Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

Stars go through a life cycle.

Some stars will finish their life cycle as a black dwarf and other stars as a black hole.

(a) The table below gives the mass, relative to the Sun, of three stars, **J**, **K** and **L**.

Star	Mass of the star relative to the Sun
J	0.5
K	14.5
L	20.0

Which **one** of the stars, **J**, **K** or **L**, will become a black dwarf? _____

Give a reason for your answer.

_____

_____

(2)

(b) Scientists can take the measurements needed to calculate the mass of many stars.

Scientists cannot calculate the mass of the star Betelgeuse.

They estimate that the star has a mass between 8 and 20 times the mass of the Sun.

(i) Betelgeuse is in the red super giant stage of its life cycle.

What will happen to Betelgeuse at the end of the red super giant stage?

_____

_____

(1)

(ii) Suggest **one** reason why scientists can only estimate and **not** calculate the mass of Betelgeuse.

_____

_____

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_____

(1)

(iii) In the future, it may become possible for scientists to calculate the mass of Betelgeuse.

Suggest **one** reason why.

_____

_____

_____

(1)

(c) Describe what happens to a star, after the main sequence period, for the star to eventually become a **black dwarf**.

_____

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(5)

(Total 10 marks)

Q2.

Nuclear fission and nuclear fusion are two processes that release energy.

(a) (i) Use the correct answer from the box to complete each sentence.

Geiger counter	**nuclear reactor**	**star**

Nuclear fission takes place within a _____ .

Nuclear fusion takes place within a _____ .

(2)

(ii) State **one** way in which the process of nuclear fusion differs from the process of nuclear fission.

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(1)

(b) The following nuclear equation represents the fission of uranium-235 (U-235).

$$^{1}_{0}n + {}^{235}_{92}U \longrightarrow {}^{236}_{92}U \longrightarrow {}^{141}_{56}Ba + {}^{92}_{36}Kr + 3\,{}^{1}_{0}n + \text{energy}$$

Chemical symbols:

Ba - barium

Kr - krypton

(i) Use the information in the equation to describe the process of nuclear fission.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(ii) An isotope of barium is Ba-139.
Ba-139 decays by beta decay to lanthanum-139 (La-139).

Complete the nuclear equation that represents the decay of Ba-139 to La-139.

$$\_\_\_\_\,{}^{139}Ba \longrightarrow \_\_\_\_\,{}^{139}La + \_\_\_\_$$

(3)

(Total 10 marks)

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