> <p>(iii) Explain your answer.</p> <p>.....</p> <p>.....</p> <p style="text-align: right;"><b>(4)</b></p> <p style="text-align: right;"><b>(Total 7 marks)</b></p>	<p>Leave blank</p> <p><b>Q16</b></p> <input type="text"/>



N 3 6 4 9 7 A 0 2 7 3 2



<p>17. (a) Draw a labelled diagram to show the structure of a comet including its two tails.</p> <p style="text-align: right;"><b>(3)</b></p> <p>(b) State <b>two</b> ways in which the orbit of a long period comet is different from that of a planet.</p> <p>1 .....</p> <p>2 .....</p> <p style="text-align: right;"><b>(2)</b></p> <p>(c) State the ways in which the two tails of a comet are made visible.</p> <p>1 .....</p> <p>2 .....</p> <p style="text-align: right;"><b>(2)</b></p> <p style="text-align: right;"><b>(Total 7 marks)</b></p>	<p>Leave blank</p> <p><b>Q17</b></p>





Leave blank

19. (a) What is meant by the term **red shift**?

..... (1)

(b) Explain why red shift is important in cosmology.



.....  
.....  
.....  
.....  
.....  
..... (3)

(c) What is meant by the term **dark matter**?

..... (1)

(d) Explain why dark matter is important in cosmology.

.....  
.....  
.....  
.....  
..... (2)

(Total 7 marks)

Q19



20. Figure 10 shows an observer's view of the sky looking south. The observer's meridian is shown.

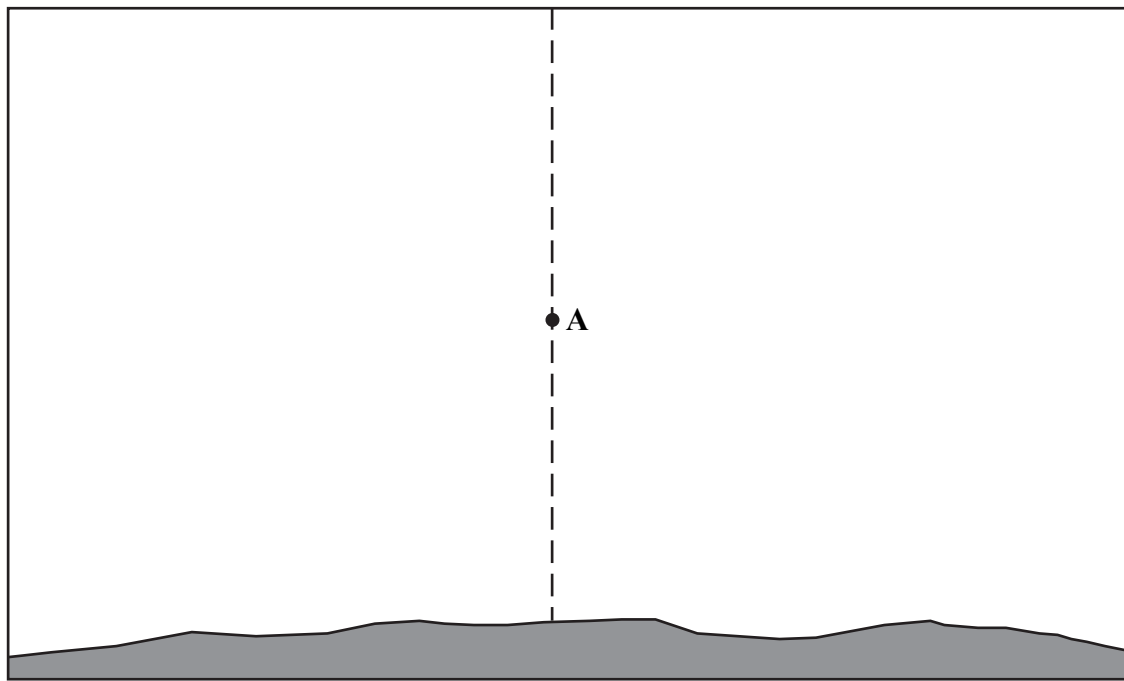


Figure 10

- (a) By how many degrees does the Earth spin in one hour?  
..... (1)
- (b) At 19:00 GMT on December 15th, star A is crossing the observer's meridian. Indicate on Figure 10 the position of this star one hour later. Use the letter B. (2)
- (c) On Figure 10, indicate the position of star A at 19:00 GMT one month later. Use the letter C. (2)
- (d) The longitude of the observer is 3° East. At what time GMT would an observer at a longitude of 1° West observe A crossing his or her meridian on December 15th?  
.....  
..... (2)

(Total 7 marks)

Q20

TOTAL FOR PAPER: 120 MARKS

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