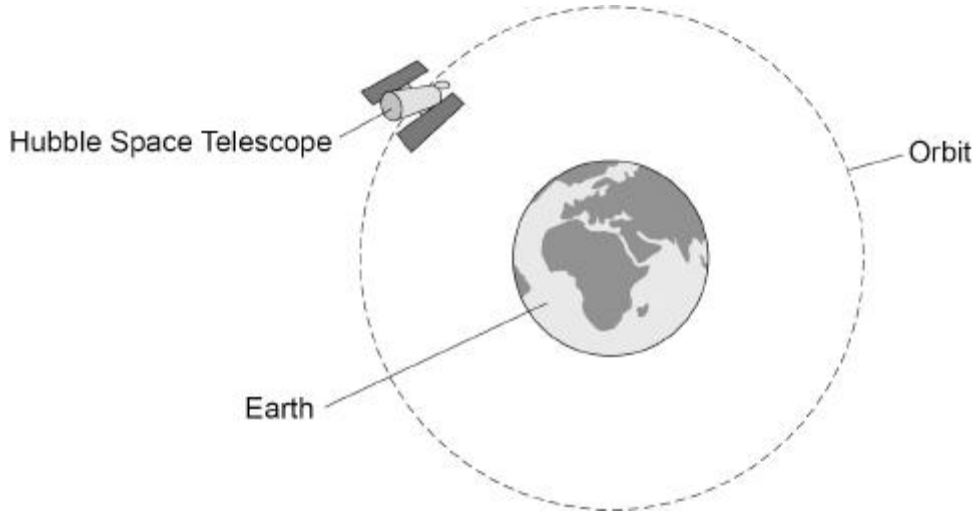
Name of the Student:_____
Max. Marks : 23 Marks **Time : 23 Minutes**

Q1.

Figure 1 shows the Hubble Space Telescope orbiting the Earth.

Figure 1



(a) What name is given to objects that orbit a planet?

_____

(1)

(b) A space telescope uses microwaves to communicate with the Earth.

A microwave has a wavelength of 12.5 cm.

The speed of microwaves through space is 3.0×10^8 m/s.

Calculate the frequency of the microwave.

Use the Physics Equations Sheet.

Give your answer in standard form.

_____

_____

_____

_____

Frequency (in standard form) = _____ Hz

(5)

(c) Explain the effect of the Earth's gravitational force on the motion of the Hubble Space Telescope.

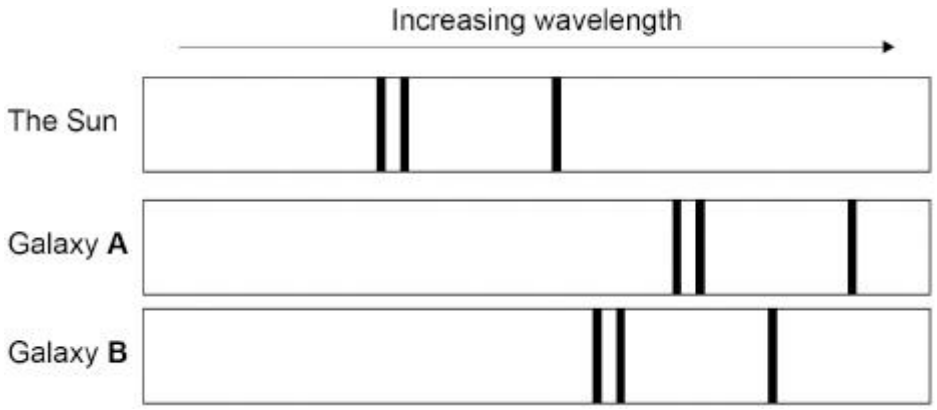
(3)

(d) The Hubble Space Telescope can detect visible light from distant galaxies.

The visible light spectra from stars and galaxies include dark lines at specific wavelengths.

Figure 2 shows the visible light spectra from the Sun and two galaxies.

Figure 2



Explain what conclusions can be made about galaxies **A** and **B**.

_____

(3)

(Total 12 marks)

Q2.

Galaxies contain billions of stars.

(a) Compare the formation and life cycles of stars with a similar mass to the Sun to stars with a much greater mass than the Sun.

_____

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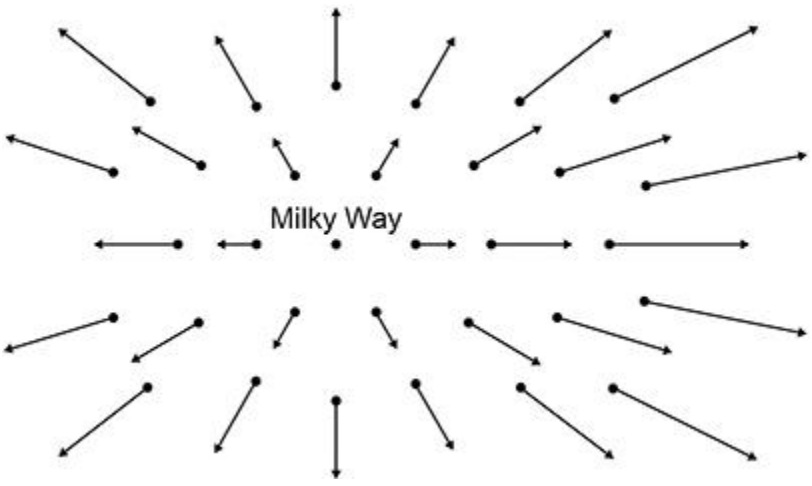
(6)

The points on diagram below represent galaxies that are moving away from the Milky Way.



Each arrow represents the velocity of the galaxy relative to the Milky Way.

(b) Light from all galaxies represented in diagram above is red-shifted.

Describe what is meant by red-shift.

_____

_____

_____

_____

(2)

(c) Explain how above diagram provides evidence for the Big Bang theory.

_____

_____

_____

_____

(2)

(d) Sometimes scientists have to change theories about the universe.

Give the reason why.

_____

_____

(1)

(Total 11 marks)