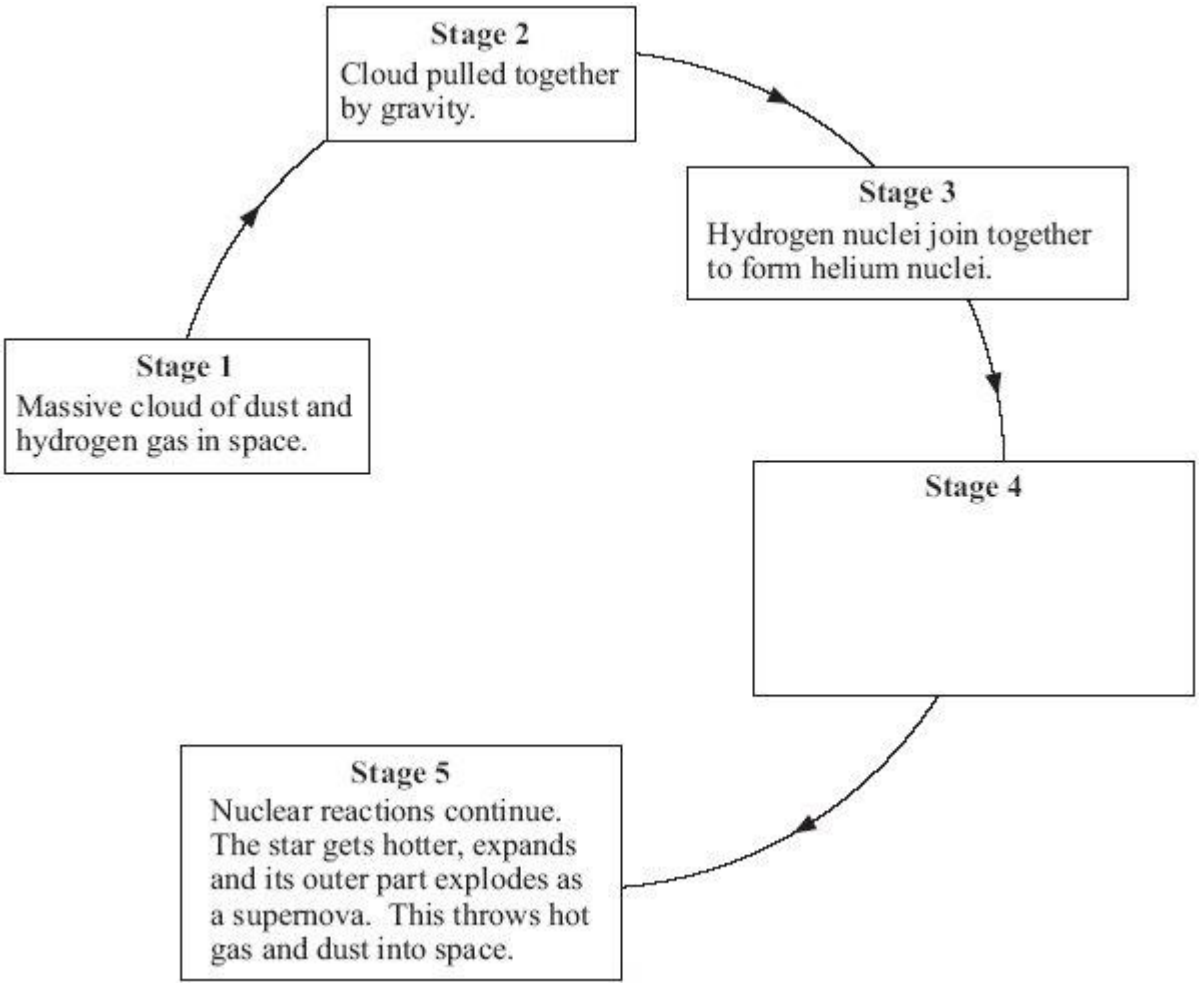
Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

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?

_____

_____

(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.

_____

_____

_____

_____

_____

(2)

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

_____

_____

_____

_____

_____

(2)

(Total 6 marks)

Q2.

The ‘steady state’ theory was once a popular alternative to the ‘big bang’ theory.

The ‘steady state’ theory suggested that the universe, although expanding, had no origin and it has always existed. As the universe expands, a small amount of matter is created to keep the universe looking exactly the same all of the time.

(a) When considering the origin of the universe, what is the difference between the ‘big bang’ theory and the ‘steady state’ theory?

_____

_____

_____

_____

(2)

(b) The light from distant galaxies shows a *red-shift*.

(i) What is *red-shift*?

_____

_____

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(1)

(ii) Why does red-shift provide evidence to support both the ‘big-bang’ theory and the ‘steady state’ theory?

_____

_____

_____

_____

(2)

(c) The ‘steady state’ theory was important in encouraging new research into the universe.

Suggest a reason why scientists were keen to carry out new research.

_____

_____

(1)

(d) Scientists can answer many questions about the universe, but not the question:

‘Why was the universe created?’

Suggest a reason why this question cannot be answered by scientists.

_____

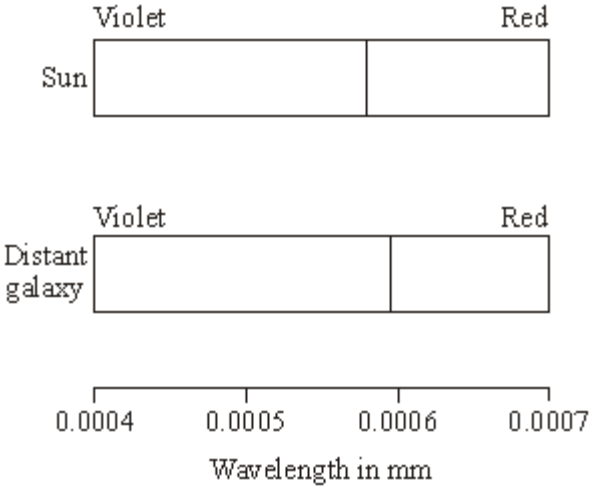
_____

(1)

(Total 7 marks)

Q3.

The visible part of the electromagnetic spectrum from a star includes a dark line. This line is at a specific wavelength. The diagram shows the position of the dark line in the spectrum from the Sun and in the spectrum from a distant galaxy.



(a) Explain how the spectrum ‘shift’ of the dark line supports the theory that the Universe began from a very small point.

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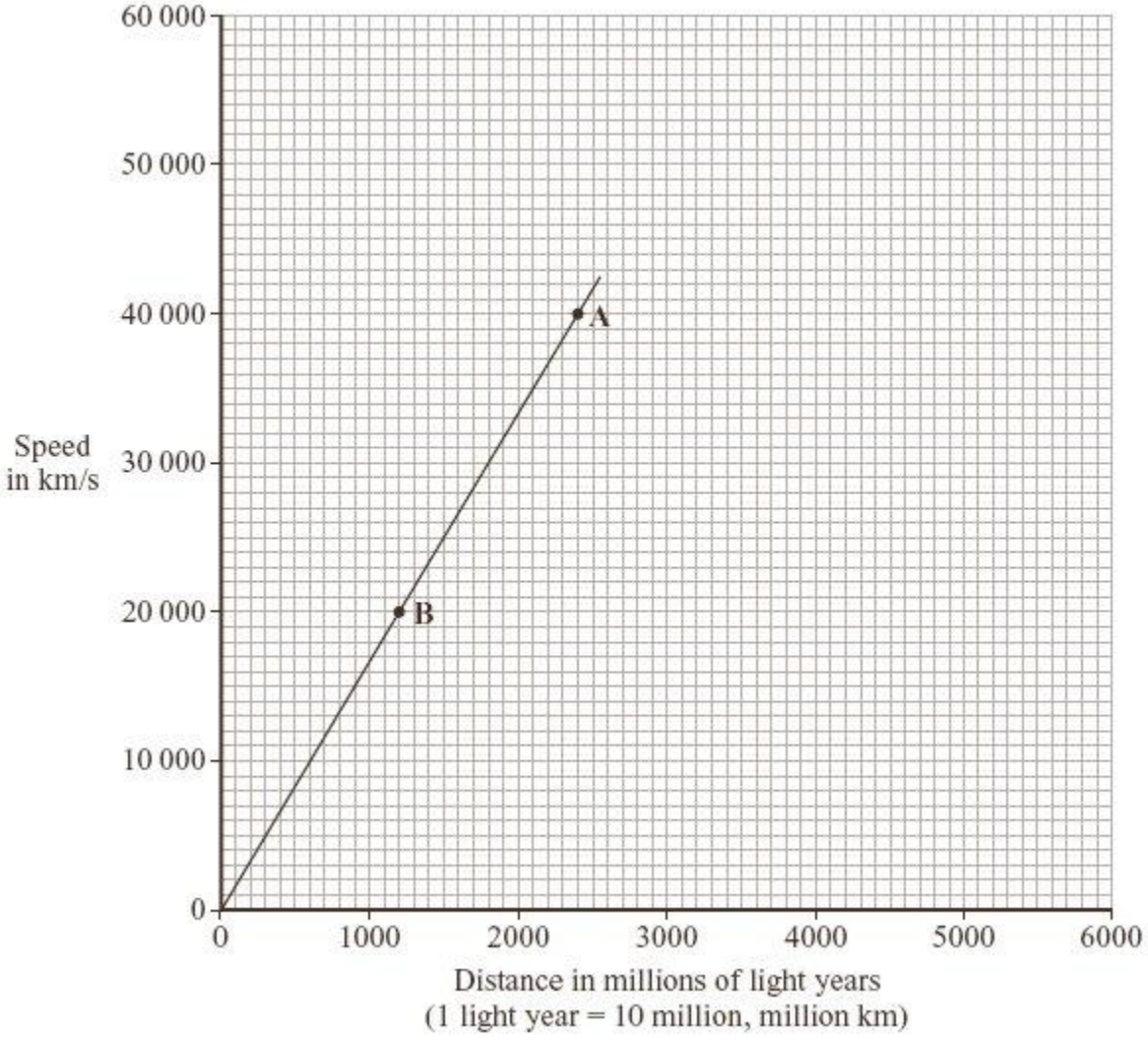
(3)

(b) From data collected, a graph can be drawn that links the speed of a galaxy with the distance of the galaxy from the Earth.



(i) How does the visible light spectrum from galaxy **A** look different from the visible light spectrum from galaxy **B**?

_____

_____

(1)

(ii) A third galaxy, **C**, seems to be travelling away from the Earth at about 60 000 km/s.

Estimate how far galaxy **C** might be from the Earth, showing how you use the graph to do

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this.

_____

_____

Distance between galaxy **C** and the Earth = _____ million light years

(2)

(Total 6 marks)

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