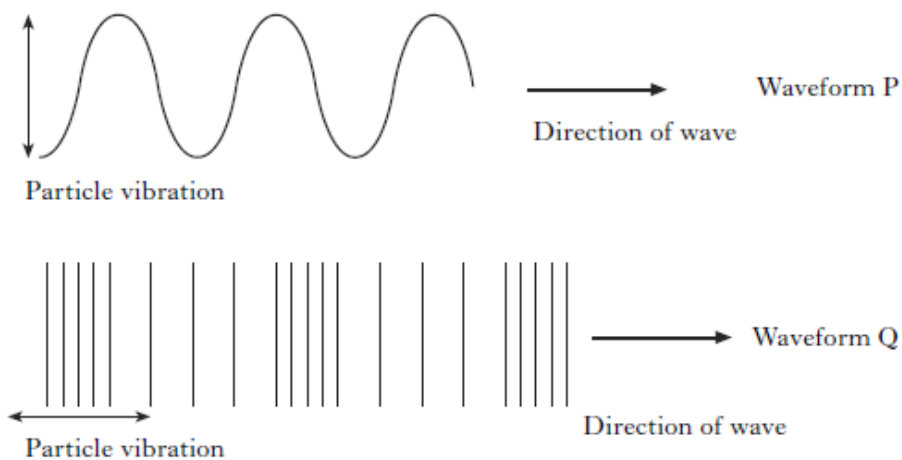


Waves Questions – NAT 5

- 1) a) Define what is meant by a 'transverse wave'.
b) List **nine** examples of transverse waves.

- 2) a) Define what is meant by a 'longitudinal wave'.
b) State **one** example of a longitudinal wave.

- 3) State which type of waveform is transverse and which is longitudinal from the wave diagrams below:



- 4) Draw a transverse wave and label the waveform with the following terms:
Crest, Trough, Amplitude, Wavelength and Null Position.

- 5) Define the following terms:
 - a) Amplitude
 - b) Wave speed
 - c) Frequency
 - d) Wavelength
 - e) Period

- 6) If 30 water waves pass a point in 2 minutes then calculate the frequency of the waves.



7) Calculate the wavelength of a wave with a speed of 37.5ms^{-1} and a frequency of 0.75Hz .

8) 36 waves have a combined length of 27m. If it takes 3 minutes for these waves to pass a particular point, then calculate or find:

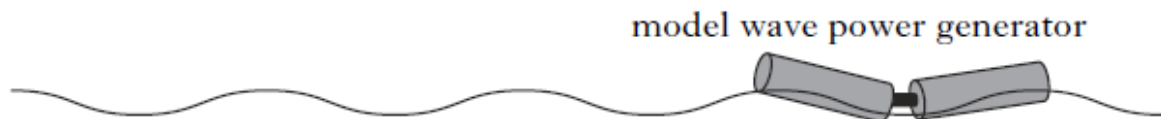
a) Wavelength

b) Frequency

c) Period

d) Speed of the waves.

9) The diagram shows a water tank used to test a model wave power generator.



A wave power generator uses waves to generate electrical energy.

A machine in the tank produces 120 waves per minute.

a) i) Calculate the frequency of the waves.

ii) Period of the waves.

iii) Wavelength of the waves if they have a speed of 2.4ms^{-1} .

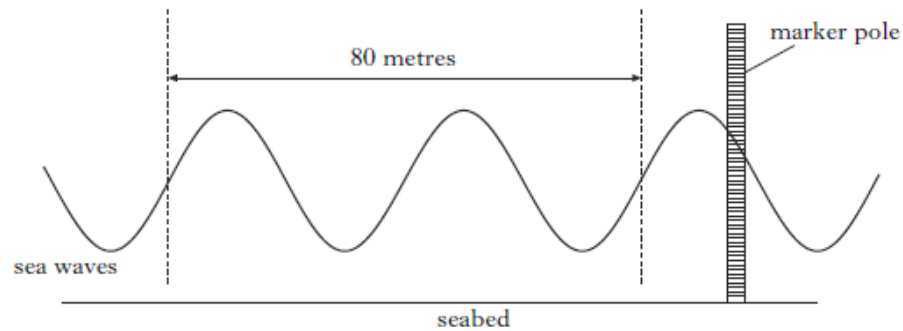
b) The amplitude of the waves in the tank is 0.18m.

Calculate the maximum vertical distance the wave power generator moves through.

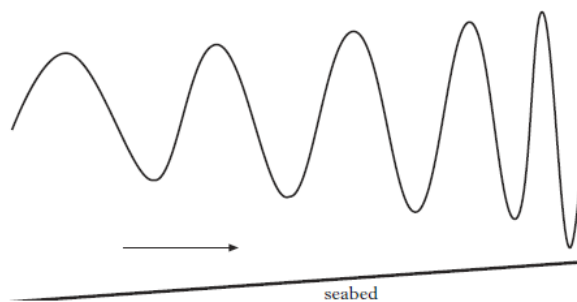
10) A surfer rides the waves on a beach.



The diagram below shows a wave some distance from the beach.

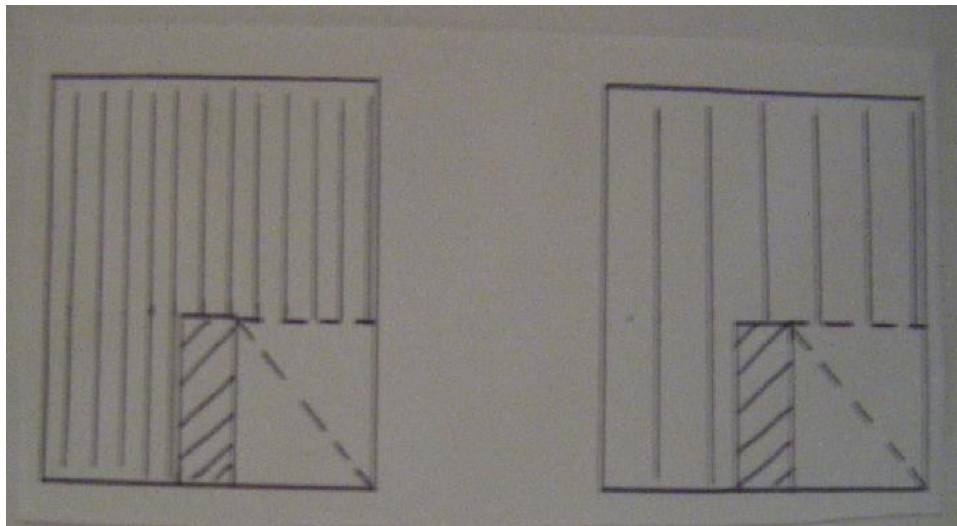


- From the wave diagram calculate the wavelength of the waves.
- The time between one crest and the next passing the marker pole is 5 seconds.
 - Calculate the speed of the waves.
 - Calculate the frequency of the waves.
- The diagram below shows the change in the waves as they approach the beach.



- What happens to the amplitude of the waves as they approach the beach.
- What happens to the wavelength of the waves as they approach the beach.
- What happens to the frequency of the waves as they approach the beach.
- Using your answers in ii) and iii), what is the relationship between the wavelength and the frequency of the waves?

11) Two wave diagrams drawn below show water waves bending around a barrier.



Wave A

Wave B

- a) What is the name of this wave effect?
- b) State which wave diagram shows:
 - i) Short wavelength waves
 - ii) Long wavelength waves.
- c) Complete the wave diagrams after the waves hit the barrier.
- d) Explain your answers to c).

12) a) What does EM spectrum stand for ?

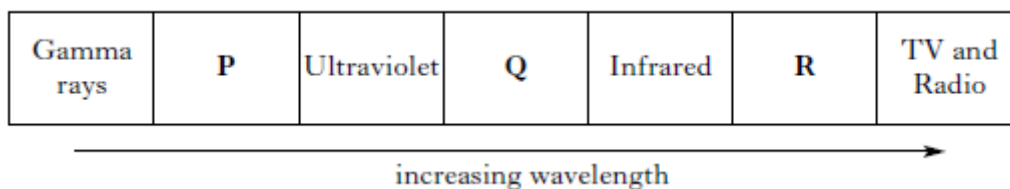
b) What is significant about all of the waves in the EM spectrum?

c) State the name of the only part of the EM spectrum that we can detect with our eyes.

13) Calculate the wavelength of a microwave mobile telephone wave that has a frequency of 900MHz.



14) The EM spectrum is listed below with waves P, Q and R missing.

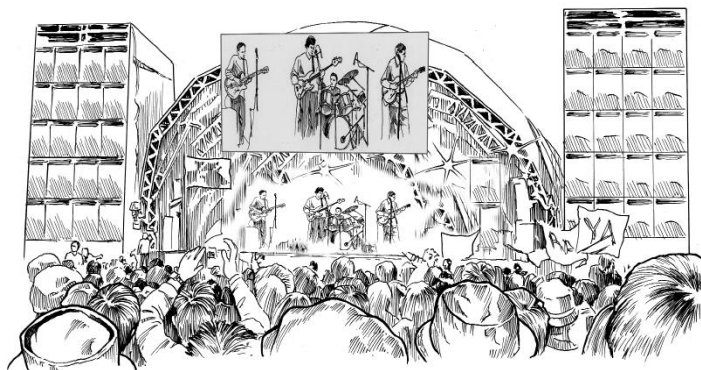


- a) State the name of the unknown waves P, Q and R.
- b) Which radiation in the EM spectrum has the largest frequency?

The sun emits ultraviolet and infrared radiation.

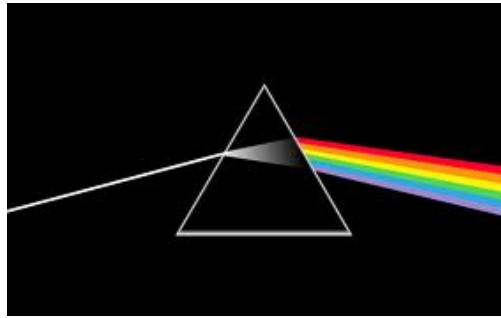
- c) i) How can infrared radiation be detected?
ii) How is infrared radiation used by physiotherapists during treatment?
- d) i) How can ultraviolet radiation be detected?
ii) Why do some people suffer from SAD (**seasonal adjustment disorder**) in the winter-time in Scotland?
iii) Explain why ultraviolet radiation light can be good for skin with a low exposure to the sun and be very bad for your skin with a high exposure to the sun.

15) Brian attends a big charity concert at Hampden in Glasgow and stands 51m from the loudspeakers on the stage. His friend Chris is listening to the music live on his DAB radio at home, which is 39km away in Larbert.



- a) Who will hear the music produced by the musicians first, Brian or Chris?
- b) Explain your answer in a) by showing **two** calculations to support it.

16) The visible spectrum (not the rainbow!!!) can be seen clearly by passing a ray of light through a prism as shown below.



a) State the names of the **7** colours of the visible spectrum using the mnemonic **ROYGBIV**.

b) What is the name of the wave effect, showing the production of the visible spectrum using a prism in the diagram above?

c) Which of the colours in the visible spectrum has the lowest wavelength of light?

17) A Helium-Neon (He-Ne) laser used in a laser conference pen has a wavelength range between 660nm (**$6.60 \times 10^{-7}\text{m}$**) and 680nm (**$6.80 \times 10^{-7}\text{m}$**).

Calculate or find:

a) The largest frequency of the laser light in the range.

b) The lowest frequency of the laser light in the range.

18)



a) State one medical use of X-Rays.

b) What can be used to detect X-Rays?

c) i) State the name given to 3-D X-Ray scans.

ii) What advantages do 3-D have over 2-D X-Rays?