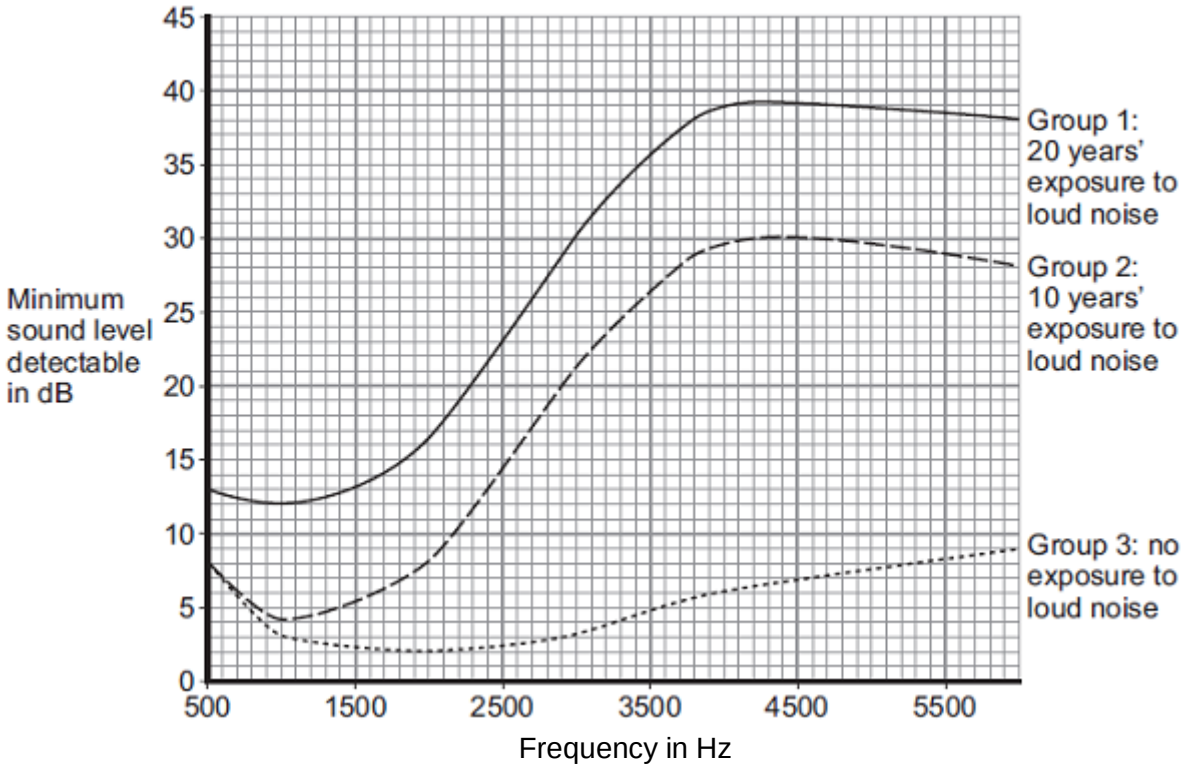
Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Q1.

Exposure to a noisy environment can damage a person's hearing.

The figure below shows the minimum sound level that is needed to detect sounds of different frequencies for three different groups of people.
Sound level is measured in decibels, dB.



(a) Which group of people has the worst hearing?

Group: _____

Use the information from the figure above to give a reason for your answer.

_____

_____

(1)

(b) Give **three** other conclusions that can be made from the figure in part (a).

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(Total 4 marks)

Q2.

A Doppler probe emits high frequency sound waves.

A doctor uses a Doppler probe to measure the pulse rate of an unborn baby in its mother's womb.

The sound waves have a frequency of 5.24×10^6 Hz.
The mean speed of sound through human body tissue is 1540 m / s.

Calculate the wavelength of the sound wave emitted by this Doppler probe as it travels through human body tissue.

Give your answer to **three** significant figures.

Use the correct equation from the Physics Equations Sheet.

_____

_____

_____

Wavelength = _____ m

(Total 3 marks)

Q3.

During the day, the Sun transfers energy to an outdoor swimming pool.

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(a) By which method of energy transfer does the pool receive energy from the Sun?

_____

(1)

(b) (i) The mass of water in the pool is 5000 kg. The specific heat capacity of water is 4200 J/kg°C.

Calculate how much energy needs to be supplied to increase the water temperature by 5°C and state the correct unit.

Use the correct equation from the Physics Equations Sheet.

Give the unit.

_____

_____

_____

Energy = _____

(3)

(ii) The Sun supplies energy to the water in the pool at a rate of 16 kJ every second.

Calculate how much time it would take for energy from the Sun to raise the water temperature by 5 °C.

You will need to use your answer to **(b)(i)** and the correct equation from the Physics Equations Sheet.

_____

_____

_____

Time = _____ seconds

(3)

(iii) On one day, the temperature of the pool is 7 °C lower than the air temperature.

The time it takes for the pool temperature to rise by 5 °C is less than the answer to part **(b)(ii)**.

Suggest a reason why.

_____

_____

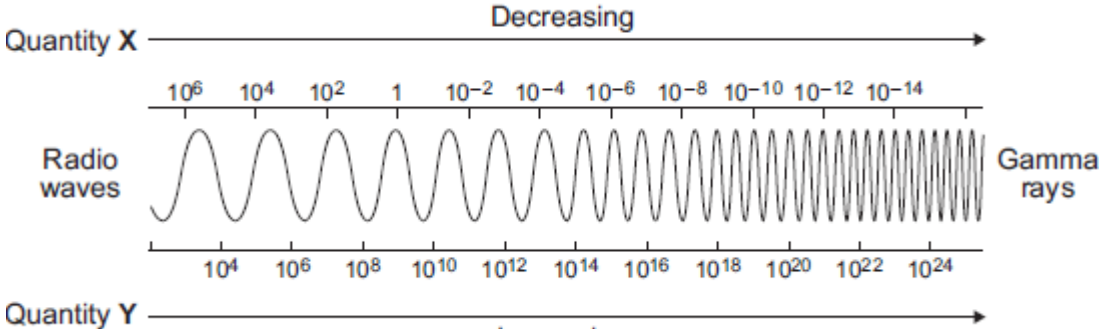
(1)

(Total 8 marks)

Q4.

The electromagnetic spectrum is shown in the diagram below.

Diagram 1



(a) Name quantities **X** and **Y**, and state the units they are measured in.

Quantity **X**: _____ Unit for Quantity **X**: _____

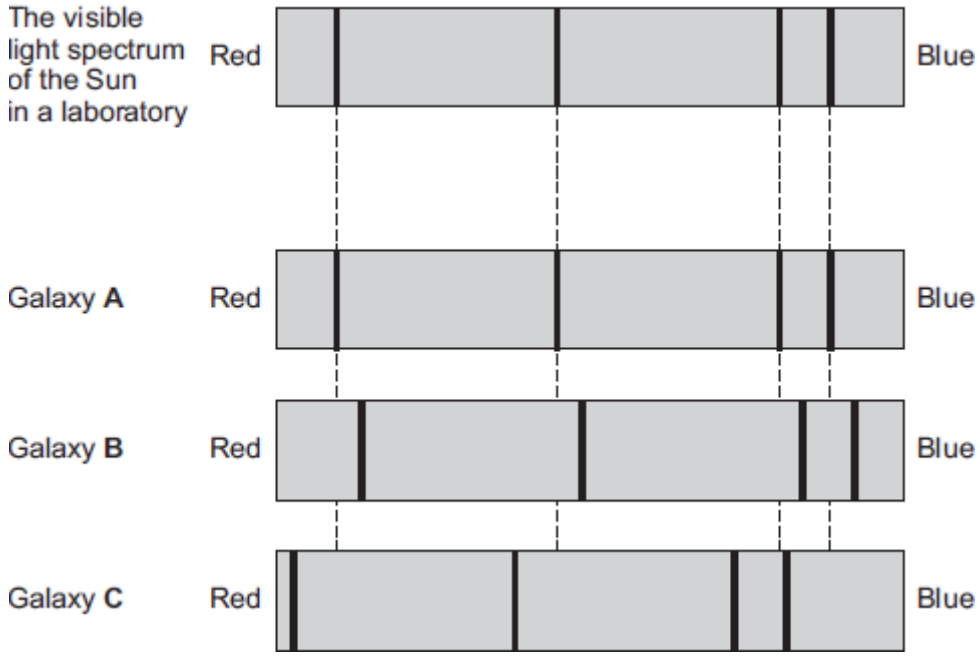
Quantity **Y**: _____ Unit for Quantity **Y**: _____

(3)

(b) The visible part of the electromagnetic spectrum from stars includes dark lines. These lines are at specific wavelengths.

Diagram 2 shows the visible light spectra for three galaxies, **A**, **B** and **C**, compared to the visible light spectrum of the Sun as seen in a laboratory.

Diagram 2



(i) Using evidence from the spectra, what conclusions can be made about the movement of galaxies **A**, **B** and **C** relative to the Earth?

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(ii) Compare the speed of galaxy **B** with the speed of galaxy **C** relative to the observer.

_____

_____

(1)

(iii) Explain why it is **not** valid to make conclusions about all galaxies in the Universe from these spectra.

_____

_____

_____

_____

(2)

(Total 9 marks)