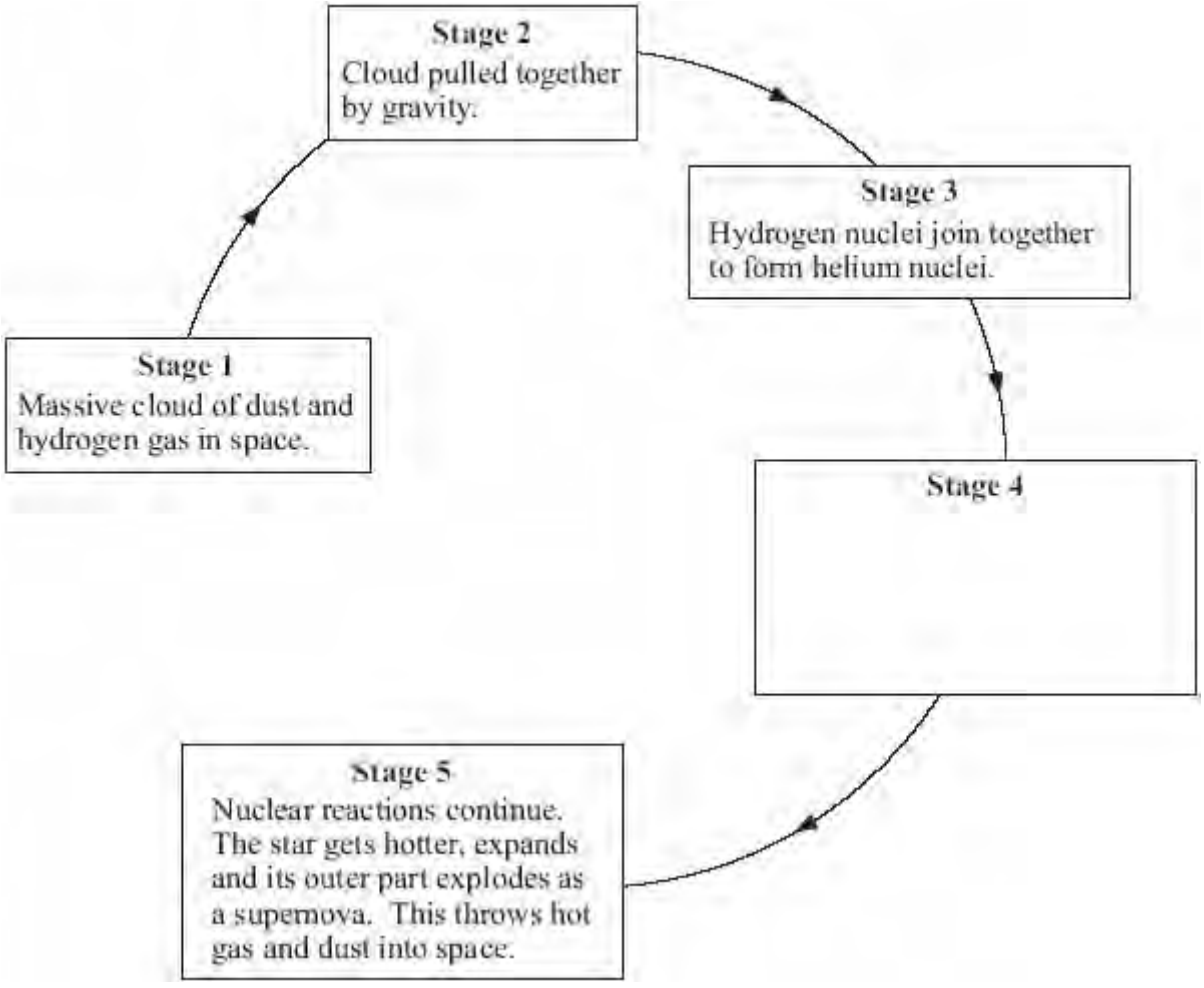
Q1. The diagram shows part of the life cycle of a star which is much bigger than the Sun.



(a) (i) What is the relationship between the masses of the dust and gas in the cloud in **Stage 2** and the force of gravity between them?

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(1)

(ii) What is the relationship between the distance apart of the dust and gas in the cloud in **Stage 2** and the force of gravity between them?

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(1)

(b) In **Stage 3** the star remains stable for millions of years.

Explain why.

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(2)

(c) What happens in **Stage 4**?

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(2)

(Total 6 marks)

Q2. (i) Explain how stars like the Sun were formed.

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(2)

(ii) The Sun is made mostly of hydrogen. Eventually the hydrogen will be used up and the Sun will "die".

Describe what will happen to the Sun from the time the hydrogen is used up until the Sun "dies".

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(3)
(Total 5 marks)

Q3. (a) Most of the Sun is hydrogen. Inside the core of the sun, hydrogen is being converted to helium. What name is given to this process and why is the process so important?

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(2)

(c) Describe what will happen to the Sun as the core runs out of hydrogen.

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(3)
(Total 5 marks)

Q4. Stars do not stay the same forever.

(a) Over billions of years the amount of hydrogen in a star decreases. Why?

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(1)

(b) Describe how a massive star (at least five times bigger than the Sun) will change at the end of the main stable period.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(4)

(c) The inner planets of the solar system contain atoms of the heaviest elements.

(i) Where did these atoms come from?

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(1)

(ii) What does this tell us about the age of the solar system compared with many of the stars in the Universe?

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(1)

(Total 7 marks)

Q5. (a) Explain how stars produce energy.

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(2)

(b) What evidence is there to suggest that the Sun was formed from the material produced when an earlier star exploded?

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(1)

(c) It is thought that gases from the massive star Cygnus X-1 are spiralling into a black hole.



(i) Explain what is meant by the term *black hole*.

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(2)

(ii) What is produced as the gases from a star spiral into a black hole?

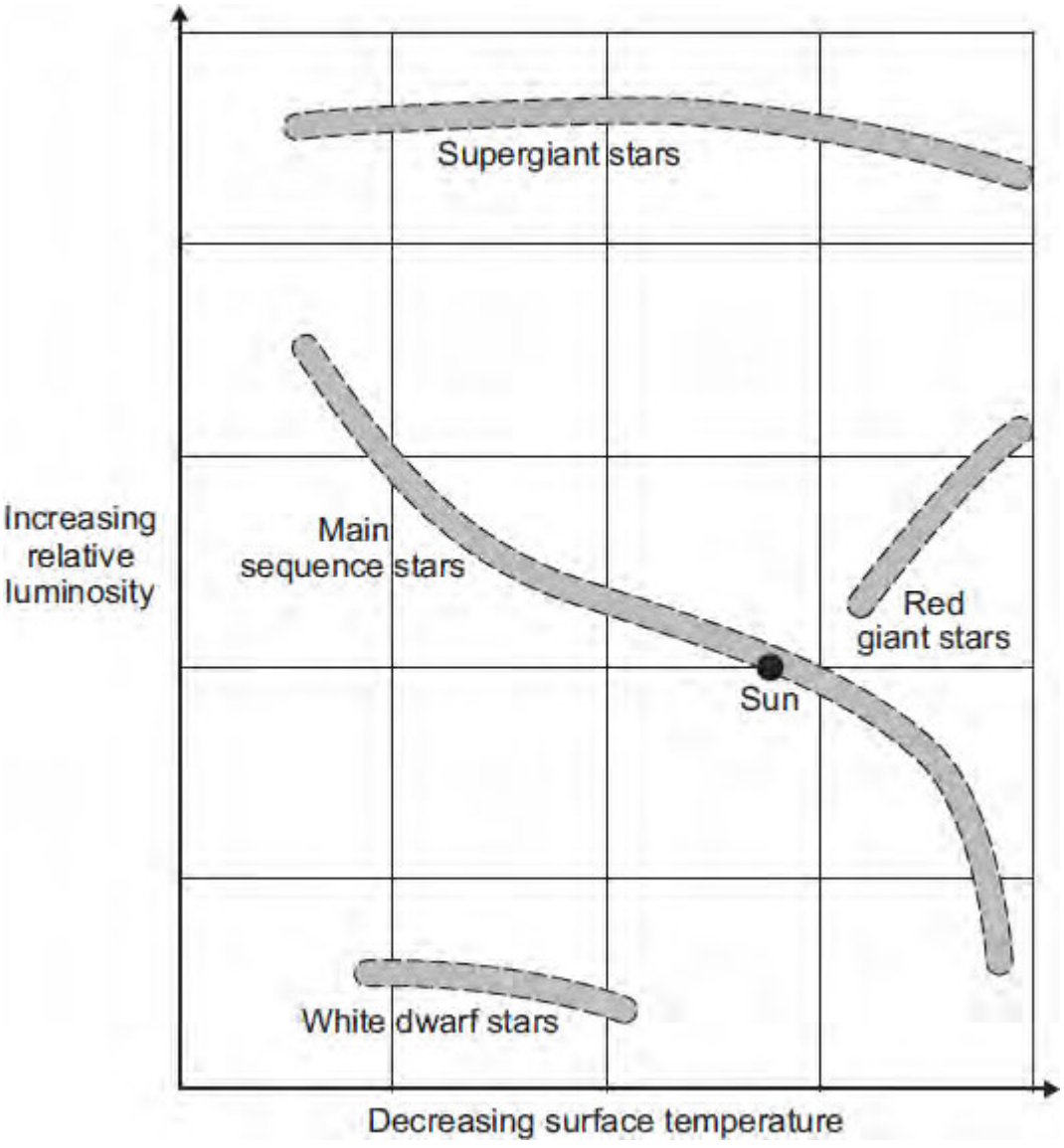
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(1)
(Total 6 marks)

Q6. The diagram, drawn below, places stars in one of four groups.

Where a star is placed on the diagram is determined by the surface temperature and relative luminosity of the star.

A star with a relative luminosity of 1, emits the same amount of energy every second as the Sun.



(a) The Sun will spend most of its life cycle as a main sequence star. This is the stable period of the Sun's life cycle.

What happens to cause the stable period in the life cycle of a star to end?

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(1)

(b) Use the information in the diagram to describe what will happen to the Sun after the stable period ends.

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(3)
(Total 4 marks)

Q7. Read this statement from a website.

Immediately after the 'big bang', at the start of the Universe, there were only atoms of the element hydrogen (H). Now the Universe contains atoms of over one hundred elements.

(a) Explain how atoms of the element helium (He) are formed in a star.

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(2)

(b) Explain how atoms of very heavy elements, such as gold (Au), were formed.

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(2)

(c) Explain how, and when, atoms of different elements may be distributed throughout the Universe.

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(2)

(Total 6 marks)

Q8. Every star goes through a 'life cycle'.

(a) Describe how a star forms.

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(2)

(b) During a long period of its life, a star remains in a stable state.

Explain why a star remains stable.

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(2)

(c) Some stars are much more massive than the Sun.

Describe what will happen to a star, originally much more massive than the Sun, after it reaches its red giant stage.

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(2)
(Total 6 marks)

Q9. (a) Our star, the Sun, is stable.

Explain what the conditions need to be for a star to remain stable.

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(2)

(b) Shortly after the 'big bang', hydrogen was the only element in the Universe.

Explain how the other elements came to be formed.

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(3)
(Total 5 marks)

Q10. (a) As part of its life cycle, a star changes from being a protostar to a main sequence star.

Explain the difference between a protostar and a main sequence star.

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(2)

(b) The early Universe contained only atoms of hydrogen. The Universe now contains atoms of over one hundred different elements.

Explain how the different elements now contained in the Universe were formed.

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(3)
(Total 5 marks)