Stars & The Universe

Question Paper

Course	CIE IGCSE Physics
Section	6. Space Physics
Topic	Stars & The Universe
Difficulty	Easy

Time Allowed 50

Score /39

Percentage /100

Question 1a

Explain the term *galactic redshift*.

[3 marks]

Question 1b

Explain why galactic redshift is considered as evidence supporting the Big Bang theory.

[2 marks]

Question 2a

Extended tier only

Define the Hubble Constant.

[1 mark]

Question 2b

Extended tier only

State the equation for the Hubble constant and define all the variables.

[3 marks]

Question 2c

Extended tier only

State the equation to calculate the age of the Universe.

[1 mark]

Question 2d

Extended tier only

The Hubble constant is estimated to be 2.2×10^{-18} per second.

Calculate the age of the Universe in years.

1 year = 3.15×10^{7} s

[4 marks]

Question 3a

Starting with the largest, list the following in order of decreasing size

Galaxy Sun Universe Jupiter

[1 mark]

Question 3b

Extended tier only

State the stages in the life cycle of a star the size of the Sun after the main sequence in the gaps below

Main sequence → ..... → .....

[2 marks]

Question 3c

Extended tier only

State the stages in the life cycle of a star much greater than the size of the Sun after the main sequence in the gaps below

Main sequence → ..... → ..... → ..... or .....

[4 marks]

Question 3d

Extended tier only

Explain what may form in nebulae created by a supernova.

[2 marks]

Question 4a

State the approximate diameter of the Milky Way in light years.

[1 mark]

Question 4b

Extended tier only

Nuclear fusion occurs in the core of a stable star.

Complete the sentence explaining nuclear fusion.

Nuclear reactions in the core of a star involve the fusion of ..... into .....

[2 marks]

Question 4c

The Virgo A galaxy and Messier 90 galaxy are 6.2×10^{20} km and 5.5×10^{20} km from Earth respectively. They are both moving away from Earth.

State and explain which galaxy is moving faster away from Earth.

[2 marks]

Question 4d

Extended tier only

Explain how the distance of a far galaxy can be determined.

[1 mark]

Question 5a

Extended tier only

Rearrange the stages of the life cycle of a star into the correct order.

1	white dwarf
2	planetary nebula
3	protostar
4	main sequence star
5	interstellar clouds of gas and dust (stellar nebula)
6	red giant

[6 marks]

Question 5b

Extended tier only

A star can be in its main sequence phase for billions of years.

Fig 1.1 shows the forces acting on the Sun during this stable stage of its life cycle.

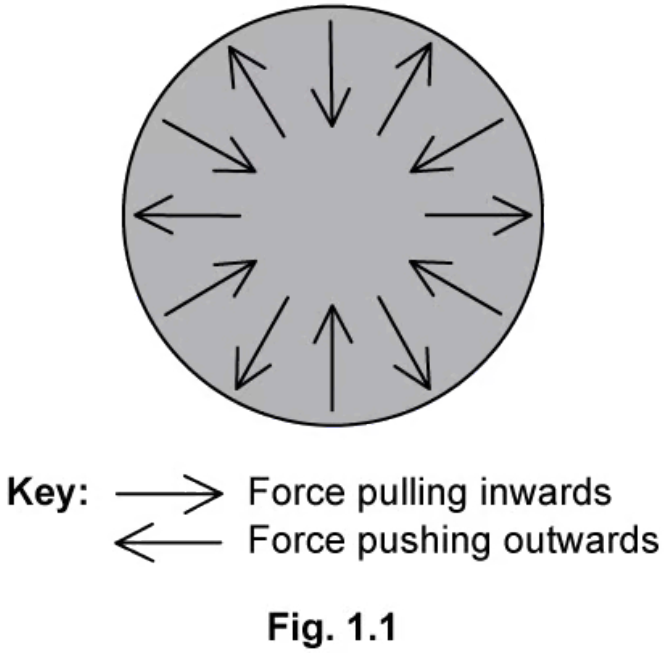

Fig. 1.1

(i) State the name of the force pulling inwards.

[1]

(ii) Explain what causes the force pushing outwards.

[1]

[1 mark]

Question 5c

Extended tier only

Two stars, Alpha Centauri B and Betelgeuse are 0.9 and 16.5 solar masses respectively.

State which star could eventually become a neutron star. Explain your reasoning.

1 solar mass = mass of the Sun

[2 marks]

Question 5d

Extended tier only

State what is meant by a *supernova*.

[1 mark]