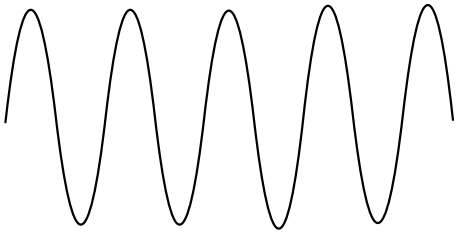
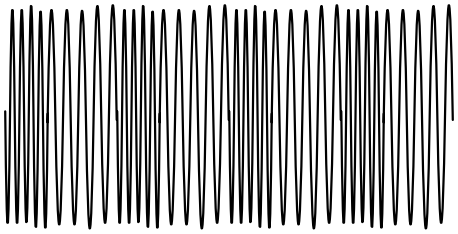
WAVE PROPERTIES

Name & Set

1 Diagrams A & B each represent waves.

A 

B 

(a)

(i) What type of wave does diagram A represent? _____ [1]

(ii) What type of wave does diagram B represent? _____ [1]

(iii) How many cycles of the wave are shown in diagram A? _____ [1]

(iv) How many cycles of the wave are shown in diagram B? _____ [1]

(b) Which diagram would you use to represent

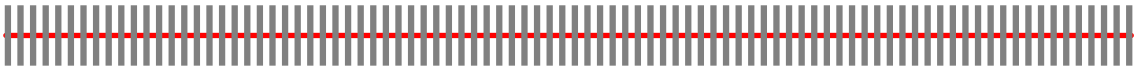
(i) a wave travelling across the surface of water _____ [1]

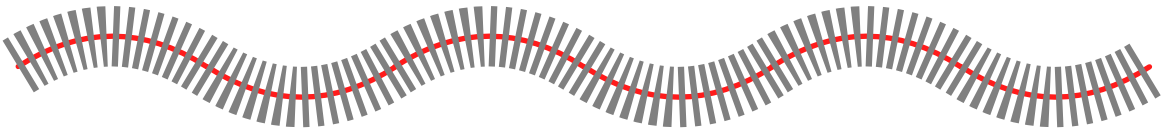
(ii) an acoustic wave (i.e. sound) _____ [1]

(iii) an electromagnetic wave _____ [1]

(iv) a transverse wave travelling through a slinky _____ [1]

2 The diagrams below are of a slinky that has been stretched between two points. Diagram A shows the slinky before a wave travels though it. Diagram B shows the slinky at some instant as a wave travels through it. The speed of the wave is 4 m/s.

A 

B 

C  **Scale 1 cm = 10 cm**

(i) What type of wave is travelling through the slinky? _____ [1]

(ii) Use the scale to find the length of the slinky in diagram A. _____

_____ [2]

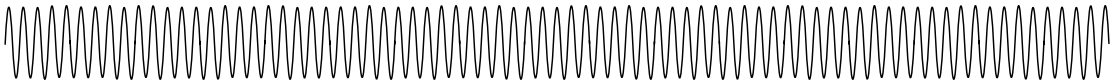
(iii) How many cycles are there in the slinky as the wave travels through it? _____ [1]

(iv) What is the wavelength of the wave? _____ [1]

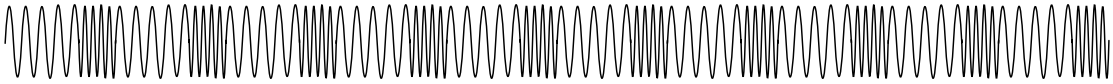
(v) Calculate the frequency of the wave. _____

_____ [3]

3 The diagrams below are of a slinky that has been stretched between two points. Diagram A shows the slinky before a compressive wave travels though it. Diagram B shows the slinky at some instant as a wave travels through it.

A 

C  Scale 1 cm = 20 cm

B 

(a) What type of wave is travelling through the slinky in this example? _____ [1]

(b) Use the scale to answer the following questions.

(i) Each compression takes 1.5 seconds to travel from one end of the slinky to the other. Use *speed = distance / time* to calculate at what speed is the wave moving through the slinky?

_____ [2]

(ii) What is the wavelength of the wave travelling through the slinky?

_____ [2]

(iii) use your answers to (i) and (ii) to calculate the frequency of the wave in this example.

_____

_____ [2]

(b) The rate of the vibration causing the compression waves is increased. It still takes 1.5 seconds for a compression to travel through the slinky. How, if at all does the frequency and wavelength of the wave through the slinky change from the situation described in part (a)

frequency _____ [1]

wavelength _____ [1]

4 A water wave has a frequency of 0.5 Hz and a wavelength of 2 m.

(a) Draw a diagram in the box on the right to represent 3 cycles of this wave.

(b) Explain the following terms when used to describe wave motion

(i) wavelength _____

_____ [2]

(ii) frequency _____

_____ [2]

(iii) amplitude _____

_____ [2]

(iv) speed _____

_____ [2]

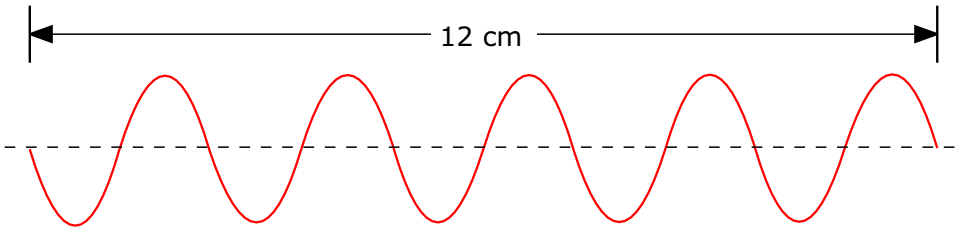
(c) (i) Write down the equation that gives the relationship between wavelength, frequency and wave speed.

_____ [2]

(ii) Use this equation to calculate the speed of the wave.

_____ [2]

5 The diagram shows the profile of a transverse wave.



(a) Mark the amplitude of the wave with an arrow labelled **A**. [1]

(b) Mark the wavelength of the wave with an arrow labelled **B**. [1]

(c) How many cycles of this wave are shown in the diagram? _____ [1]

(d) Now calculate the wavelength of this wave. _____

_____ [2]

(e) This wave has a velocity of 80 cm per second. Using you answer to (d), calculate the frequency of the wave.

_____ [2]

6 An acoustic wave is what we hear as sound. Use the wave equation to calculate

(a) the wavelength of acoustic waves of frequency 80 hz through air if their speed is 320 m/s.

_____

_____ [2]

(b) the wavelength of acoustic waves of frequency 700 hz through water if their speed is 1400 m/s.

_____

_____ [2]

(c) the frequency of acoustic waves of wavelength of 0.2 m travelling through a steel rod at 5600 m/s.

_____

_____ [2]

7 (a) Is a 'Mexican Wave' in a football stadium like a transverse or longitudinal wave? Explain.

_____

_____ [2]

(b) What other type of wave could the spectators create, and how would they have to move to do this?

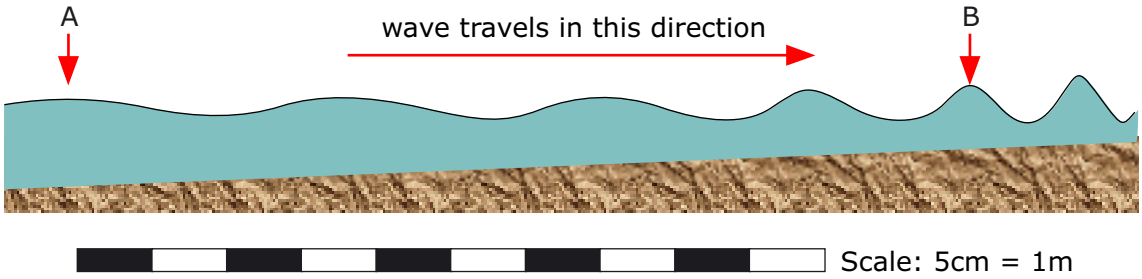
_____

_____ [1]

8 Some of the following statements about the words in ***italics*** are true, some false. Tick which it is, and If the sentence is false, write the correct version in the space immediately below the sentence

a) ***Waves*** *can be longitudinal or transverse.*	***True / false***
b) Light is an example of a ***longitudinal*** *wave.*	***True / false***
c) The amplitude of a water wave is the distance from ***crest to crest****.*	***True / false***
d) ***Waves*** *are a means of transferring energy without transferring matter.*	***True / false***
e) The ***frequency*** *of a wave can be found by dividing the wavelength by the wave velocity.*	***True / false***
f) In the passage of a ***longitudinal*** *wave through air, the molecules vibrate in a direction parallel to the direction of wave travel.*	***True / false***

9 The diagram below shows waves travelling over the surface of a body of water near the shore. The waves travel towards the shore where the depth of the water is less.



(a) On The diagram mark the point that represents one wavelength from point A. Do the same for point B. Use the scale to measure the wavelength for waves at A and at B.

at A _____ [2]

at B _____ [2]

(b) The frequency of a surface wave on water remains constant as it travels towards the shore. Suppose in this case the wave has a frequency of 0.2 hz, calculate the wave speed at A and at B.

_____

_____

_____ [2]

(c) What other change, apart from wavelength, is noticeable as waves travel from A to B?

_____ [1]

(d) What kind of energy do these waves possess? _____ [1]

(e) What becomes of this energy after the waves reach the shore?

_____ [1]