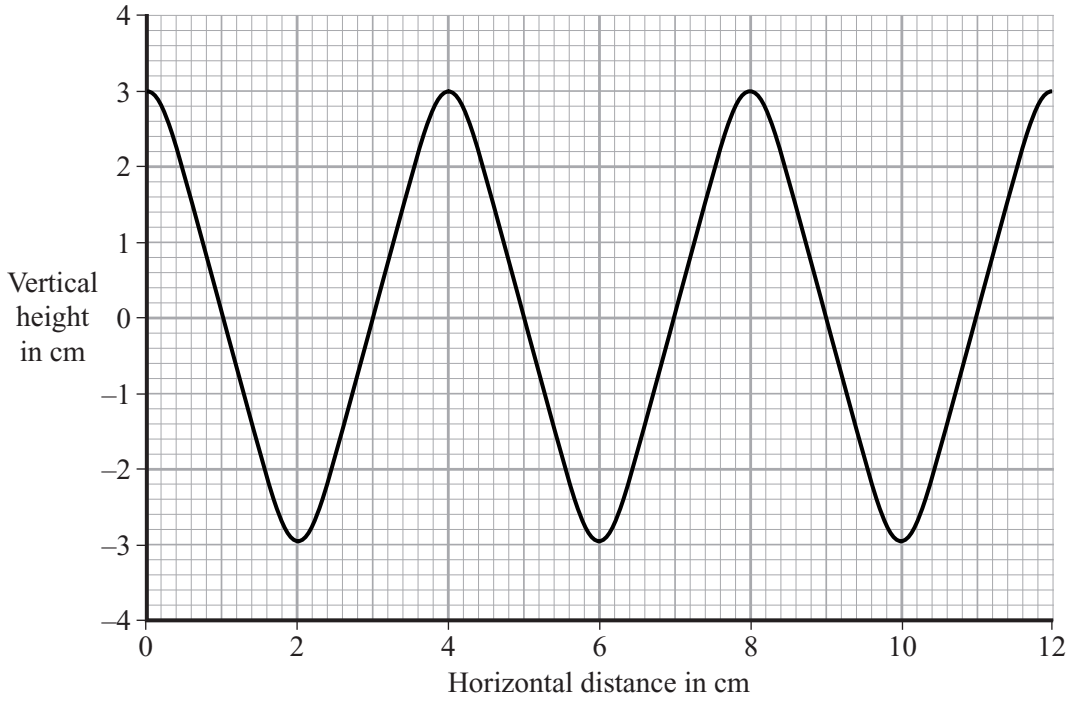
WAVES AND RADIATION

5 The diagram shows a water wave drawn to scale.



(a) What is the wavelength of this water wave? ..... cm *(1 mark)*

(b) What is the amplitude? ..... cm *(1 mark)*

(c) Twelve waves pass an observer in four seconds.

What is the frequency of the waves? Show clearly how you work out your answer and give the unit.

.....

.....

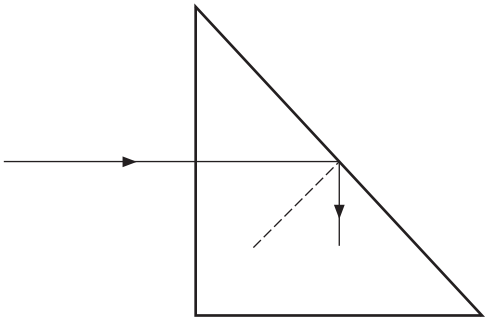
Frequency = ...

(3 marks)

5

6 Glass prisms are used in many optical devices.

(a) The diagram shows what happens to a ray of light as it travels through a glass prism.



To gain full marks for this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

Use the words in the box to help you to explain why the ray behaves in this way.

angle	critical	normal

.....

.....

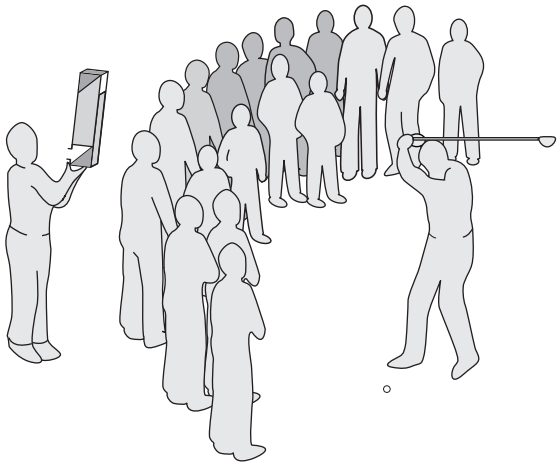
.....

.....

.....

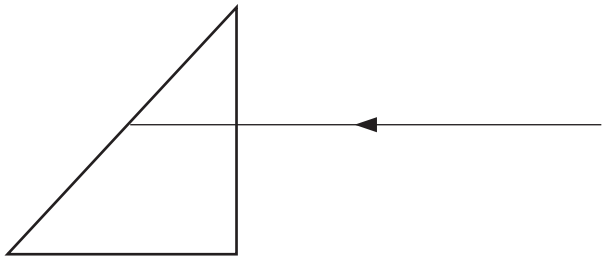
(3 marks)

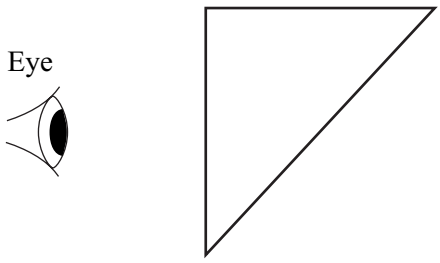
(b) Periscopes can be used to look over the heads of other people.



A periscope contains two glass prisms.

Complete the diagram to show the ray of light reaching the person's eye.



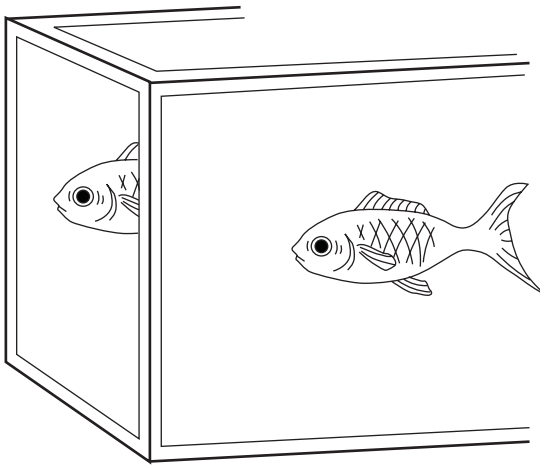


(3 marks)

6

Turn over ▶

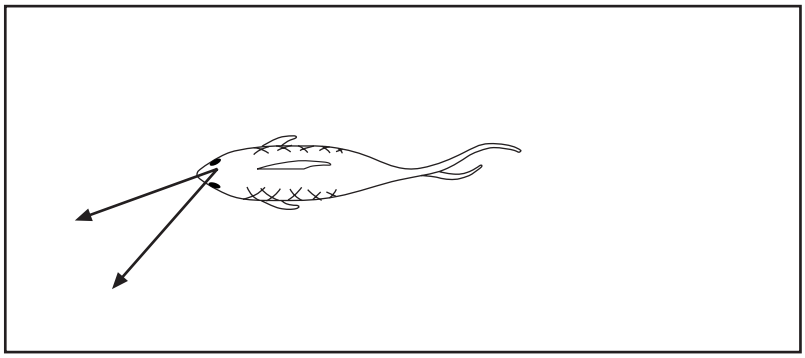
6 An aquarium contains only one fish. But if you look at the corner of the aquarium, there seem to be two fish.



The diagram below shows the top of the aquarium.

Two light waves have been drawn from the fish.

(a) Complete the diagram to show how the light waves reach the eye.



(2 marks)

(b) Complete each sentence by using the correct words from the box.

colour	diffraction	longitudinal	reflection
refraction	speed	transverse	

When the light waves pass from glass into the air they change .....

This causes a change in direction called .....

Light waves are ..... waves.

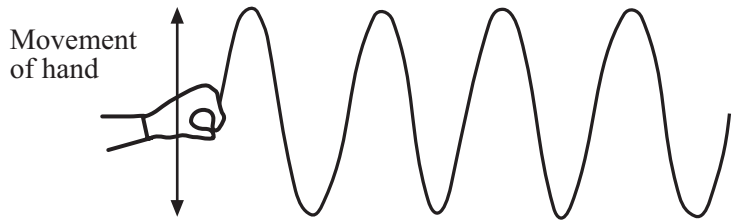
(3 marks)

5

TURN OVER FOR THE NEXT QUESTION

WAVES AND RADIATION

16 The diagram shows a wave travelling along a rope.



(a) On the diagram:

(i) show the wavelength and label it **W**;

(ii) show the amplitude and label it **A**.

(2 marks)

(b) The wavelength of the wave is 0.1 m. Its frequency is 2 Hz.

Calculate the speed of the wave. Show clearly how you work out your answer and give the unit.

.....

.....

.....

Speed of wave .....

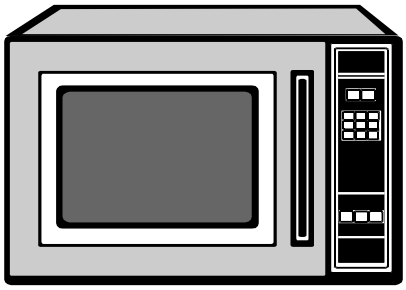
(3 marks)

5

TURN OVER FOR THE NEXT QUESTION

WAVES AND RADIATION

6 (a) Microwave ovens can be used to heat many types of food.



(i) Describe, in as much detail as you can, how microwaves heat food.

.....

.....

.....

.....

(2 marks)

(ii) Microwaves have a frequency of 10 000 million Hz. Their wavelength is 0.03 m.

Calculate the speed of microwaves.

Show clearly how you work out your answer.

.....

.....

.....

Speed of microwaves..... m/s

(2 marks)

(b) Another type of wave has been used to investigate the structure of the inside of the Earth.

(i) Name this type of wave. .....

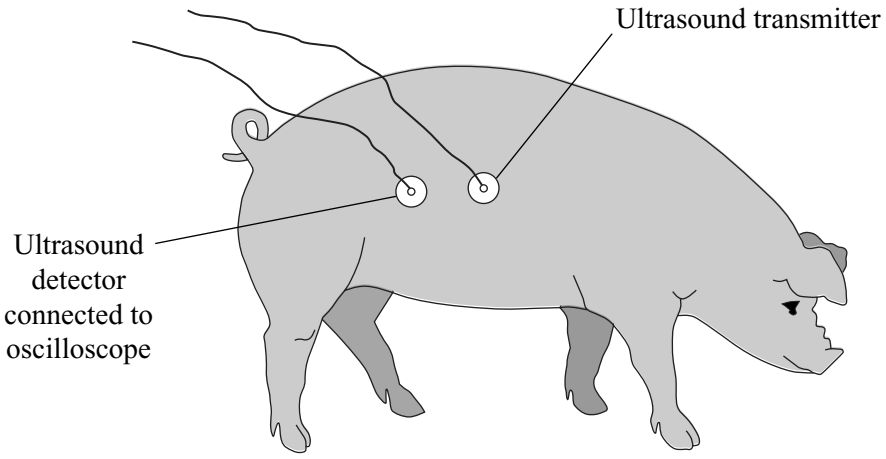
(ii) Name the instrument used to detect this type of wave. .....

(2 marks)

6

WAVES AND RADIATION

13 Pigs have a layer of fat in their skin. Underneath the fat is a layer of muscle. Ultrasonic waves are used to measure the thickness of the layer of fat. An ultrasound transmitter and detector are attached to the skin of the pig.



(a) Explain why ultrasound can be used to measure the thickness of the layer of fat.

.....

.....

.....

.....

(2 marks)

(b) The oscilloscope does not measure distance directly.

(i) What does the oscilloscope measure in this case?

.....

.....

(1 mark)

(ii) What other information is needed to calculate the thickness of the layer of fat in a pig?

.....

.....

(1 mark)

4

18 Earthquakes produce different kinds of shockwaves. Two of these are **P** waves and **S** waves.

(a) Give **two** differences between **P** waves and **S** waves.

1 .....

.....

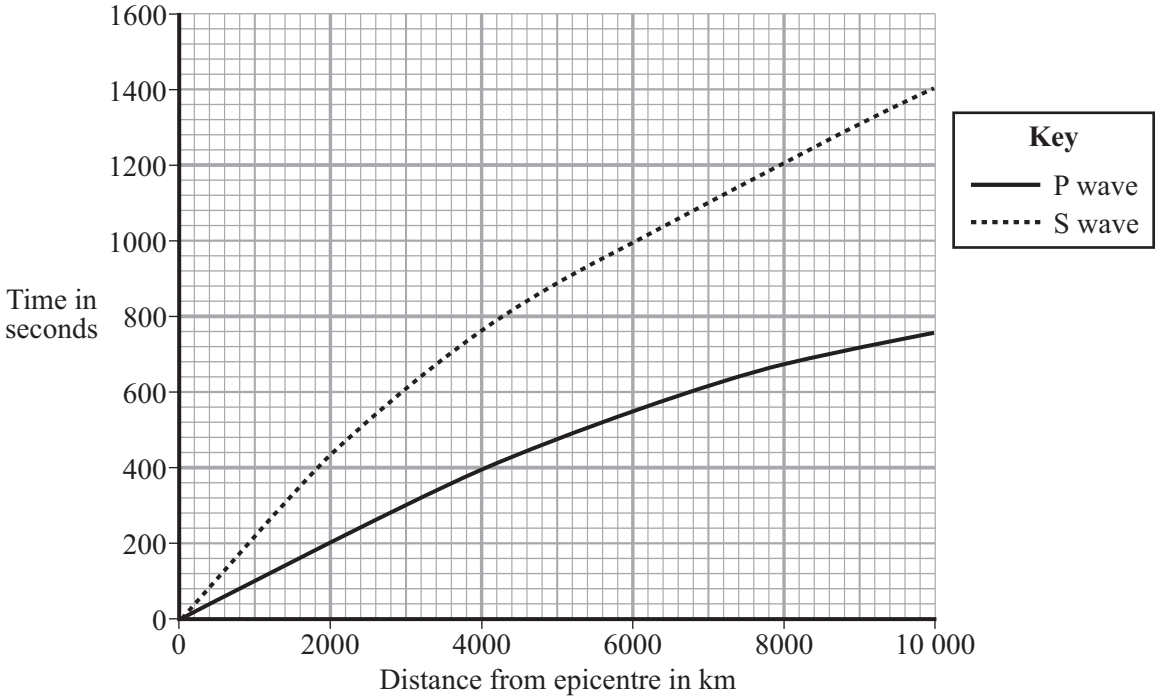
2 .....

.....

(2 marks)

(b) Scientists have measured the speed of shock waves produced by many earthquakes.

From this data they have produced a distance-time graph. This graph shows how far the shock waves travel from the epicentre (origin) of an earthquake in a given time.



(i) As a result of a particular earthquake, a seismograph station records the first **S** waves arriving 360 seconds after the first **P** waves.

Use the graph to estimate the distance of the seismograph station from the epicentre of the earthquake.

.....

.....

Distance ..... km

(1 mark)

(ii) The lines for the **P** wave and the **S** wave are not straight.

What does this tell you?

.....

.....

.....

.....

(2 marks)

5

TURN OVER FOR THE NEXT QUESTION