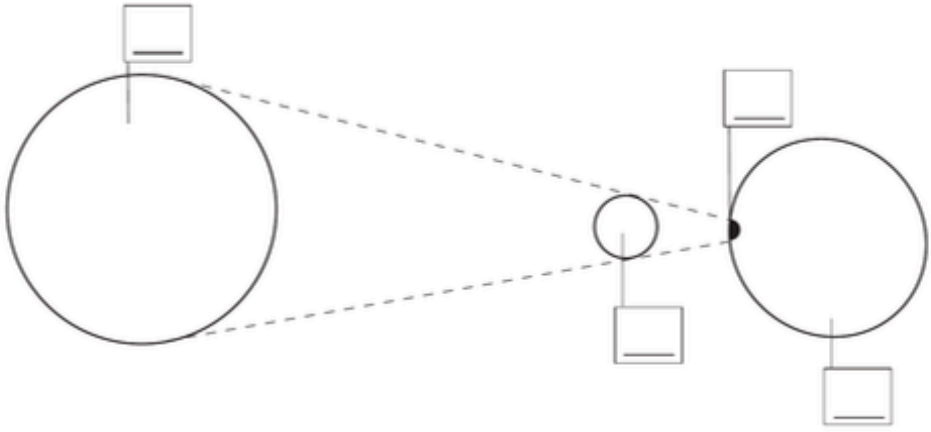
Space Physics

From the phases of the Moon to the scale of the solar system, this topic explores our place in space — essential KS3 physics knowledge for GCSE Science.

11. (a) The diagram below shows the positions of the Sun, Moon and Earth during a solar eclipse.

Write numbers (1–4) on the diagram below to label the features during an eclipse.

1. the Earth
2. the Moon
3. the Sun
4. a region where the total eclipse of the Sun is taking place



not to scale

11a 1 mark

11a 1 mark

(b) Scientists discovered a regular cycle of eclipses. It is called the Saros cycle. The table below shows the dates of some eclipses in this cycle.

Complete the table by predicting the date of the next eclipse in the Saros cycle.

eclipse	date
eclipse 1	20th July 1963
eclipse 2	31st July 1981
eclipse 3	11th August 1999
eclipse 4	

11b 1 mark

11b 1 mark

KS3 Science SATs, Tier 3-6, Paper 1 (2009) - Q11(a-b)

planet	average distance from Sun (millions of km)	time for one orbit (Earth years)	average surface temperature of planet (°C)
Saturn	1427	30	–180
Uranus	2870	84	–210
Pluto	5900	248	–230

(i) The time for one orbit of the planet Neptune is 165 Earth years.

Estimate the average distance of Neptune from the Sun.
Use information in the table to help you.

_____ millions of km

1 mark

(ii) How does the surface temperature of these planets vary with distance from the Sun?
Use information in the table to help you.

_____

_____

1 mark

(iii) Explain why the temperature varies with distance from the Sun in this way.

_____

_____

1 mark

Modern Tuition

15. Each of the observations shown below has one explanation.

Draw a line from each observation to the correct explanation.

observation	explanation
A ship going out to sea goes out of sight.	The Earth spins on its axis.
We have day and night.	The Earth is a sphere.
We have summer and winter.	The Earth orbits the Sun and the Earth's axis is tilted.
One year on Earth is 365 days.	Gravity attracts objects towards the Earth.
	The Earth orbits the Sun.

Modern Tuition

(d) The table below gives information about five planets.

planet	distance from the Sun (million km)	time for planet to orbit the Sun (Earth-years)
Venus	110	0.6
Earth	150	1.0
Mars	230	
Jupiter	780	12.0
Saturn	1400	30.0

(i) Look at the information in the table.

How does the time for a planet to orbit the Sun change with its distance from the Sun?

_____

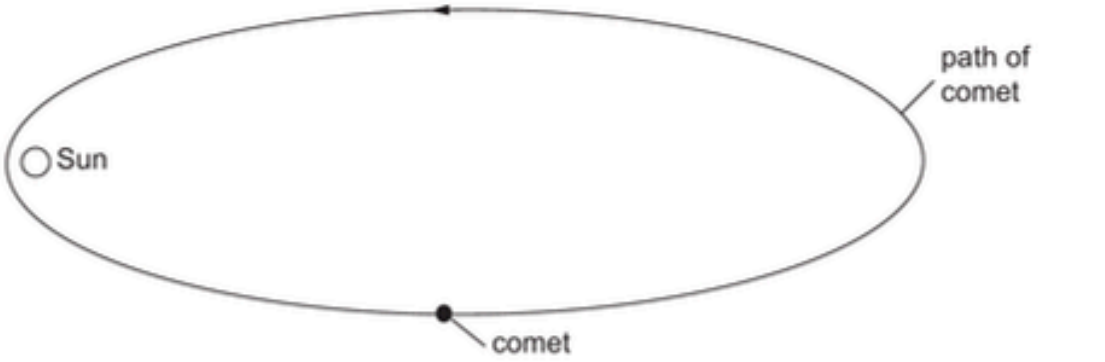
_____

(ii) Use information in the table to estimate the time for Mars to orbit the Sun.

_____ Earth-years

(e) The diagram below shows the path of a comet around the Sun.

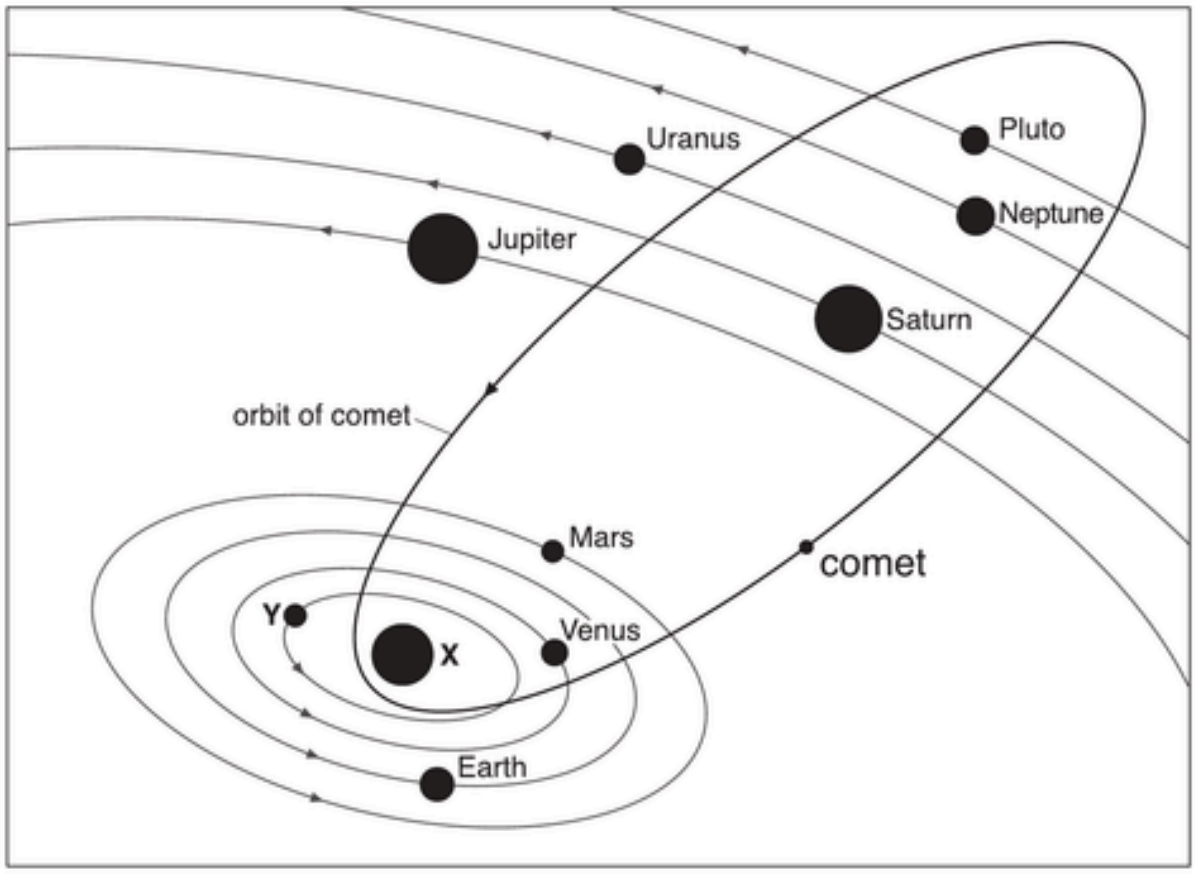
On the path of the comet below, place a letter X to show the position where the comet is travelling the fastest.



not to scale

Modern Tuition

15. The diagram below shows part of the solar system.



not to scale

(a) Look at the diagram.
Give the names of X and Y.

X _____

Y _____

(b) It takes Jupiter much longer than Mars to complete one orbit.
Give **two** reasons for this.

1. _____

_____

2. _____

_____

Modern Tuition

(c) The diagram opposite also shows the orbit of a comet.

In 1531, 1607 and 1683 scientists recorded that they had seen a comet in the sky.

(i) Edmund Halley looked at these dates and suggested the scientists had all seen the same comet.

Explain how he worked out that it was the same comet each time.

_____

_____

15

1 mark

(ii) The comet was last seen in 1986.

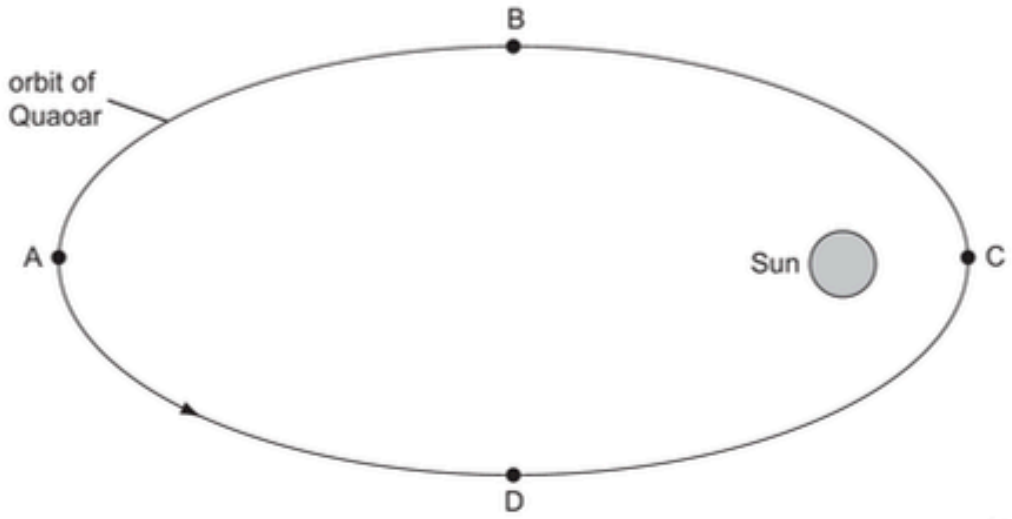
Predict when it will be seen next.

_____

15

14. (a) In 2002 a large asteroid was discovered orbiting the Sun.
It was named Quaoar.

The diagram below shows Quaoar in four positions in its orbit.



not to scale

(i) In which of the four positions, A, B, C or D, is the effect of the Sun's gravity on Quaoar the greatest?

_____

Explain your answer.

_____

_____

14ai
1 mark

(ii) **On the diagram above**, draw arrows to show the direction of the Sun's gravity on Quaoar in each of the positions A, B, C and D.

14aii
1 mark

(iii) At which position, A, B, C or D, is Quaoar travelling most slowly?

_____

Explain your answer.

_____

_____

14aiii
1 mark

Modern Tuition

16. The table shows information about three planets in our solar system.

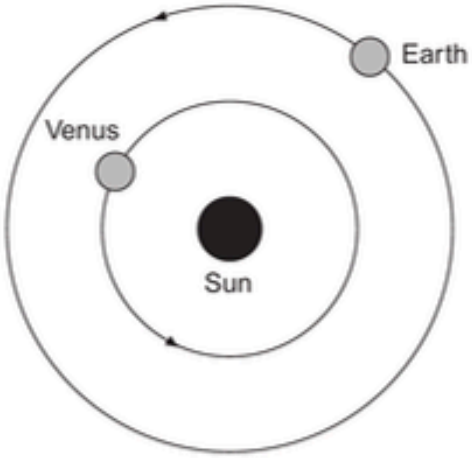
planet	time taken to orbit the Sun (Earth-years)
Mars	2.0
Venus	0.6
Earth	1.0

(a) Give **one** reason why Venus takes less time than Earth to orbit the Sun.

16a

1 mark

(b) The diagram below shows the orbits of Venus and Earth.
The Sun is a source of light. Venus does **not** produce its own light.



not to scale

16b

1 mark

On the diagram above, draw rays of light to show how Venus can be seen from Earth. Use a ruler.

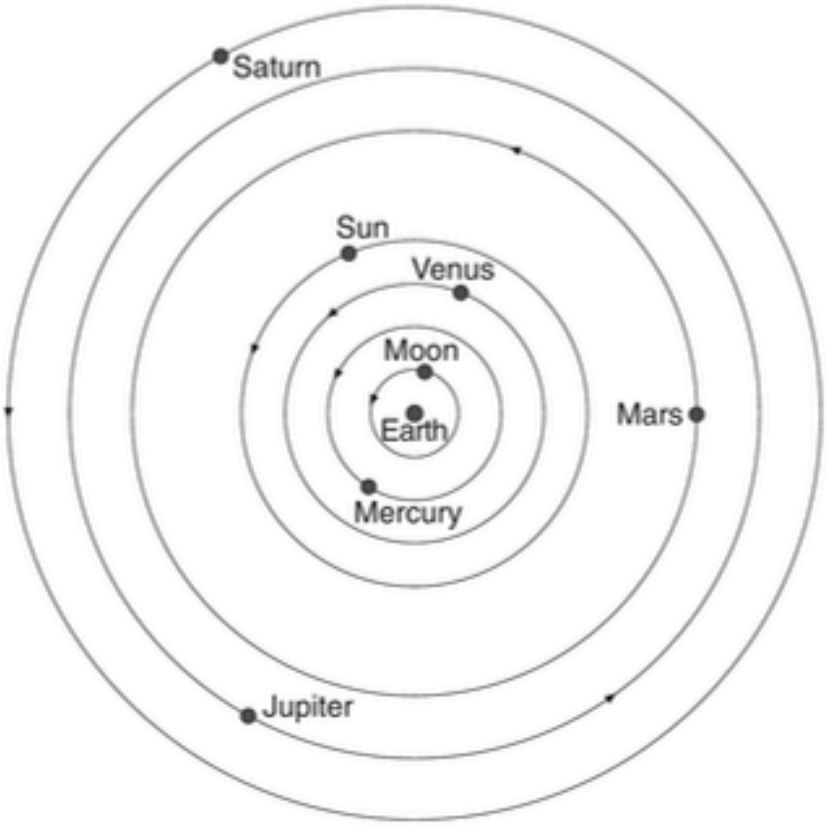
16b

1 mark

Draw an arrow **on each** ray to show the direction of light.

Modern Tuition

(c) The diagram below shows how the astronomer Ptolemy drew the solar system 2000 years ago.



not to scale

(i) The planets Uranus and Neptune are missing from his diagram.

Suggest why Ptolemy did **not** include these planets in his diagram.

_____

_____

16c

1 mark

(ii) Today we know the correct arrangement of the planets in our solar system.

Give **one** way the diagram above is incorrect.
Complete the sentence below.

In the correct arrangement _____

_____

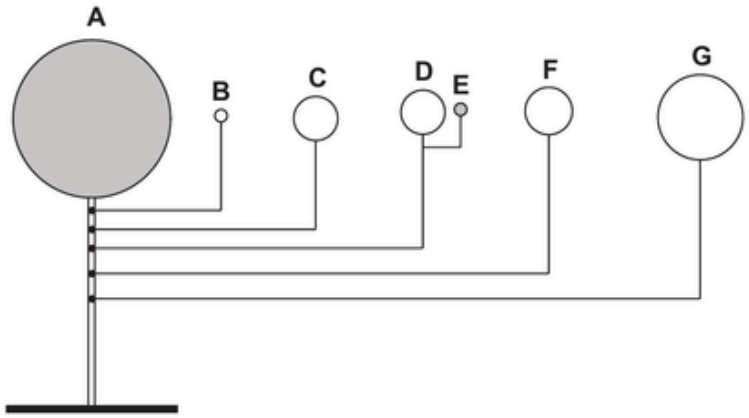
16c

1 mark

maximum 5 marks

Modern Tuition

1. (a) Alfie made a model of part of the solar system.
He used metal balls for the Sun, the Moon and the planets.



- E goes around D.
- B, C, D, F and G go around A.

Give the letter that is used to label:

(i) the model Sun;

_____ 1ai
1 mark

(ii) the model Earth;

_____ 1aii
1 mark

(iii) the model Moon;

_____ 1aiii
1 mark

(iv) the model planet with the largest orbit.

_____ 1aiv
1 mark

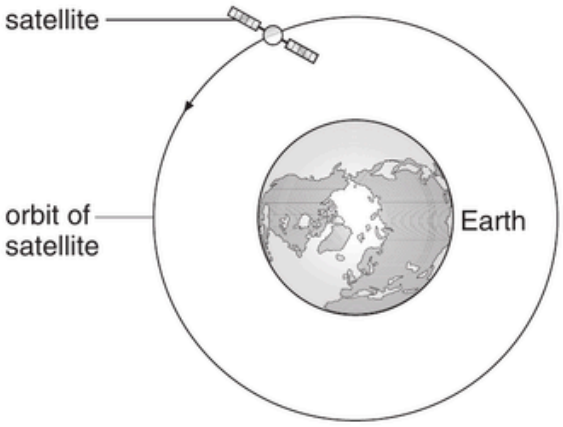
Modern Tuition

(b) The table below shows the order of some of the planets in our solar system.

Complete the table to show the positions of the Earth, Neptune and the Sun.

	Mercury	Venus		Mars	Jupiter	Saturn	Uranus	

(c) The diagram shows a satellite in orbit around the Earth.



not to scale

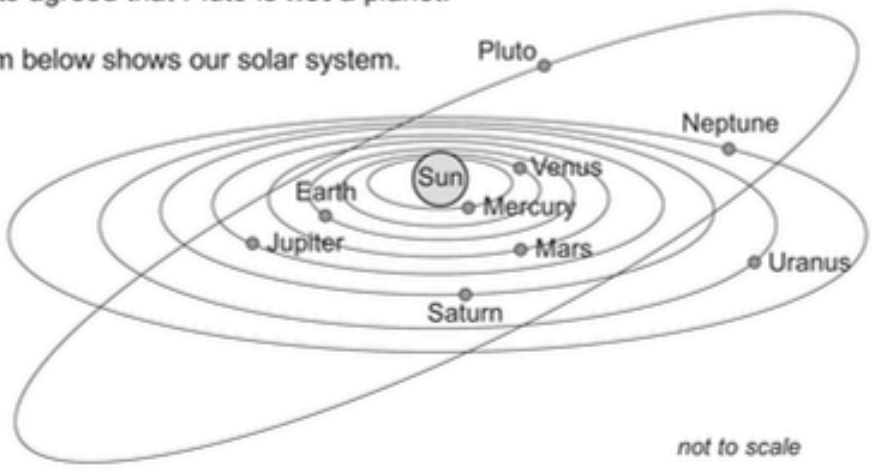
(i) Give **one** use of a satellite.

_____

Modern Tuition

14. Pluto was discovered in 1930. It was classified as a planet.
In 2006, scientists agreed that Pluto is **not** a planet.

(a) The diagram below shows our solar system.



(i) **From the diagram**, what supports the idea that Pluto is a planet?

14ai
1 mark

(ii) **From the diagram**, what supports the idea that Pluto is **not** a planet?

14aii
1 mark

(b) The table below shows information about planets in our solar system.

planet	diameter (km)
Mercury	4800
Venus	12200
Earth	12800
Mars	6800
Jupiter	142600
Saturn	120200
Uranus	49000
Neptune	50000

Pluto has a diameter of 2300 km.
How does this information suggest to scientists that Pluto is **not** a planet?

14b
1 mark

Modern Tuition

(c) An object called Charon orbits Pluto.

How does the presence of Charon support the idea that Pluto is a planet?

_____

1 mark

(d) The table below shows the composition of the atmosphere of some of the objects in our solar system.

object	atmosphere
Mercury	none
Venus	mainly carbon dioxide
Earth	mainly nitrogen and oxygen
Neptune	hydrogen, helium and methane
Earth's moon	none
Titan (a moon)	nitrogen and methane
Pluto	nitrogen and methane

Atmosphere is **not** used to classify objects as moons or planets.
Use the information above to suggest a reason for this.

_____

_____

1 mark

(e) Why do you think scientists found it difficult to decide how Pluto should be classified?

_____

_____

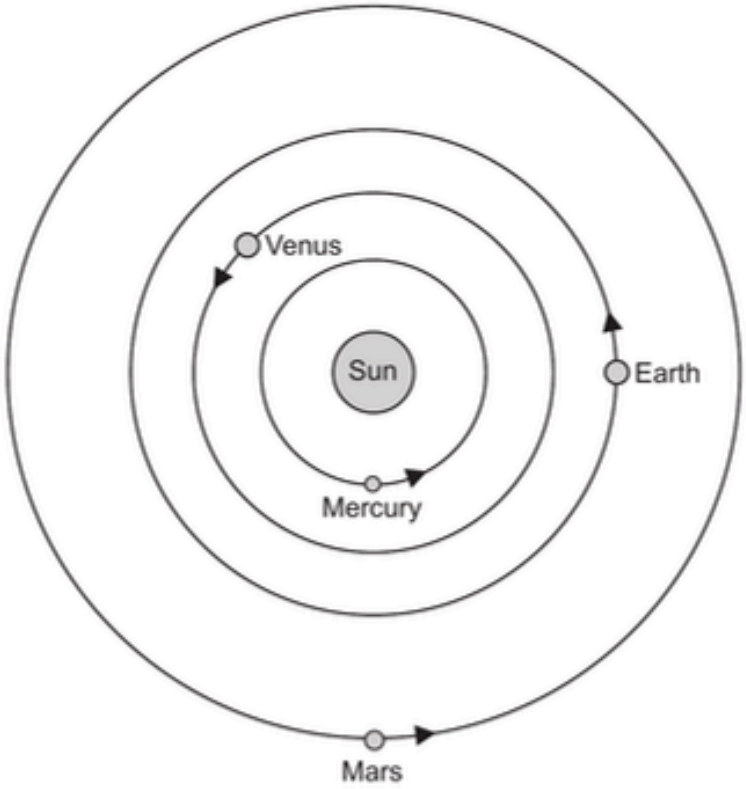
1 mark

Modern Tuition

12. The table below shows information about four planets.

planet	time taken to orbit the Sun (Earth years)	distance from the Sun (million km)
Mercury	0.25	60
Venus	0.5	108
Earth	1.0	150
Mars	2.0	228

The diagram below shows the orbits of the Earth, Mercury, Venus and Mars, and their position at one particular time.
The arrows show the direction in which the planets move.



not to scale

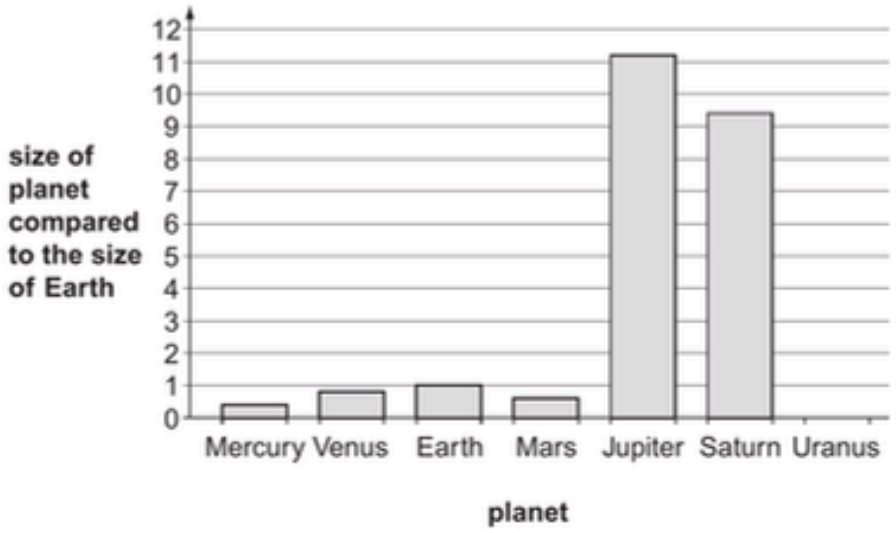
12a
1 mark

12a
1 mark

(a) Show the position of each planet six months later by drawing a letter X on the orbit of each planet.

Modern Tuition

(d) The bar chart shows the size of five planets compared to the size of Earth.



The planet Uranus is four times the size of Earth.
On the chart above, draw a bar for the planet Uranus.

1 mark

(e) (i) Arrange the following in order of size, starting with the smallest.

Sun	Hubble telescope	Earth

smallest **largest**

1 mark

(ii) Some stars are bigger than the Sun but they look smaller.
Why do they look smaller than the Sun?
Tick the correct box.

They are brighter than the Sun.	☐	They are the same colour as the Sun.	☐
They are further away than the Sun.	☐	They are nearer than the Sun.	☐

1 mark

Modern Tuition