

Solar system**Name & Set**

- 3 (a) The following table gives information about some of the planets.

<i>Planet</i>	<i>Distance from the Sun (million km)</i>	<i>Radius (km)</i>	<i>Average density (kg/m³)</i>
Earth	149	6350	5520
Jupiter	773	70960	1330
Mars	227	3360	3940
Mercury	58	2400	5430
Uranus	2886	25275	1300
Venus	108	6025	5240
Neptune	4469	25200	1760

Use the information given in the table to answer the following questions.

(i) Which of the planets is closest to the Earth? _____ [1]

(ii) On which of these planets is the surface temperature likely to be the lowest? Explain your answer.

_____ [2]

(iii) What pattern, if any, is there between the size and density of the planets?

_____ [2]

(iv) What pattern, if any, is there between the density of the planets and their position in the Solar System? Give an explanation for your answer.

_____ [4]

4 The table below gives data concerning Mars and Earth.

<i>Planet</i>	<i>Distance from the Sun (km)</i>	<i>Diameter (km)</i>	<i>Acceleration of free fall (m/s)</i>	<i>Density (kg/m)</i>
MARS	228×10^6	6794	3.8	3.93
EARTH	150×10^6	12760	10.0	5.52

Use the data to answer the following questions.

(a) (i) Calculate the weight of a 100 kg mass on Mars.

_____ [3]

(ii) The intensity of solar radiation from the Sun is given by the following expression

$$\text{Intensity} = \text{a constant} \times (\text{distance from Sun})^2$$

Use this to calculate the ratio of the intensity of solar radiation received on Earth to that received on Mars.

 _____ [3]

(iii) Use your answer to part (ii) to explain why the average surface temperature on Mars is less than that on Earth.

_____ [3]

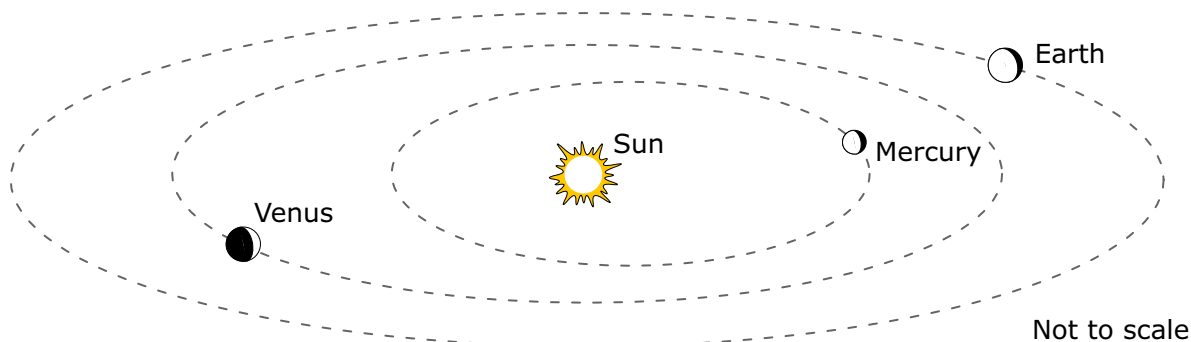
(b) (i) It has been claimed that Mars once had a denser atmosphere than it has now. Suggest a reason why most of its atmosphere would have escaped.

_____ [2]

(ii) The temperature of Mars at night time is $-125\text{ }^\circ\text{C}$. Give TWO reasons why this is much lower than the temperature of Earth at night-time.

_____ [2]

6 The diagram represents the orbits of the three planets nearest the Sun. These are Mercury, Venus and Earth.



(a) There are six other planets that orbit the Sun. Write down the names of two of them.

_____ [2]

(b) Use the diagram to describe *two* ways in which the orbits of Mercury and Venus differ.

(i) _____

_____ [2]

(ii) _____

_____ [2]

(c) Mercury travels at an average speed of 48 km/s around the Sun. Venus travels at an average speed of 35 km/s around the Sun. State *two* reasons why Venus takes longer to orbit the Sun than Mercury does.

(i) _____

_____ [2]

(ii) _____

_____ [2]

(d) Why does the Sun's energy not travel to the surface of Mercury by conduction or convection?

_____ [2]

(e) The gravitational force that the Sun exerts on Mercury is not constant.

(i) Describe how the force changes as Mercury orbit the Sun.

[2]

(ii) The Sun exerts a bigger gravitational force on Venus than it does on Mercury. Suggest a reason for this.

[2]

(f) Pictures sent back to Earth from space showed that Mercury has a Moon-like surface. What is meant by describing Mercury's surface like this?

[2]

(g) There are many satellites orbiting the earth. What is the name of the earth's only natural satellite?

[2]

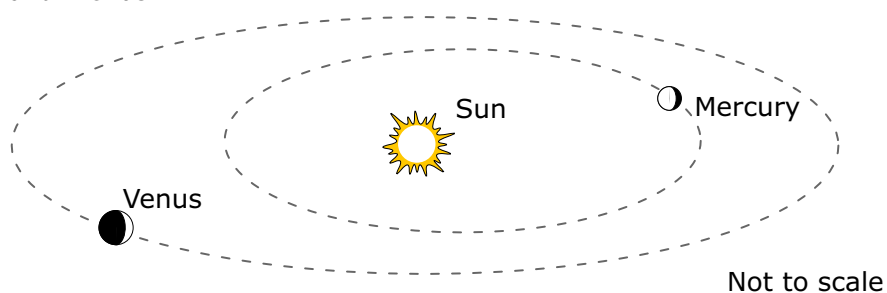
(h) Explain, with the aid of a diagram, why the number of daylight hours in England is not the same in Summer and Winter.

[2]

(i) A student wrote 'At night we can see things because the Moon shines on them.' Explain why this is not correct and why the Moon appears to shine.

[2]

- 7 The diagram represents the orbits of the two planets nearest the Sun. These are Mercury and Venus.



- (a) (i) The gravitational force which the Sun exerts on Mercury is not constant. Describe how this force changes as Mercury orbits the Sun.

[2]

- (ii) The Sun exerts a bigger gravitational force on Venus than it does on Mercury. Suggest a reason for this.

[2]

- (b) (i) Pictures sent back to Earth from a space probe showed that Mercury has a Moon-like surface. It has craters ranging from 100 m to 1300 km in diameter. Suggest how craters of such different sizes were caused.

[2]

- (ii) Although the surface of Mercury is Moon-like, the composition of the interior of the planet is probably similar to that of Earth. Astronomers are not sure whether the core has solidified or is still molten.

[2]

- (iii) If you were able to examine the surface of Mercury, what evidence would you look for which might provide clues about the interior of the planet.

[2]

- (iv) Explain how this evidence could be interpreted.

[2]

(c) Venus and Earth have an atmosphere. The table shows the approximate composition of the atmospheres of these planets.

<i>gas</i>	<i>atmosphere of earth (%)</i>	<i>atmosphere of Venus (%)</i>
nitrogen	78	3
oxygen	20	trace
carbon dioxide	0.03	97
water vapour	2	0.01

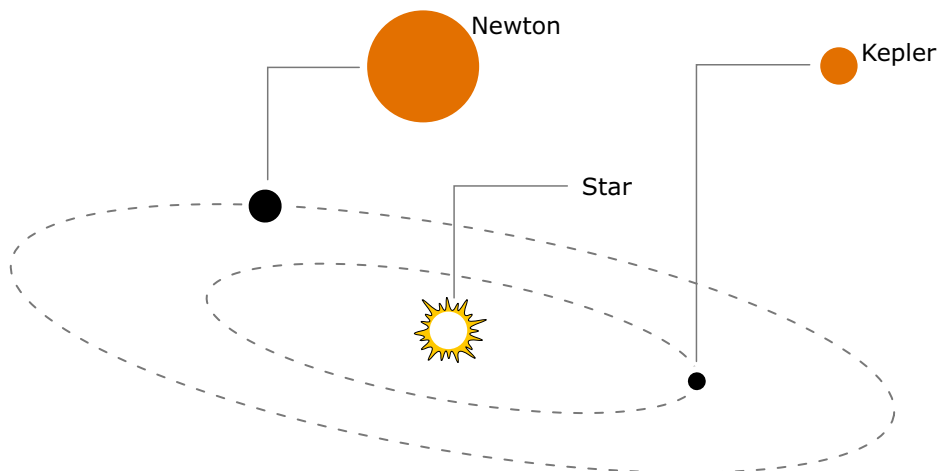
(i) Use the information in the table to explain how the temperature on the surface of Venus might compare with the temperature on the surface of the Earth.

[3]

(ii) The atmosphere of Venus extends to a greater height above the planet's surface than the atmosphere of the Earth. Use this fact and the information in the table to explain how the pressure at the surface of Venus might compare with the pressure at the surface of the Earth.

[3]

- 8 A new solar system is discovered. It consists of two planets: There are two planets: Newton and Kepler. The diagram shows their orbits and their relative size.



- (a) How does the length of the year on Kepler compare to the length of the year on Newton?

_____ [1]

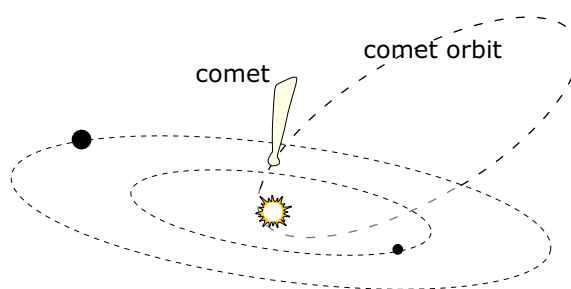
- (b) How does the gravity on the surface of Kepler compare to the gravity on the surface of Newton, if both planets are made of the same stuff?

_____ [1]

- (c) How will the surface temperature on Kepler be different to the surface temperature on Newton?

_____ [1]

- (d) Comets made of ice orbit this star in different planes from the orbits of the planets. State, with an explanation, the relative speed of the comet



- (i) the nearer to the star it is.

_____ [1]

- (ii) the further from the star it is.

_____ [2]

9 The ancient Greeks believed that the Earth was at the centre of the universe., and that the stars were attached to an invisible sphere that spins around the earth.

Give two reasons why this model was accepted by the Ancient Greeks.

1. _____

_____ [2]

2. _____

_____ [2]

(b) Neptune and Uranus are very similar in both size and mass. Neptune is about one and a half times further from the Sun than Uranus.

(i) Compare the size of the force of gravity between a 1 kilogram mass resting on the surface of Neptune and a 1 kilogram mass resting on the surface of Uranus.

_____ [2]

(ii) How does the size of the force of gravity between the Sun and Neptune compare with the size of the force of gravity between the Sun and Uranus?

_____ [1]

Give a reason for your answer.

_____ [1]

(c) An understanding of gravity has allowed communication satellites to be launched into geosynchronous orbits around the Earth.

(i) Why are microwaves, and not radio waves, used to carry information from the Earth to the satellites?

_____ [1]

(ii) Why are communication satellites placed in geosynchronous orbits?

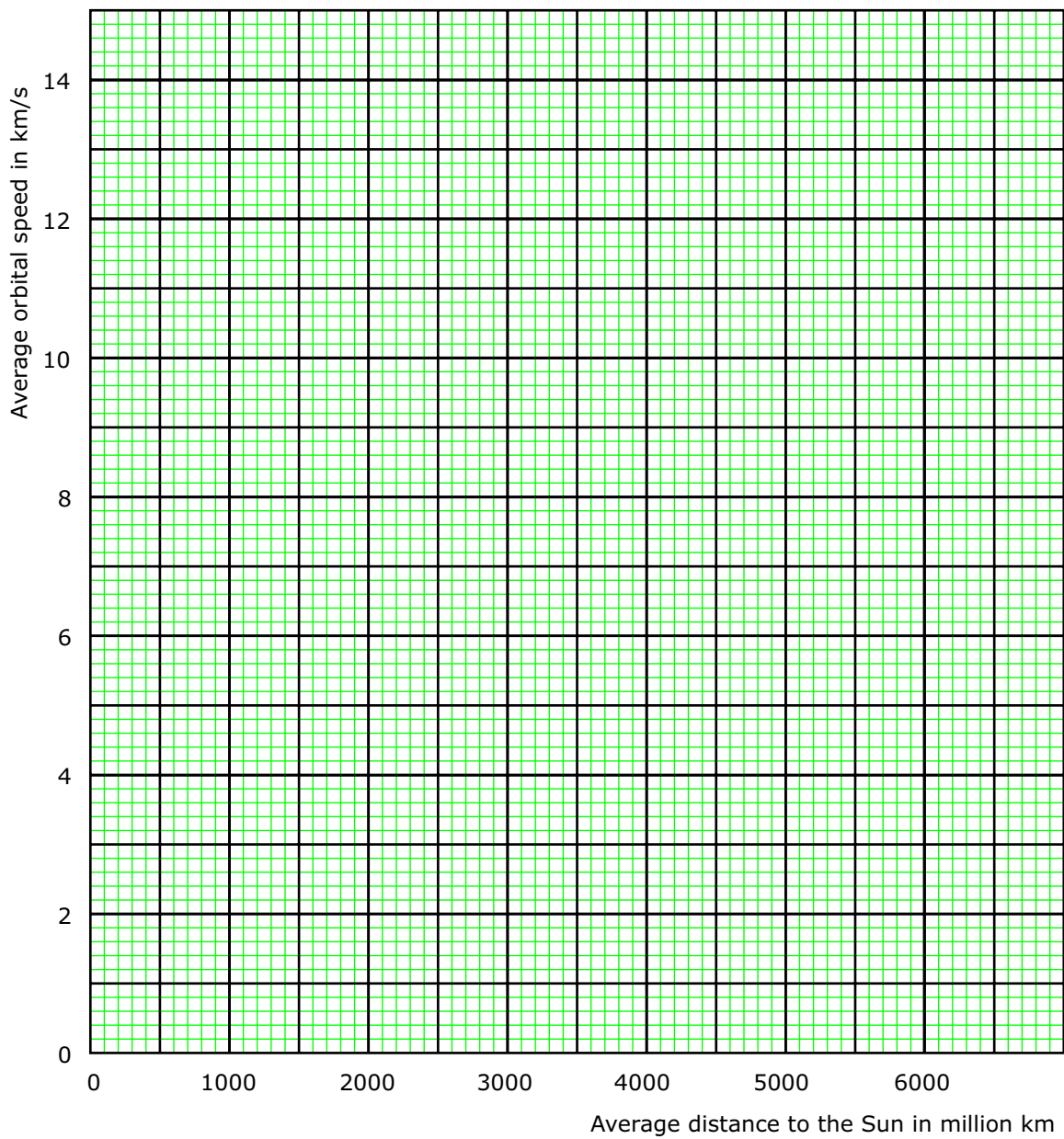
_____ [1]

_____ [1]

1 0 (a) The table gives some information about four planets.

<i>Planet</i>	<i>Average distance from the Sun in million km</i>	<i>Average time to complete one orbit in Earth years</i>	<i>Average orbital speed in km/s</i>
Jupiter	800	12	13.0
Saturn	1400	30	9.6
Neptune	4500	165	5.2
Pluto	5900	248	4.7

(i) Draw a graph of each planet's average orbital speed against the distance the planet is from the Sun.



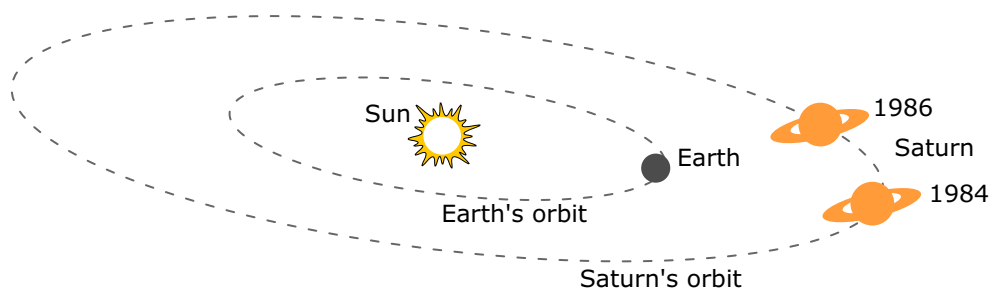
(ii) How does the average orbital speed of a planet vary with its average distance from the Sun?

[1]

(iii) The average distance between Uranus and the Sun is 2900 million kilometres. Use the graph to predict the average orbital speed of Uranus.

[1]

(b) The diagram shows the position of Saturn in July 1984 and July 1986.



(i) Saturn takes 30 Earth years to complete one orbit of the Sun. On the diagram, mark with an **X** the position of Saturn in the year 2000. [1]

(ii) Suggest why it will be difficult to see Saturn in July 2000.

[1]

11 (a) The table gives information about five planets in the solar system.

<i>Name of planet</i>	<i>Average distance from the Sun in millions of km</i>	<i>Mass compared with the Earth</i>	<i>Time for one orbit in Earth years</i>
Earth	150	1.0	1.0
Mars	228	0.1	1.9
Jupiter	778	320	12
Saturn	1427	95	30
Neptune	4497	17	165

(i) Consider a planet's orbit. Why is the distance between the planet and the Sun given as an average?

_____ [1]

(ii) Complete the arrangement of the five planets in order of increasing orbital speed.

planet with slowest orbital speed	
planet with fastest orbital speed	Earth

(iii) The solar system contains thousands of asteroids.

[A] Between which two planets are most asteroids found?

_____ [1]

[B] Use the information in the table to estimate how many years an asteroid takes to orbit the Sun.

_____ [1]

(b) The diagram shows the orbit of Halley's comet. The position of the comet in certain years is shown.

(i) State how and explain why the speed of the comet changed between 1985 and 1986.

[3]

(ii) Comets rarely collide with a planet. Explain why.

[3]