OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE

PHYSICS

9203/1   PAPER 1

Specimen material   1 hour 30 minutes

Materials
For this paper you must have:
* a ruler with millimetre measurements
* a calculator.

Instructions
* Use black ink or black ball-point pen.
* Fill in the boxes at the bottom of this page.
* Answer **all** questions.

Information
* The marks for questions are shown in brackets.
* The maximum mark for this paper is 90.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number ☐☐☐☐☐   Candidate number ☐☐☐☐

Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Forename(s) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Candidate signature _____

9203/1

Answer **all** questions in the spaces provided.

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0 1 . 1 A skydiver jumps from an aircraft and after 25 seconds reaches a maximum velocity of 50 m/s.

They then fall for a further 200 seconds before opening their parachute.

What is the maximum velocity called?

Tick **one** box.

[1 mark]

Frictional velocity ☐

Gravitational velocity ☐

Internal velocity ☐

Terminal velocity ☐

0 1 . 2 How many meters did the skydiver fall at the maximum velocity before opening his parachute?

Tick **one** box.

[1 mark]

4.0 m ☐

8.0 m ☐

130 m ☐

10 000 m ☐

0 1 . 3 The skydiver's weight was 784 N.

The gravitational field strength is 9.8 N / kg.

Calculate the mass of the skydiver.

[2 marks]

_____

_____

_____

Mass of skydiver = _____ kg

0 1 . 4 Immediately after leaving the aircraft, the skydiver's acceleration was 9.8 m/s^2

State what happens to the skydiver's acceleration as their velocity increases.

[1 mark]

_____

_____

0 1 . 5 Explain your answer to question **01.4** in terms of forces.

[2 marks]

_____

_____

_____

_____

0 1 . 6 What is the acceleration of the skydiver after he has been falling for 25 seconds?

State and explain your value of acceleration in terms of forces.

[3 marks]

Acceleration _____ m / s^2

Explanation:

_____

_____

_____

_____

Turn over ▶

0 2 . 1 Which of the following sentences gives the best description of an object's centre of mass.

Tick **one** box.

[1 mark]

A point representing the central point of an object. ☐

A point representing the mean position of the matter in an object. ☐

A point representing the mean position of the weight in an object. ☐

A point representing the centre of symmetry of an object. ☐

0 2 . 2 The object below is a thin lamina.

Draw lines on the object to find the centre of mass of the thin lamina.

[1 mark]

0 2 . 3 Simple levers can be used to multiply which of the following?

Tick **one** box.

[1 mark]
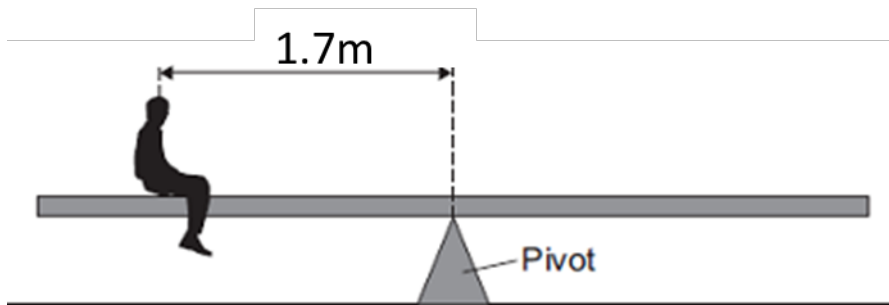
Distance ☐

Force ☐

Gravity ☐

Speed ☐

| 0 | 2 | . | 4 |

Below is a diagram of a see-saw.

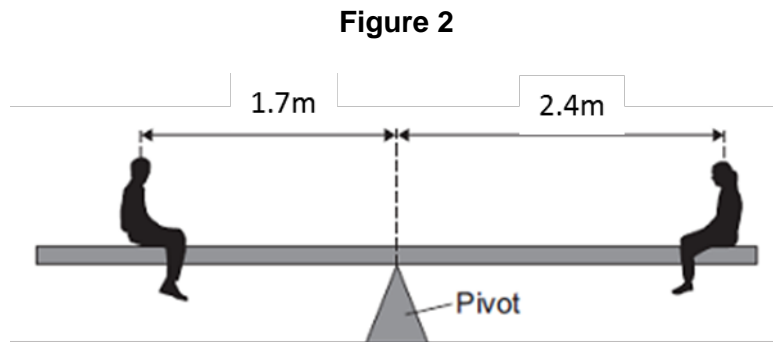A see-saw is a narrow board balanced upon a pivot.

Figure 1

The child shown in **Figure 1** weighs 560N.

Calculate the anticlockwise moment.

[2 marks]

_____

_____

Anticlockwise moment = _____ Nm

Figure 2 shows another child sitting at the opposite end of the see-saw.

Their weight is 420 N.

Figure 2

The see-saw is **not** balanced.

0 2 . 5   In which direction will the see-saw rotate?

Give the reason for your answer.

[2 marks]

Direction

Reason

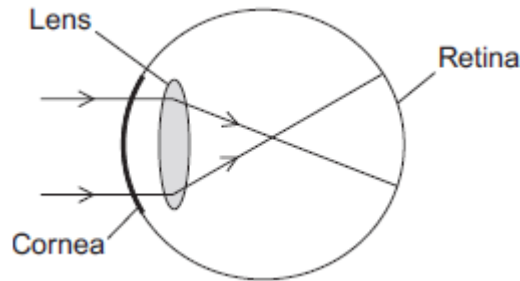**0 2 . 6**   Calculate how far away from the pivot the Child **A** must sit for the see-saw to become balanced. Assume Child **B** does not move.

[3 marks]

3   **Figure 3** shows rays of light entering a child's eye and being focused at a point.

This point is not on the retina so the child sees a blurred image.

Figure 3

0 3 . 1   What is the visual defect of this eye?

[1 mark]

_____

_____

0 3 . 2   What is the cause of the defect of vision shown in **Figure 3**?

Tick **one** box.

[1 mark]

The eyeball is too short. ☐

The cornea is too short. ☐

The lens is unable to focus the rays onto the retina. ☐

The retina is blurring the light rays. ☐

0 3 . 3   Use the correct answer from the box to complete the sentence.

[1 mark]

converging	convex	diverging

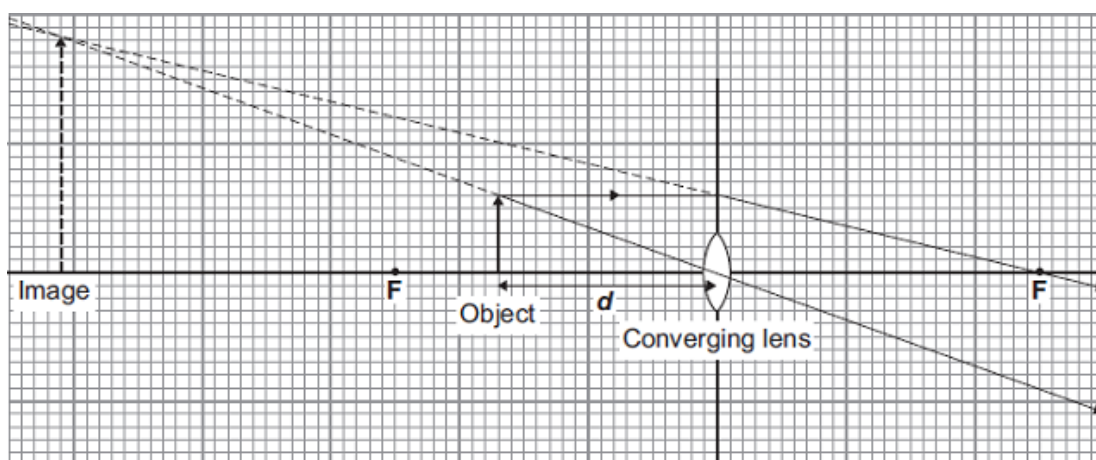The type of lense used to correct this visual defect is a _____ lense.

| 0 | 3 | . | 4 | Visual defects may be corrected with eye surgery. One type of surgery uses a concentrated source of light.

State the name given to the concentrated source of light used in eye surgery.

[1 mark]

_____

_____

| 0 | 3 | . | 5 | The diagram shows how a converging lense forms an image of an object

Describe the nature of the image.

[3 marks]

_____

_____

_____

_____

_____

_____

0 3 . 6 The height of the object and the height of its image are drawn to scale.

Calculate the magnification produced by the lense.

[2 marks]

_____

_____

_____

Magnification = _____

0 3 . 7 What name is given to the point labeled **F** in the diagram?

[1 mark]

_____
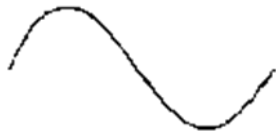
_____

Turn over ▶

| 0 4 . 1 | What are the differences between waves **A** and **B**? |

[3 marks]

Wave A

Wave B

Frequency _____

Wavelength _____

Amplitude _____

| 0 4 . 2 | Radio waves are electromagnetic waves. |

Describe how radio waves are different from sound waves.

[4 marks]

_____

_____

_____

_____

_____

_____

0 4 . 3 When a racing car passes an observer the pitch of the sound of the engine appears to change.

State the name of this effect.

[1 mark]

_____

0 4 . 4 Describe how the observed frequency of the sound changes as the car travels towards, and away, from the observer.

[2 marks]

_____

_____

_____

_____

0 5 . 1 Draw **four** lines between the boxes to complete the sentences.

One sentence has already been completed.

[3 marks]

|	
The current through a resistor depends…	…across each component is the same.
A direct current…	…is supplied by a cell or battery.
In a series circuit, the potential difference…	…is constantly changing direction.
An alternating current…	…of the power supply is shared by the components.
In a parallel circuit, the potential difference…	…on the potential difference across the resistor.

0 5 . 2 State what is meant by an electric current?

[1 mark]

_____

_____

0 5 . 3 The graph shows how the electric current through a 12 V filament bulb varies with the potential difference across the bulb.
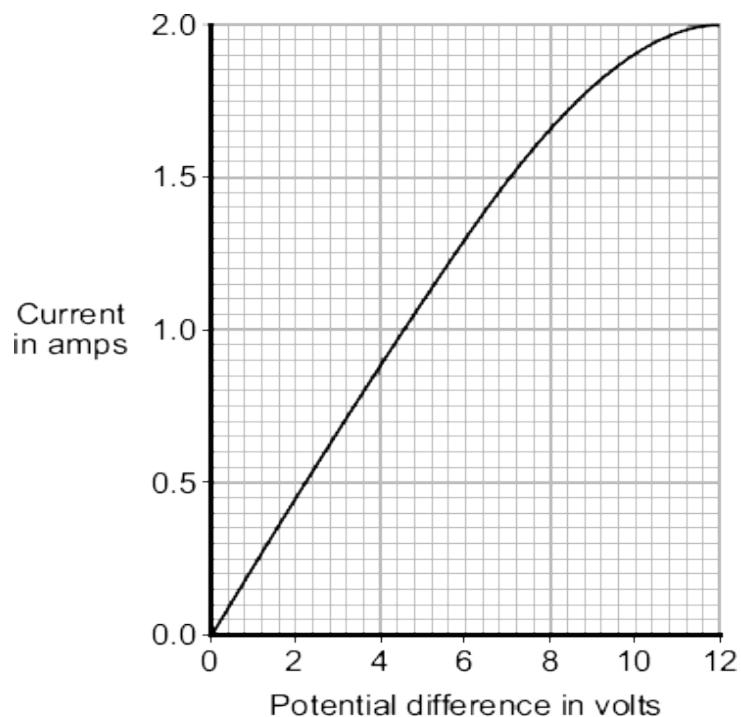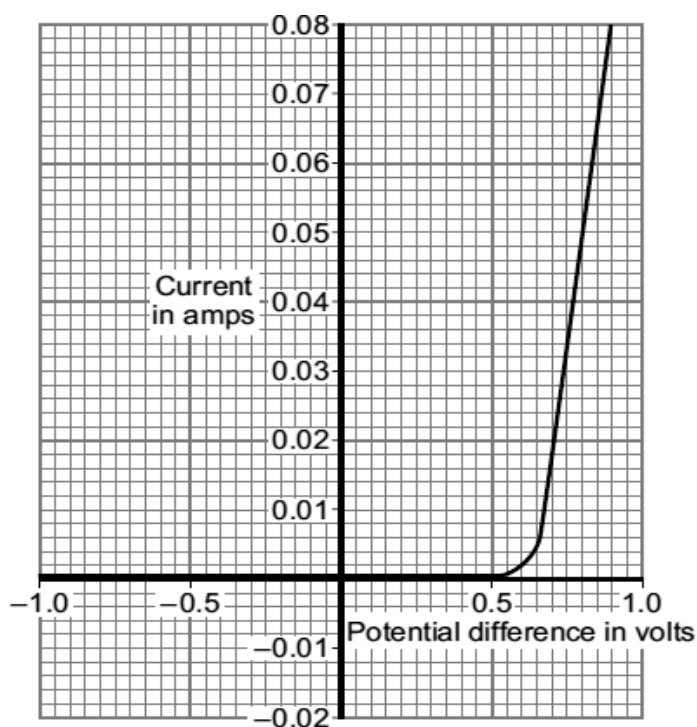
Explain why the resistance of the metal filament inside the bulb changes as the potential difference across the bulb increases.

[3 marks]

_____

_____

_____

_____

_____

_____

| 0 | 5 | . | 4 |

The current–potential difference graph for one type of electrical component is shown below.

What is the component?

Tick **one** box.

[1 mark]

Diode ☐

Light-dependent resistor ☐

Thermistor ☐

Variable resistor ☐

| 0 | 5 | . | 5 |

Calculate the resistance of the component when the potential difference across it is 0.8 volts.
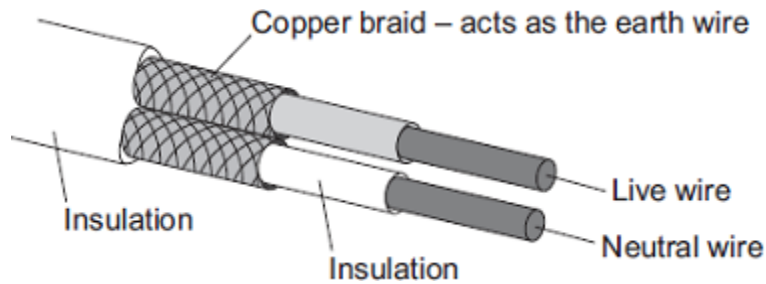
Use data from the graph.

[2 marks]

Resistance = _____ Ω

6 The diagram shows the structure of a cable. The cable is part of an air conditioning circuit inside an air conditioner.

| 0 | 6 | . | 1 |

The cable is connected to the mains electricity supply through a residual current circuit breaker (RCCB).

If the cable is accidentally cut the RCCB automatically switches the circuit off.

Explain what happens when the cable is cut to cause the RCCB to switch the circuit off.

[2 marks]

0 6 . 2 A circuit can also be switched off by the action of a fuse.

Give **one** advantage of using a RCCB to switch off a circuit rather than a fuse.

[1 mark]

_____

_____

0 6 . 3 The 230 volt mains electricity supply causes a current of 11 amps to flow through the cable.

Calculate the amount of charge that flows through the cable when the cable is switched on for 2 hours.

Give the unit.

[3 marks]

_____

_____

_____

_____

Charge = _____ Unit _____

0 6 . 4 Calculate the energy transferred from the cable to the air conditioner in 2 hours.

[2 marks]

_____

_____

Energy transferred = _____ J

0 6 . 5 The cooling circuit includes a thermistor. The thermistor is located in the room and acts as a thermostat to control the temperature of the room.

Describe how an **increase** in the temperature of the room affects the thermistor.

[2 marks]

_____

_____

_____

7   Nuclear fission and nuclear fusion are two processes that release energy.

0 7 . 1   Use the correct answer from the box to complete each sentence.

[2 marks]

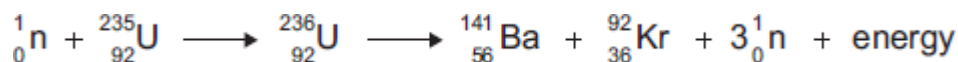| Geiger counter   nuclear reactor   star |
| --- |

Nuclear fisson takes place within a _____ .

Nuclear fusion takes place within a _____ .

0 7 . 2   State **one** way in which the process of nuclear fusion differs from the process of nuclear fission.

[1 mark]

_____

_____

The following nuclear equation represents the fission of uranium-235 (U-235).

$$_{0}^{1}n + {}_{92}^{235}U \longrightarrow {}_{92}^{236}U \longrightarrow {}_{56}^{141}Ba + {}_{36}^{92}Kr + 3{}_{0}^{1}n + energy$$

Chemical symbols:

Ba - barium

Kr - krypton

0 7 . 3   Describe the process of nuclear fission of uranium-235.

Use the information in the equation.

[4 marks]

_____

_____

_____

_____

_____

_____

| 0 | 7 | . | 4 |

An isotope of barium is Ba-139.

Ba-139 decays by beta decay to lanthanum-139 (La-139).

Complete the nuclear equation that represents the decay of Ba-139 to La-139.

[3 marks]

$$\underline{}^{139}\text{Ba} \longrightarrow \underline{}^{139}\text{La} + \underline{}$$

0 8 . 1   Scientists have observed spectra from different galaxies.

Tick **one** box to complete the sentence.

[1 mark]

These observations have:

proved the 'Big Bang' theory to be correct. ☐

proved the existence of electromagnetic waves. ☐

provided evidence that the universe will expand forever. ☐

provided more evidence to support the 'Big Bang' theory. ☐

0 8 . 2   The net result of the nuclear fusion reaction is that four hydrogen nuclei produce one helium nucleus. There is a loss of mass of 0.7%.

The energy released during the reaction can be calculated as shown:

energy released   =   loss of mass   ×   (speed of light)^2

(The speed of light is 3×10^8 m/s)

Calculate the energy released when 1 g of hydrogen fuses to form helium.

[4 marks]

_____

_____

_____

_____

_____

Energy released = _____ J

0 8 . 3   The table shows the lifetimes and surface temperatures of main sequence stars with different masses.

Mass of star (Sun = 1)	Lifetime on main sequence (million years)	Surface temperature (degrees C)
0.5	200 000	4000
1	10 000	6000
3	500	11 000
15	15	30 000

What conclusions can be drawn from the data given in the table?

[2 marks]

_____

_____

_____

_____

0 8 . 4   The diagram, drawn below, places stars in one of four groups.

Where a star is placed on the diagram is determined by the surface temperature and relative luminosity of the star.

A star with a relative luminosity of 1 emits the same amount of energy every second as the Sun.
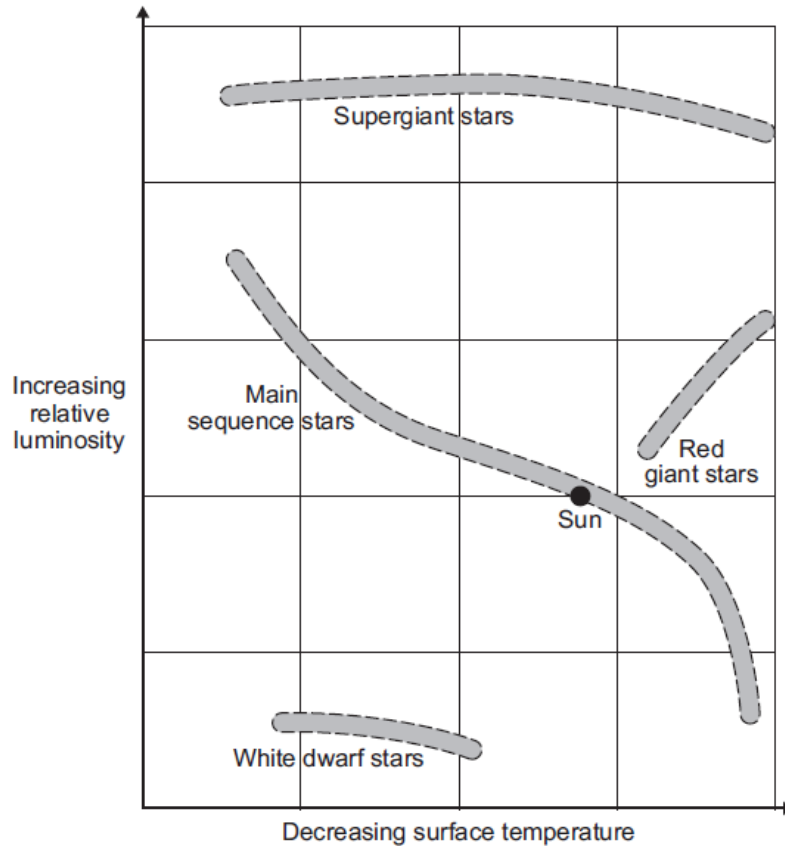
The Sun will spend most of its life cycle as a main sequence star. This is the stable period of the Sun's life cycle.
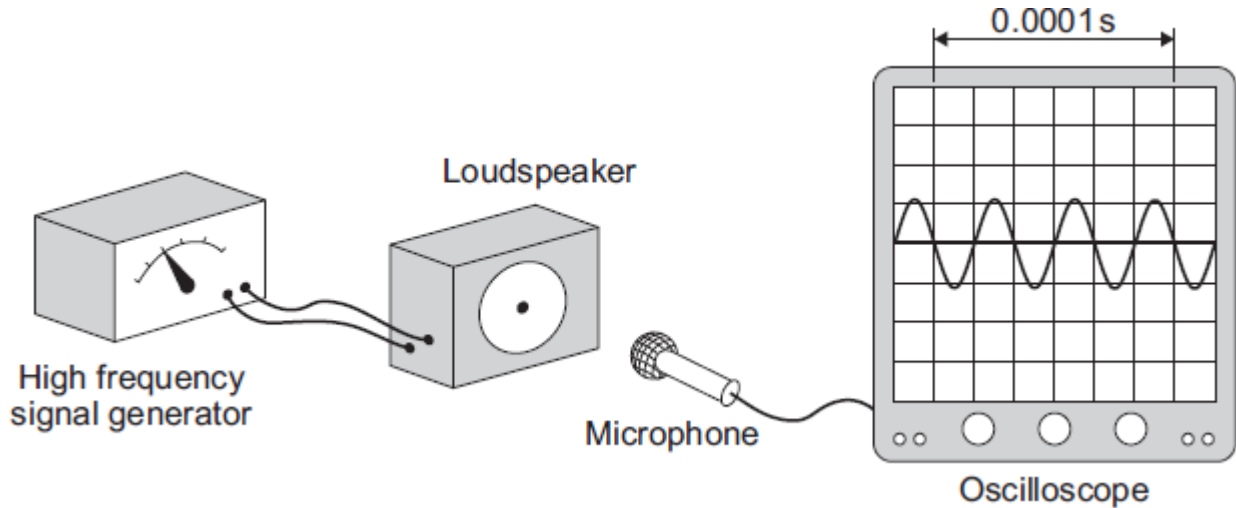
Describe, using the diagram, what will happen to the temperature and luminosity of the Sun after the stable period ends.

[3 marks]

_____

_____

_____

_____

_____

_____

9   The diagram shows a microphone being used to detect the output from a loudspeaker.

The oscilloscope trace shows the wave pattern produced by the loudspeaker.

0 9 . 1   How many waves are produced by the loudspeaker in 0.0001 seconds?

[1 mark]

_____

0 9 . 2   How many waves are produced by the loudspeaker every second?

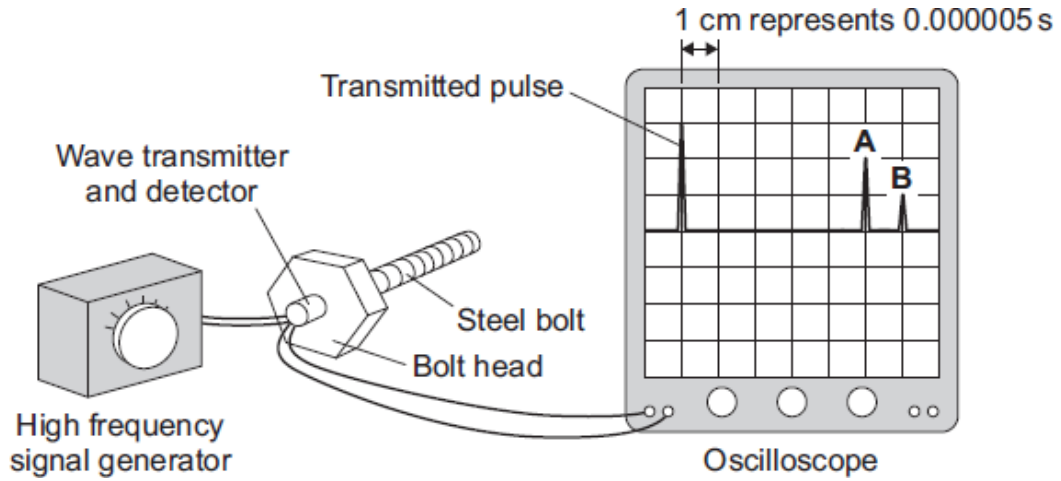Assume the input to the loudspeaker does not change.

[1 mark]

_____

_____

0 9 . 3   Explain why a person with normal hearing cannot hear the sound produced by the loudspeaker.

[3 marks]

_____

_____

_____

_____

Turn over ▶

The diagram shows how a very high frequency sound wave can be used to check for internal cracks in a large steel bolt.

The oscilloscope trace shows that the bolt does have an internal crack.

0 9 . 4   Explain what happens to produce pulse **A** and pulse **B**.

[2 marks]

_____

_____

_____

_____

0 9 . 5   Calculate the distance from the head of the bolt to the internal crack.

Use the information in the diagram.

Speed of sound in steel = 6000 m/s

[3 marks]

_____

T _____

w

o _____

_____

Distance = _____ m

END OF QUESTIONS

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