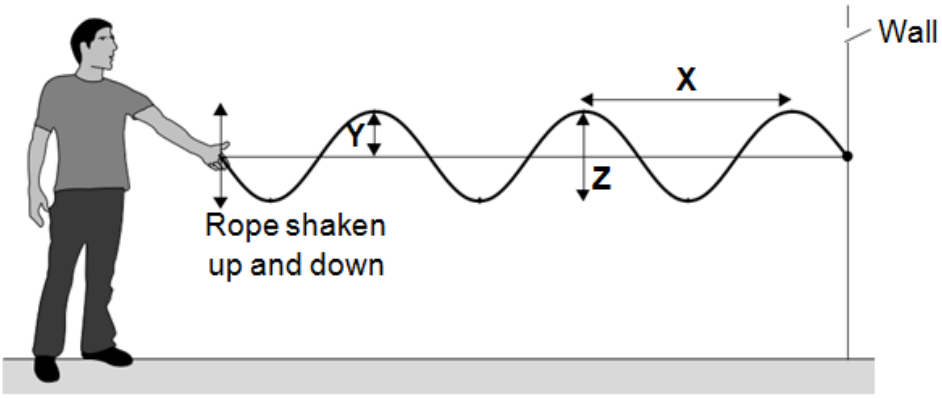
Transverse and Longitudinal Waves 1

Q:1 The diagram shows waves being produced on a rope.The waves are not reflected by the wall.



(a) Draw an arrow on the diagram to show the direction in which the waves transfer energy.

(1 mark)

(b) Which one of the arrows, labelled, X, Y or Z, shows the amplitude of a wave? Write the correct answer in the box.

(1 mark)

(c) The waves produced on the rope are transverse. Name one other type of transverse wave.

_____

(1 mark)

(d) The rope is shaken up and down, producing 3 waves every second.

The waves have a wavelength of 1.2 metres.

(d) (i) State the frequency of the waves.

_____ Hz

(1 mark)

(d) (ii) Calculate the speed of the waves. Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

_____

_____

Wave speed = _____ m/s

(2 marks)

Q:2(a) Water waves are transverse waves. Sound waves are longitudinal waves.

(a) (i) Explain the difference between a transverse wave and a longitudinal wave.

You may include labelled diagrams in your answer.

_____

_____

_____

_____

_____

_____

_____

(3 marks)

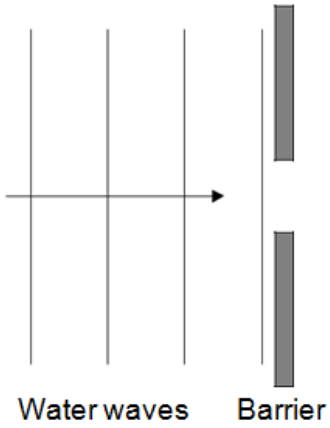
(a) (ii) Name one type of wave that may be either transverse or longitudinal.

_____

(1 mark)

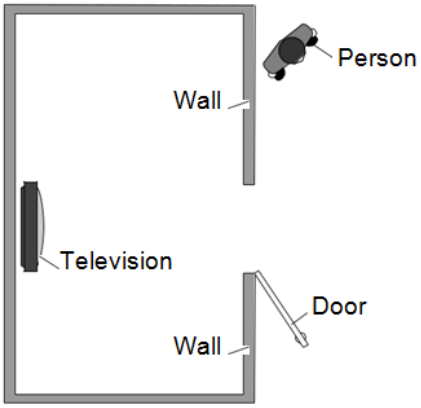
(b) The diagram shows water waves in a ripple tank moving towards a gap in a barrier.

The water waves diffract as they pass through the gap. Complete the diagram to show the diffracted water waves.



(1 mark)

(c) A television is switched on inside a room. A person outside the room can hear the television, but only when the door is open.



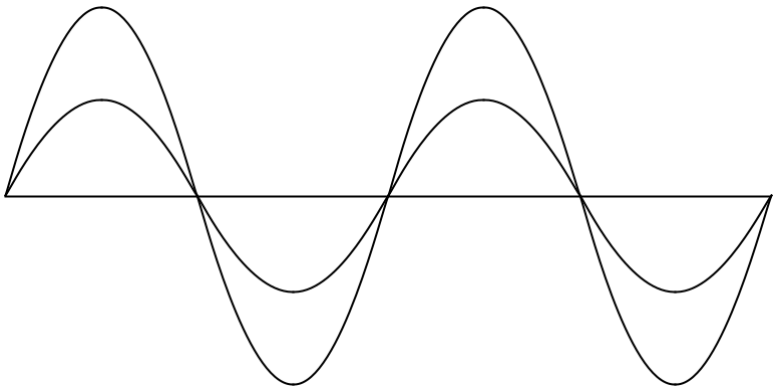
When the door is open, the person can hear the sound but cannot see the television.

Explain why.

(2 marks)

Q:3 **(a)** Diagram 1 shows two waves.

Diagram 1



(a) (i) Name one wave quantity that is the same for the two waves.

(1 mark)

(a) (ii) Name one wave quantity that is different for the two waves.

(1 mark)

(a) (iii) The waves in Diagram 1 are transverse.

Which one of the following types of wave is not a transverse wave?

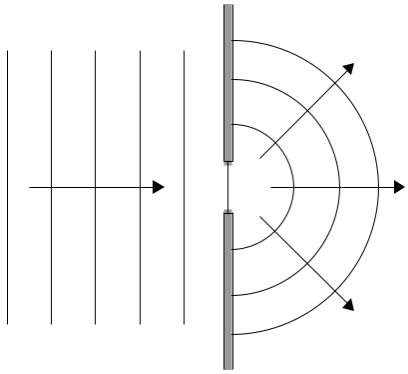
Draw a ring around the correct answer.

gamma rays sound visible light

(1 mark)

(b) Diagram 2 shows water waves in a ripple tank moving towards and passing through a gap in a barrier.

Diagram 2



(b) (i) The water waves spread out after passing through the gap in the barrier.

What name is given to the process causing the waves to spread out?

_____

(1 mark)

(b) (ii) Every second, 8 waves pass through the gap in the barrier. The waves have a wavelength of 0.015 metres.

Calculate the speed of the water waves and give the unit.Use the correct equation from the Physics Equations Sheet.

_____

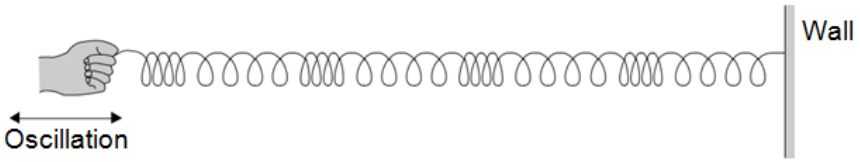
_____

Speed = _____

(3 marks)

Q:4 Diagram 1 shows a longitudinal wave being produced in a stretched spring.

Diagram 1



(a) A longitudinal wave has areas of compression and areas of rarefaction.

Mark with the letter C, one area of compression shown in Diagram 1.

(1 mark)

(b) Diagram 2 shows the apparatus a teacher uses to demonstrate that sound can be reflected.

Diagram 2

(b) (i) Using a ruler, draw on Diagram 2 to show how sound from the loudspeaker is reflected by the sheet of metal to the sound sensor.

(2 marks)

(b) (ii) The teacher replaced the sheet of metal with a sheet of glass. When he did this, the reading on the sound level meter went down. Suggest why.

_____

_____

(1 mark)

(b) (iii) The teacher changed the output from the loudspeaker to increase the amplitude of the sound wave produced.

What effect, if any, does this increase of amplitude have on the loudness of the sound?

Draw a ring around the correct answer.

makes the sound quieter	does not change the loudness of the sound	makes the sound louder

(1 mark)

(b) (iv) The loudspeaker produces a sound wave at a frequency of 850 Hz. The wavelength of the sound wave is 0.4 m.

Calculate the speed of the sound wave.

Use the correct equation from the Physics Equations Sheet.

Show clearly how you work out your answer.

_____

_____

_____

Speed = _____ m/s

(2 marks)

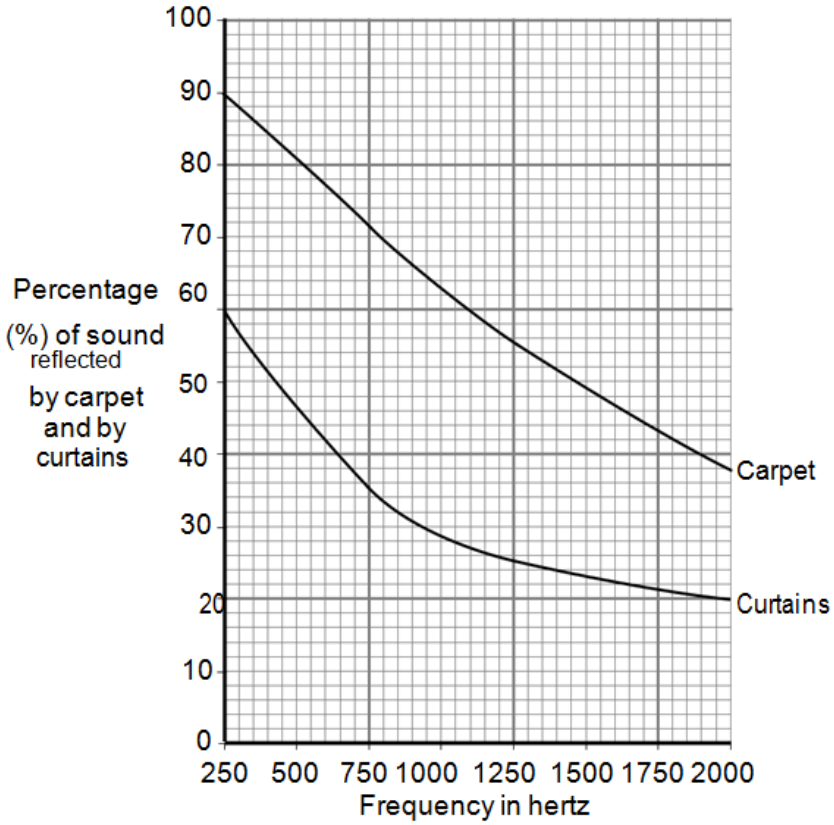
(c) Music concerts are sometimes performed in sports halls. The concerts can be spoilt because of the sound reflected from the floor and walls.

What word is used to describe a reflected sound?

_____

(1 mark)

(d) The graph shows how the percentage of sound reflected from the floor and from the walls of a large room can be reduced by carpets and by curtains.



(d) (i) Over which range of frequencies do curtains reduce the percentage of sound reflected the most?

Tick (☒) one box.

from 250 Hz to 750 Hz

from 750 Hz to 1250 Hz

from 1250 Hz to 1750 Hz (1 mark)

(d) (ii) The manager of a sports hall plans to use the hall for regular music concerts. He has enough money to buy either carpet or curtains, but not both.To improve the sound an audience hears, it would be better to hang curtains on the walls rather than laying a carpet over the floor.

Use the data in the graph to explain why.

_____

_____

_____

(2 marks)

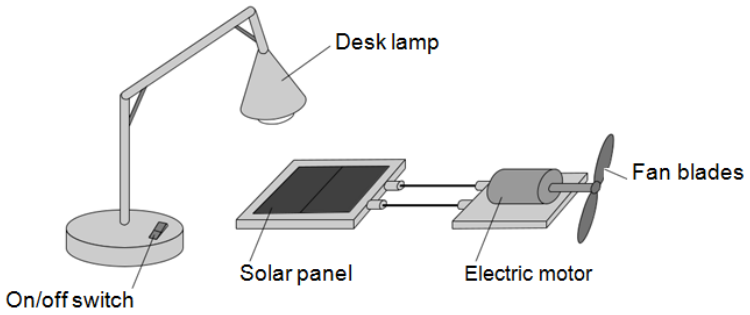
Q:5(a) Light waves transfer energy.

(a) (i) Complete the following sentence.

The oscillations producing a light wave are _____ to

the direction of the energy transfer by the light wave. (1 mark)

(a) (ii) The apparatus in the diagram shows that light waves transfer energy.



Describe how switching the desk lamp on and off shows that light waves transfer energy.

You do not need to describe the energy transfers.

_____

_____

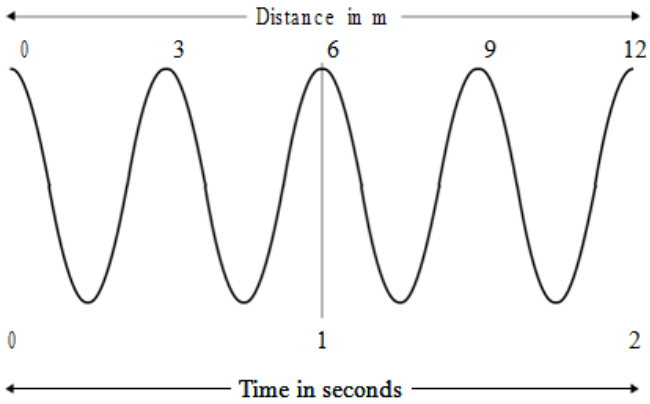
_____

_____

_____

(2 marks)

Q:6 The diagram shows a wave.



wave speed (metre/second, m/s)	=	frequency (hertz, Hz)	×	wavelength (metre, m)

Match figures, A, B, C and D, with the numbers 1–4 in the table.

A 2

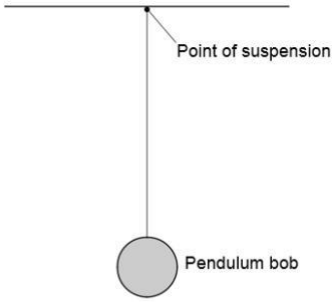
B 3

C 4

D 6

1	the number of complete waves shown in the diagram
2	the wavelength in metres
3	the frequency in hertz
4	the speed of the wave in metres per second

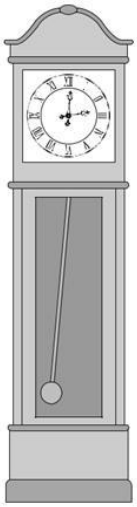
Q:7 (a) The diagram shows a pendulum.



Draw an X on the diagram above, so that the centre of the X marks the centre of mass of the pendulum bob.

(1 mark)

(b) A large clock keeps time using the swing of a pendulum.



(i) The frequency of the swinging pendulum is 0.5 hertz.
Calculate the periodic time of the pendulum.

Use the correct equation from the Physics Equations Sheet.

Period _____ sec

(2 marks)

(b) **(ii)** Calculate the number of complete swings the pendulum would make in 60 seconds. Use your answer from part (b)(i) in your calculation.

Number of swings in 60 seconds _____

(2 marks)

TOTAL MARKS=42