

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

Monday 9 June 2008 – 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.

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 24 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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**Turn over**

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1. (a) What is the astronomical significance of one day? Put a cross (☒) in the correct box.

the time taken for the Earth to orbit the Sun

the time taken for the Moon to orbit the Earth

the time taken for the Earth to rotate once

(1)

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

the time taken for the Earth to orbit the Sun

the time taken for the Moon to orbit the Earth

the time taken for the Earth to rotate once

(1)

(c) Which way does the Earth rotate? Put a cross (☒) in the correct box.

from East to West

from North to South

from West to East

(1)

(d) By how many minutes is a sidereal day shorter than a solar day?

.....

(1)

Q1

(Total 4 marks)



Leave blank

2. (a) Which region of the electromagnetic spectrum:

(i) lies between infra-red and radio waves? Put a cross (☒) in the correct box.

microwaves  ultra-violet  X-rays

(ii) has the longest wavelength? Put a cross (☒) in the correct box.

radio waves  ultra-violet  visible light

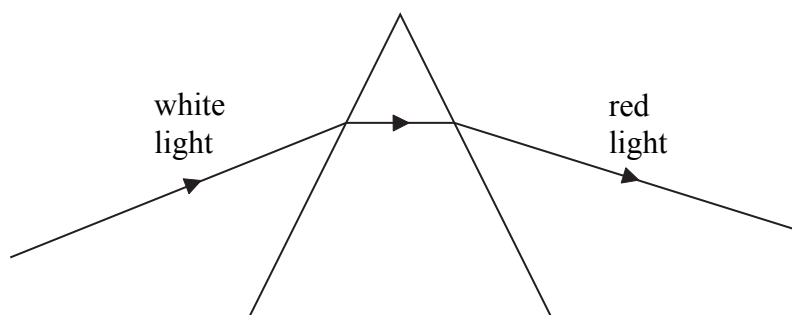
(2)

(b) From which part of the Sun are X-rays emitted? Put a cross (☒) in the correct box.

chromosphere  corona  photosphere

(1)

(c) The diagram shows the path taken by white light entering a glass prism. The path taken by red light leaving the prism is shown.



On the diagram show the path taken by violet light as it passes through the prism.

(2)

Q2

(Total 5 marks)



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3. (a) A group of students observed the sky on a clear night and described what they saw. For each of the descriptions (i) to (iii), put a cross (☒) in the correct box.

(i) It moved from east to west and I saw green and red flashing lights.

Aircraft ☒    Earth satellite ☒    Meteor ☒    Planet ☒

(ii) Out of the corner of my eye, I saw a bright streak of light lasting for about one second.

Aircraft ☒    Earth satellite ☒    Meteor ☒    Planet ☒

(iii) A constellation looking like the letter 'W'.

Orion ☒    Cassiopeia ☒    Taurus ☒    Ursa Major ☒

(3)

(b) On another occasion the students observed an Earth satellite. During the observation its light faded within a few seconds. Explain why the light from a satellite fades in this way.

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

(2)

(Total 5 marks)

Q3



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4. (a) (i) What is the approximate distance from the Earth to the Moon? Put a cross (☒) in the correct box.

13 000 km ☐      250 000 km ☐      380 000 km ☐

(ii) What is the approximate distance from the Earth to the Sun? Put a cross (☒) in the correct box.

93 million km ☐      150 million km ☐      380 million km ☐

(2)

(b) State the shape of the Earth's orbit around the Sun.

.....  
(1)

(c) State what is meant by one Astronomical Unit.

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

(Total 5 marks)

Q4



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5. Five moons are listed:

Phobos, a moon of Mars

Io, a moon of Jupiter

Titan, a moon of Saturn

Miranda, a moon of Uranus

Triton, a moon of Neptune.

From the list, name the moon described in each statement below.

- (i) The surface is covered in ridges, faults and cliffs; the moon appears to have broken apart and re-formed.

.....

- (ii) It is one of the coldest moons in the Solar System with a surface temperature of  $-235\text{ }^{\circ}\text{C}$ . Geysers erupt from its surface.

.....

- (iii) The surface is orange/red in colour and contains a large number of active volcanoes.

.....

- (iv) The dense atmosphere contains methane and nitrogen and the moon was studied by the Huygens space probe in 2005.

.....

**(Total 4 marks)**

**Q5**



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6. The image shows the Earth rising above the Moon's surface. Clouds in the Earth's atmosphere are clearly visible.



*Image courtesy of NASA*

- (a) Describe **two** drawbacks of the Earth's atmosphere to astronomers.

1 .....

2 .....

(2)

- (b) Describe **two** features of planet Earth that distinguish it from the other planets in the Solar System.

1 .....

2 .....

(2)

- (c) In the image the Earth's phase is gibbous. Viewed from Earth, what was the Moon's phase on the same day?

.....

(1)

(Total 5 marks)

Q6



Leave blank

7. (a) State what is meant by the Moon's **shadow terminator**.

.....  
.....  
**(1)**

(b) Features on the Moon's surface are illuminated differently according to the lunar phase. What phase of the Moon is ideal to observe large rayed-craters such as Tycho or Copernicus?

.....  
**(1)**

(c) Explain why the same side of the Moon always faces the Earth.

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

(d) Give **one** reason why it is possible to observe slightly more than 50% of the Moon's surface over a period of time.

.....  
.....  
**(1)**

**(Total 5 marks)**

Q7





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8. (a) Draw a labelled diagram to show the relative positions of the Earth, the Sun and the Moon during a solar eclipse.

(1)

(b) During a **total** solar eclipse

(i) Which part of the Sun is visible?

.....

(ii) Explain why this part of the Sun can only be observed at this time.

.....

.....

.....

(3)

(c) (i) Draw the appearance of the Sun during an **annular** eclipse.

(ii) Explain briefly why an **annular** eclipse occurs.

.....

.....

.....

(3)

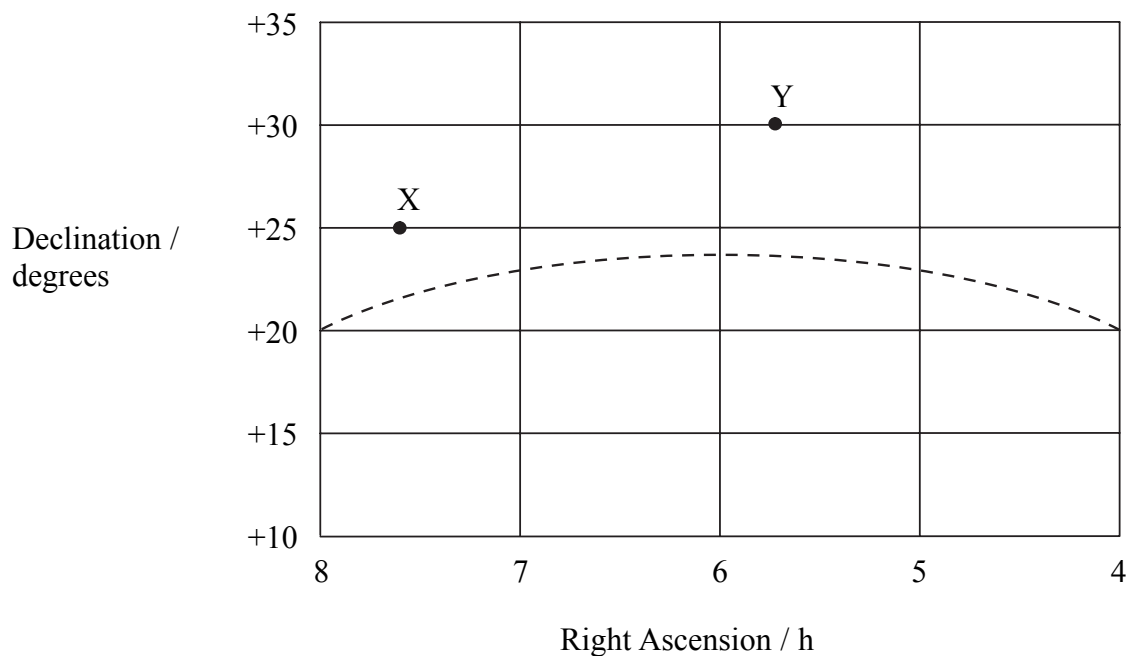
(Total 7 marks)

Q8



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9. The diagram represents part of the celestial sphere. The dashed line shows the ecliptic and two stars, X and Y, have been plotted.



(a) On the diagram:

(i) plot the position of the Sun on June 21 (use S);

(ii) indicate the zodiacal band.

(3)

(b) From what latitude could an observer see star X directly overhead?

..... (1)

(c) Explain why star Y is not circumpolar when observed from Penzance in Cornwall (latitude 50 °N).

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

(2)

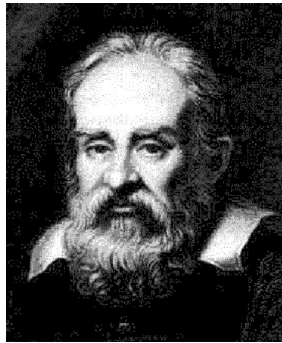
(Total 6 marks)

Q9



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10. Galileo Galilei (pictured below) made many important discoveries that developed the heliocentric theory.



*Image courtesy of NASA*

(a) What is meant by the **heliocentric theory**?

.....  
.....

(1)

(b) Which one of the following astronomers suggested the heliocentric theory before Galileo. Put a cross (☒) in the correct box.

Copernicus ☒      Kepler ☒      Newton ☒

(1)

(c) State **two** of Galileo's discoveries that gave evidence for the heliocentric theory.

1 .....  
2 .....

(2)

(d) Galileo also discovered that Saturn had an unusual appearance, that was later shown to be a system of rings. State **two** key facts about Saturn's rings.

1 .....  
.....  
2 .....  
.....

(2)

(e) State **one** further astronomical discovery made by Galileo.

.....  
.....

(1)

(Total 7 marks)

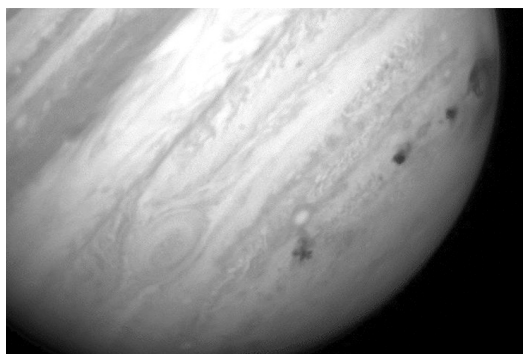
Q10

11



Turn over

11. The image shows the planet Jupiter following impacts of fragments of Comet Shoemaker-Levy in 1994.



*Image courtesy of NASA*

(a) Explain why Jupiter was the most likely planet for such a collision.

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

**(2)**

(b) State **three** further pieces of evidence to show that serious collisions between objects in the Solar System have occurred.

1 .....

2 .....

3 .....

**(3)**



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blank

(c) At its furthest distance a comet is 20 AU from the Sun. At its closest distance it is 2 AU from the Sun.

(i) What is the name of the furthest point on its orbit?

.....

(ii) How many times greater will the force of gravity on the comet be when it is 2 AU from the Sun compared to when it is 20 AU from the Sun? Put a cross (☒) in the correct box.

1 ☒      10 ☒      100 ☒      1000 ☒

(2)

Q11

(Total 7 marks)



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12. The Sun is a main sequence star.

(i) Describe how the Sun became a main sequence star.

.....

.....

.....

.....

.....

.....

.....

(ii) Describe how the Sun will evolve after the main sequence.



.....

.....

.....

.....

.....

.....

.....

**(Total 7 marks)**

**Q12**



Leave  
blank

13. (a) State what is meant by the **radiant** of a meteor shower.

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

(b) State why an observer on the Moon could never see a meteor.

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

(c) Explain clearly the difference between a meteoroid and a meteorite.

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

(Total 5 marks)

Q13



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14. (a) Explain why it is dangerous to observe the Sun directly.

.....  
.....

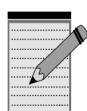
(1)

(b) With the aid of a diagram, describe **one** method of safely observing the Sun.

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

(2)

(c) Describe how the Sun's energy is produced.



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

(3)

(d) Which part of the Sun has the lowest temperature? Put a cross (☒) in the correct box.

core     corona     photosphere     radiation zone

(1)

(Total 7 marks)

Q14





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15. (a) Two stars,  $\alpha$  and  $\beta$ , have apparent magnitudes of  $-0.2$  and  $+2.8$  respectively.

By how many times does star  $\alpha$  appear brighter than star  $\beta$ ?

.....  
(2)

(b) A galaxy has an apparent magnitude of  $+14.5$  and is  $10$  Mpc away from the Earth. Calculate the galaxy's absolute magnitude.

Use the formula  $M = m + 5 - 5 \lg d$  where  $d$  is the distance in parsecs.

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

(Total 5 marks)

Q15

16. (a) Describe how astronomers obtain the spectrum of a star.



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

(b) The spectrum of a star contains absorption lines. Describe the appearance of absorption lines.

.....  
(1)

(c) State **two** facts about a star that astronomers can deduce by analysing its spectrum.

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

(Total 6 marks)

Q16



Leave  
blank

17. In 1990, the surface of Venus was mapped using radar reflection.

(a) Which region of the electromagnetic spectrum was used?

.....  
(1)

(b) Name the space mission that mapped Venus.

.....  
(1)

(c) Why was it not possible for astronomers to describe the surface of Venus before this mission?

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

(d) At one point in its orbit, waves emitted from the space probe returned 0.0018 seconds later. Calculate the height of the probe above the surface of Venus at this time.

Use the formula  $\text{speed} = \text{distance} / \text{time}$

The speed of light is 300 000 km/s

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

Q17

(Total 6 marks)



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**18.** The Milky Way is a faint band of stars stretching across the sky.

(a) Explain why the Milky Way appears like this.

.....  
.....

**(2)**

(b) State **one** factor that can make it difficult to observe the Milky Way on a clear night.

.....

**(1)**

(c) Sketch a side view of our galaxy. Indicate the position of:

- (i) the Solar System (use **SS**)
- (ii) a typical open cluster (use **OC**)
- (iii) a typical globular cluster (use **G**)

**(5)**

**Q18**

**(Total 8 marks)**



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19. (a) Describe some of the evidence for the existence of planetary systems orbiting stars other than the Sun.

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

(3)

(b) The table gives data for two planets orbiting a star.

planet	radius of orbit / AU	orbital period / days
A	0.42	40
B	1.68	

Calculate the orbital period of planet B.

Use the formula  $(T_1 / T_2)^2 = (r_1 / r_2)^3$

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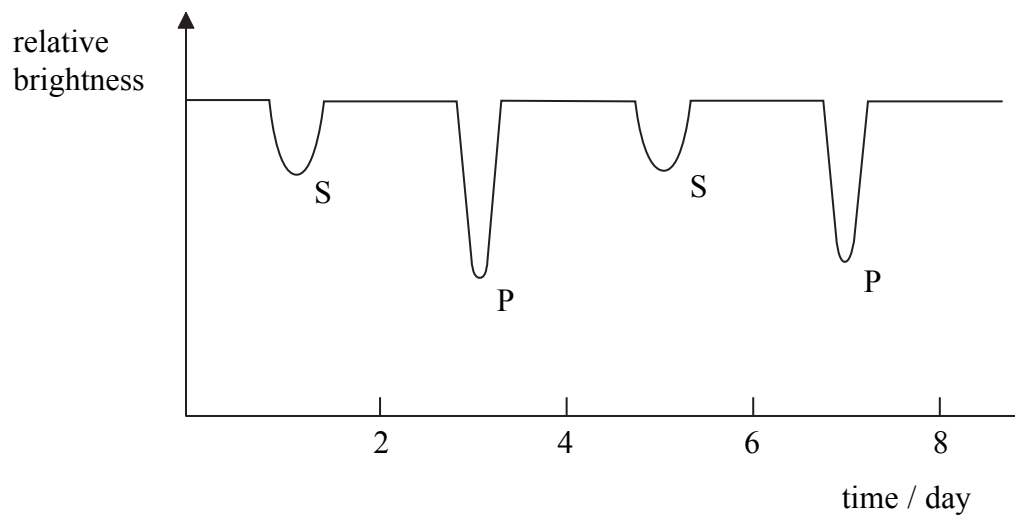
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(Total 6 marks)

Q19



20. (a) The diagram shows the light curve for an eclipsing binary star.



(i) Determine the orbital period of the binary star.

.....

(ii) With the aid of a diagram, explain how dips P and S occur.

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

(4)



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(b) State the difference between a **binary** star and an **optical double** star.

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

(2)

(c) (i) Sketch the light curve for a Cepheid variable.

(ii) Explain how the light curve of a Cepheid variable can be used to determine its distance.

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

(4)

Q20

(Total 10 marks)

**TOTAL FOR PAPER: 120 MARKS**

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