WJEC Physics GCSE
Topic 2.5: Stars and planets
Questions by topic

1.

Earth	Universe	Milky Way	Sun	Solar system

(a) Write the objects named above in order of **increasing size**. [4]

....

Smallest **Largest**

(b) Which **one** of the above objects is a galaxy? ..... [1]

(c) State what is meant by a 'light year'. [1]

.....

6

2.

The boxes on the left show the names of objects in the Universe.
The boxes on the right show the time taken for light to travel from these objects to Earth. They are not in order.
Draw a line from each box on the left to the correct box on the right. [3]

Objects in the Universe	Time taken for light to travel to Earth
The Sun	1.3 seconds
Alpha Centauri (a star in the Milky Way)	Over 2 million years
The Andromeda Galaxy	4.5 years
The Moon	500 seconds

3

3.

(a) The distances to stars and solar system planets are very large. Astronomers make their lives easier by using a number of different units.

1 light year = distance travelled by light in one year
1 AU = distance between the Earth and Sun
(1 AU = 8.3 light minutes)

(i) The centre of our galaxy is 30 thousand light years away. How long does light take to travel to us from the centre of the galaxy? [1]

..... years

(ii) How long does light take to travel from the Sun to Earth? [1]

..... minutes

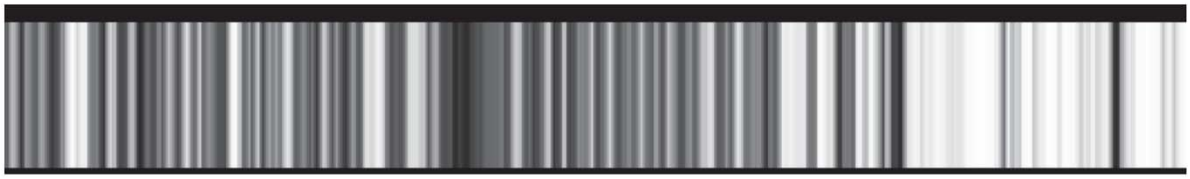
(iii) Light takes 13 hours to travel from Pluto to Earth. What is the **distance** between these planets? [1]

..... hours

(iv) Mercury is 0.4 AU from the Sun. Venus is further than Mercury from the Sun but not as far as Earth. Estimate the distance between the Sun and Venus. [1]

..... AU

(b) The spectrum of light from the Sun is crossed with dark lines.

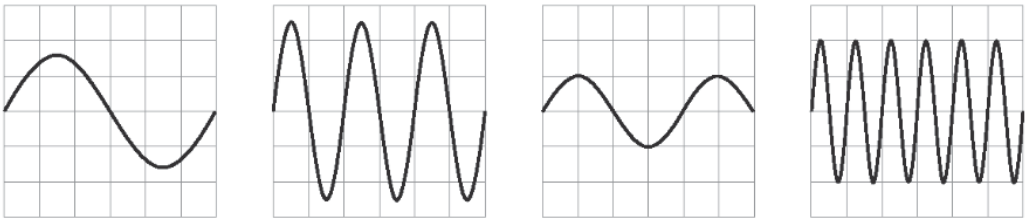


Complete the sentences below by **underlining** the correct word(s) in brackets. [2]

(i) The dark lines are caused by atoms of gas (**reflecting / absorbing / transmitting**) light.

(ii) The dark lines in the spectrum from a distant galaxy moving away from us would be (**blue shifted / red shifted / green shifted**).

(c) Four wave patterns of light from a star are shown below. Each pattern is produced in the same time interval.



A **B** **C** **D**

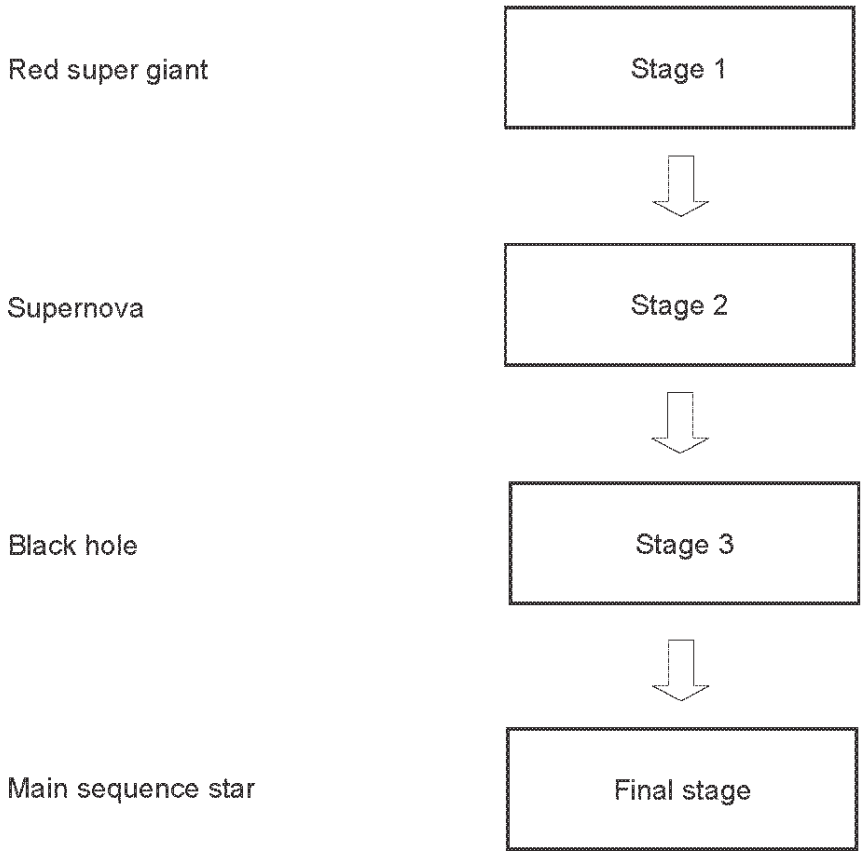
(i) Which wave pattern has the lowest frequency? ..... [1]

(ii) Which wave pattern has the largest amplitude? ..... [1]

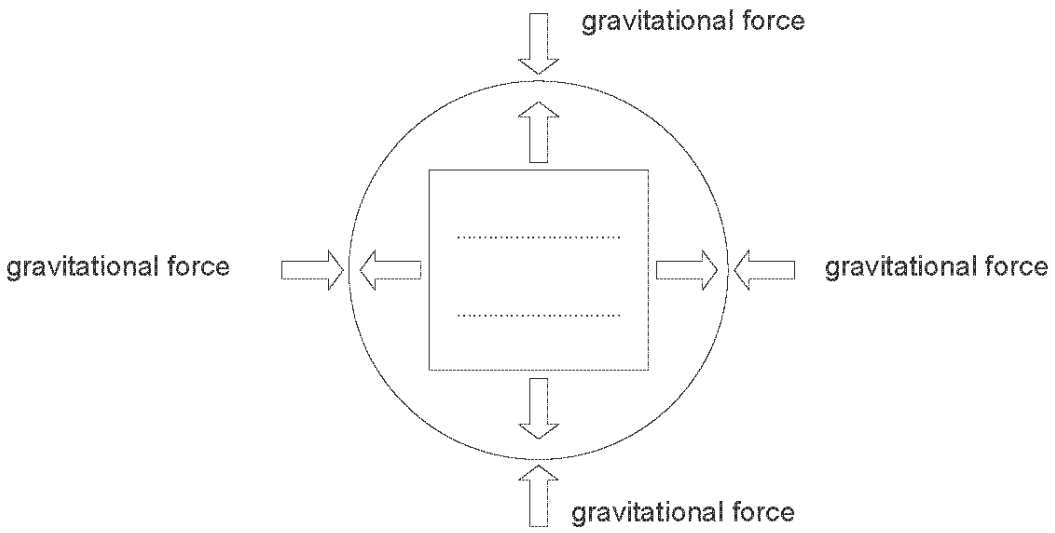
8

4.

(a) The block diagram below shows the life cycle of a star much larger than our Sun.
Draw lines from the names on the left to the correct box on the right to put them in order. [3]



(b) The following diagram shows the major forces acting on a main sequence star.
Label the outward acting force. [1]



(c) Choose words from the box below to complete the sentences that follow. [4]
Each word may be used **once, more than once or not at all.**

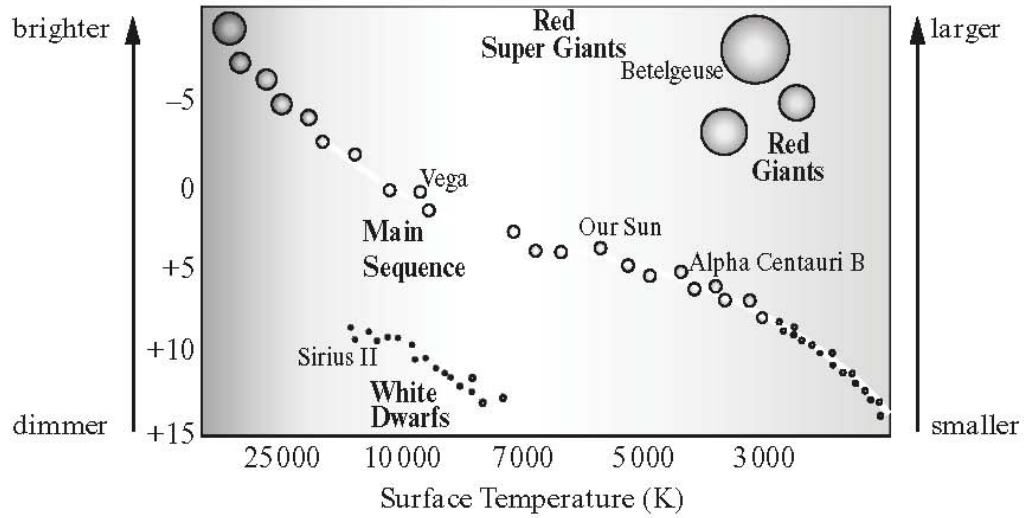
uranium	iron	fission	fusion	helium

Main sequence stars generate energy by ..... of hydrogen into ..... Heavier elements are created when stars much larger than our Sun collapse. These heavier elements include ..... which we use in our fission reactors on Earth. We only have elements heavier than ..... because they are created during a supernova explosion.

8

5 (HIGHER).

In the Hertzsprung-Russell (HR) diagram below, each star is represented by a dot. The position of each dot on the diagram tells us two things about each star: its brightness and its temperature. Stars on the main sequence are stable because their gravitational force and radiation pressure are balanced.



(a) Use the information in the diagram to answer the following questions.

(i) Estimate the surface temperature of our Sun. ..... K [1]

(ii) State **two** differences in the properties of Alpha Centauri B compared with our Sun. [2]

1. .....

2. .....

(iii) State **one** way our Sun and Alpha Centauri B are similar. [1]

.....

(b) (i) What changes will happen in the Sun to cause it to expand to a red giant? [1]

.....

(ii) Use information from the diagram to describe the effect these changes will have on the properties of the Sun. [3]

.....

.....

(c) **Mark** the diagram with an **X** to show where our Sun will end its life. [1]

6.

The Sun is in a stable state in the main sequence stage of its "life".

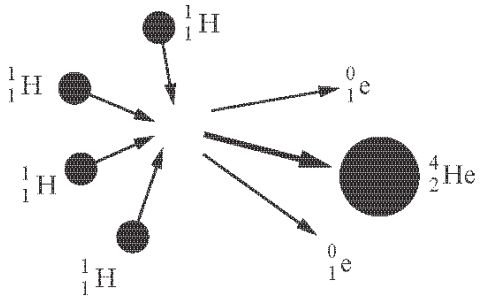
(a) (i) Name the forces acting on the Sun. [1]

.....

(ii) State why the Sun is in a stable state at present. [1]

.....

(b) The Sun generates most of its energy by the nuclear reaction shown in the diagram.



(i) Write the nuclear equation for this reaction. [1]

(ii) Describe this reaction, naming the particles involved. [3]

.....

.....

.....

.....

(c) State what happens when a particle $^{0}_{1}e$ collides with a particle $^{0}_{-1}e$. [1]

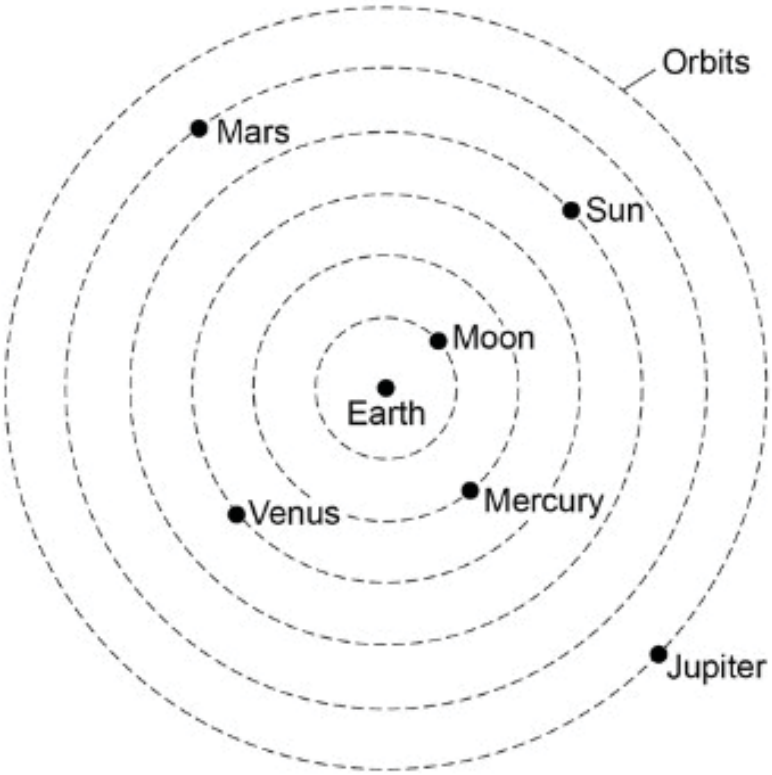
.....

7

7.

Figure 1 shows what scientists over 1000 years ago thought the solar system was like.

Figure 1



1 Give **one** way that the historical model of the solar system shown in **Figure 1** is different from what we now know about the solar system.

[1 mark]

2 Give **one** way that the solar system shown in **Figure 1** is the same as what we now know about the solar system.

[1 mark]

3 The first artificial satellite to orbit the Earth was launched into space in 1957.

Describe the orbit of an artificial satellite.

[1 mark]

4 What provides the force needed to keep a satellite in its orbit?

Tick **one** box.

[1 mark]

friction ☐

gravity ☐

tension ☐

5 All stars go through a lifecycle.

The star Mira will go through a supernova stage in its lifecycle but the Sun will not.

How is the star Mira different to the Sun?

[1 mark]