OXFORD
INTERNATIONAL
AQA EXAMINATIONS

Please write clearly in block capitals.

Centre number | | | | | |

Candidate number | | | | |

Surname ____________________

Forename(s) ____________________

Candidate signature ____________________

I declare this is my own work.

INTERNATIONAL GCSE

PHYSICS

Paper 1

Tuesday 10 November 2020 07:00 GMT Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a pencil and a ruler
- a scientific calculator
- the Physics Equations Sheet (enclosed).

Instructions

- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you worked out your answer.

Information

- The maximum mark for this paper is 90.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

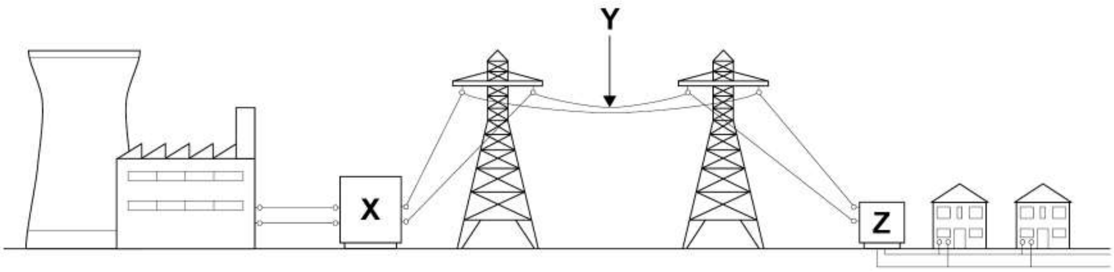
There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

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

0 1 **Figure 1** shows how electricity is distributed from a power station to consumers.

Figure 1



0 1 . 1 Give the names of the parts of the distribution system **X**, **Y** and **Z**.

Choose answers from the box.

[2 marks]

generator		**pylon**
step-down transformer	**step-up transformer**	**transmission cable**

X ____

Y ____

Z ____

0 1 . 2 Why is the electricity distributed at a high voltage?

[1 mark]

Tick (✓) **one** box.

The electricity distribution is more efficient. ☐

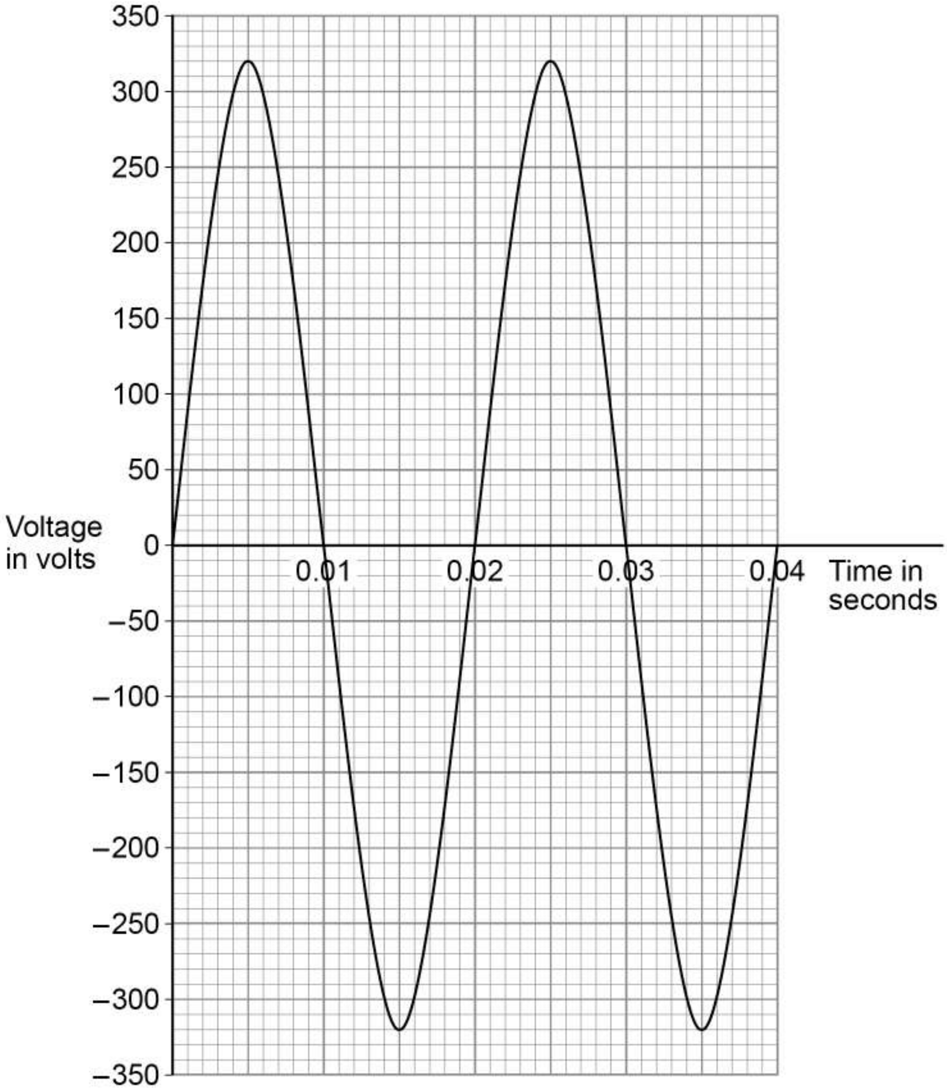
The electricity distribution is faster. ☐

The electricity distribution is safer. ☐

Question 1 continues on the next page

Figure 2 shows how the voltage supplied to consumers varies with time.

Figure 2



0 1 . 3 Use **Figure 2** to determine the time period of the voltage supplied to consumers.

[1 mark]

Tick (✓) **one** box.

0.005 s ☐

0.01 s ☐

0.02 s ☐

0.04 s ☐

0 1 . 4 Calculate the frequency of the voltage supplied to consumers.

Use your answer from Question **01.3**.

Use the equation

$$\text{frequency} = \frac{1}{\text{time period}}$$

[2 marks]

Frequency = ____________ Hz

0 1 . 5 The voltage supplied to consumers causes an alternating current.

What is meant by 'alternating current'?

[1 mark]

Question 1 continues on the next page

A person watched television for 2 hours.

The power rating of the television was 0.40 kW.

0 1 . 6 Calculate the energy transferred by the television.

Give your answer in kilowatt-hours.

Use the Physics Equations Sheet.

[2 marks]

Energy transferred = ______________ kW h

0 1 . 7 The cost of electricity is $0.12 per kilowatt-hour.

Calculate the cost of electricity used by the television in 2 hours.

Use your answer from Question **01.6**.

[2 marks]

Cost of electricity = $ ______________

11

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

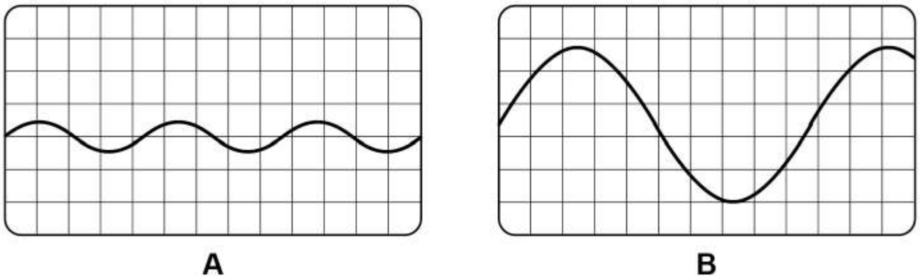
0 2 A student investigated different sounds using a microphone connected to an oscilloscope.

The sound wave received by the microphone is shown on the oscilloscope.

Figure 3 shows the oscilloscope traces from two different sound waves **A** and **B**.

The settings on the oscilloscope stayed the same for each sound wave.

Figure 3



0 2 . 1 What do sound waves transfer?

[1 mark]

Tick (✓) **one** box.

Energy ☐

Light ☐

Matter ☐

Particles ☐

0 2 . 2 How do the traces on **Figure 3** show that sound **A** has a higher pitch than sound **B**?

[1 mark]

____

____

0 2 . 3 How do the traces on **Figure 3** show that sound **B** is louder than sound **A**?

[1 mark]

____

____

0 2 . 4 A sound wave has a wavelength of 0.11 m when travelling through air.

The speed of sound in air is 330 m/s.

Calculate the frequency of the sound wave.

Use the Physics Equations Sheet.

[3 marks]

____

____

____

____

____

Frequency = ____________ Hz

Question 2 continues on the next page

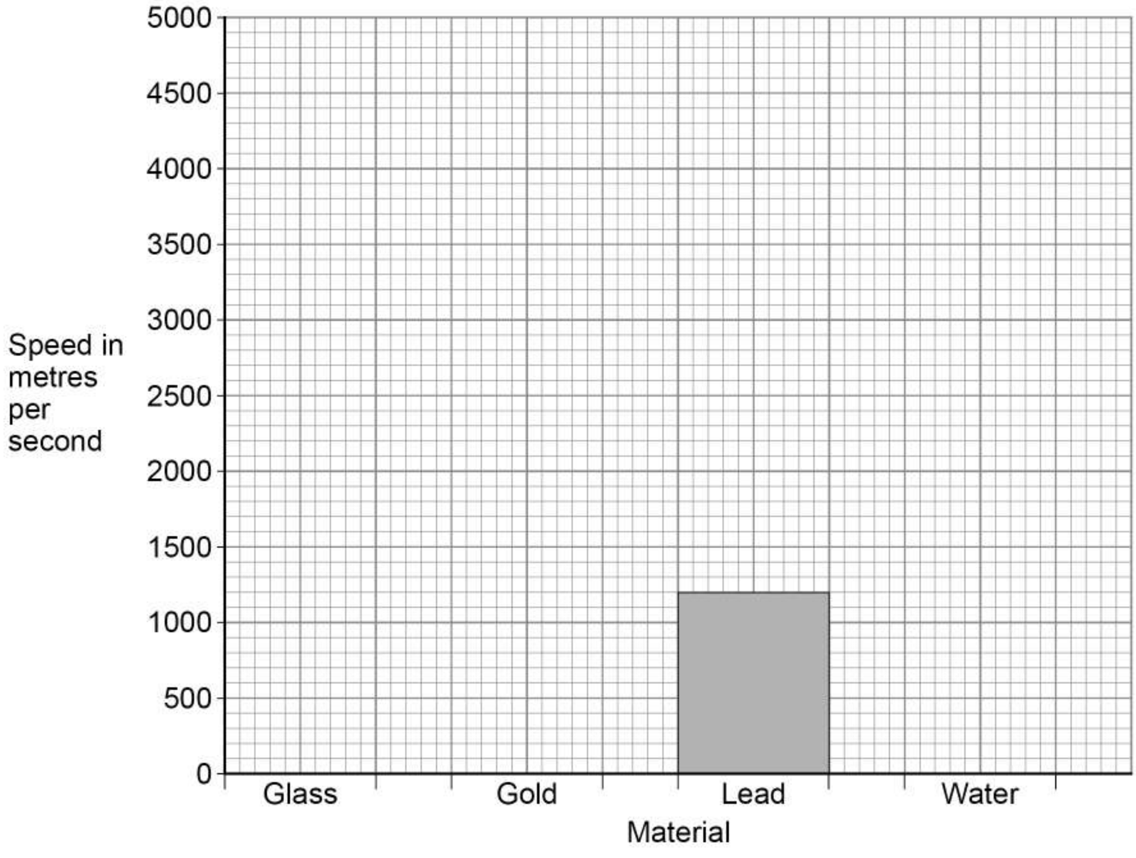
Table 1 shows the speed of sound in some different materials.

Table 1

Material	**Speed in metres per second**
Glass	4500
Gold	3300
Lead	1200
Water	1500

Figure 4 shows one of the speeds plotted on a bar chart.

Figure 4



0 2 . 5 Plot the remaining speeds in **Table 1** on the bar chart in **Figure 4**.

[2 marks]

0 2 . 6 Why is drawing a bar chart more appropriate than drawing a line graph for the data in **Table 1**?

[1 mark]

____

____

0 2 . 7 Suggest why sound waves travel faster through a liquid than they do through a gas.

[1 mark]

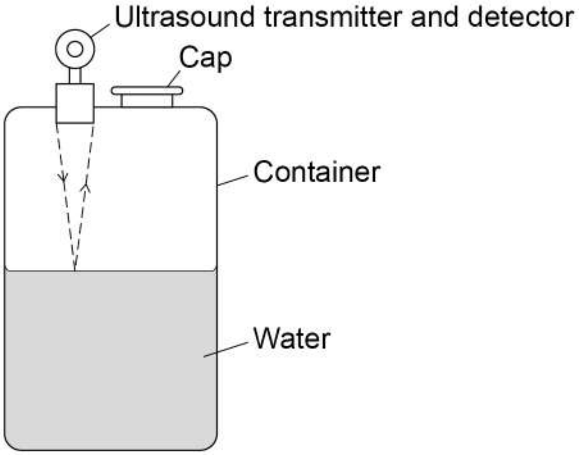
____

____

Question 2 continues on the next page

Figure 5 shows ultrasound being used to determine the height of water in a container.

Figure 5



0 2 . 8 Ultrasound waves are beyond the limit of human hearing.

What is the maximum frequency humans can hear?

[1 mark]

Tick (✓) **one** box.

200 Hz ☐

2000 Hz ☐

20 000 Hz ☐

200 000 Hz ☐

0 2 . 9 What property of ultrasound waves is shown in **Figure 5**?

[1 mark]

Tick (✓) **one** box.

Diffraction ☐

Reflection ☐

Refraction ☐

Total internal reflection ☐

0 2 . 1 0 The ultrasound wave in **Figure 5** travels for a total time of 0.0020 s.

The speed of the ultrasound is 330 m/s.

Calculate the distance travelled by the ultrasound.

Use the equation

$$\text{distance} = \text{speed} \times \text{time}$$

Give your answer in cm.

[3 marks]

Distance travelled = ________________ cm

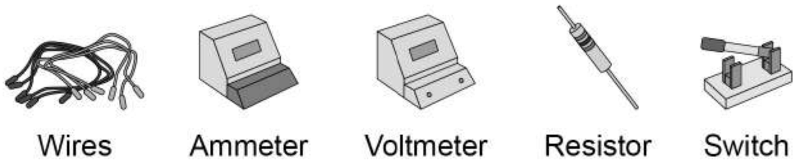
15

Turn over for the next question

0 3 A student investigated how the current in a resistor varies with the potential difference across the resistor.

Figure 6 shows some of the equipment the student used.

Figure 6



0 3 . 1 Plan an investigation to determine how the current in a resistor varies with the potential difference across the resistor.

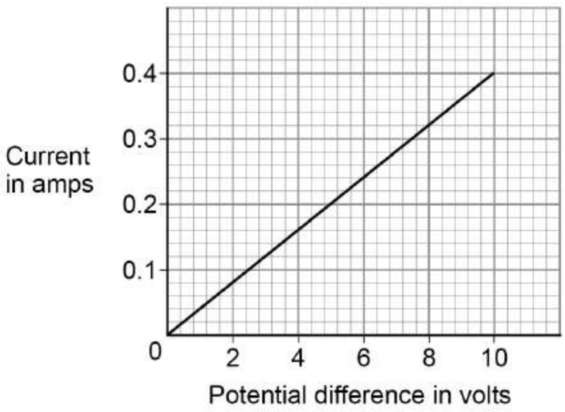
You may include a circuit diagram in your answer.

[6 marks]

Question 3 continues on the next page

0 3 . 2 **Figure 7** is a graph of current against potential difference for a resistor.

Figure 7



Determine the resistance of the resistor when there is a potential difference of 10 V across it.

Use **Figure 7** and the Physics Equations Sheet.

Choose the unit from the box.

A	**Hz**	**Ω**	**V**

[4 marks]

____

____

____

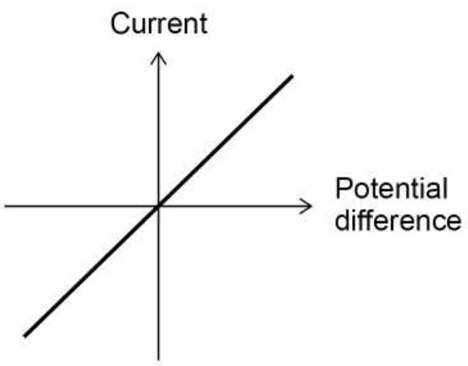
____

____

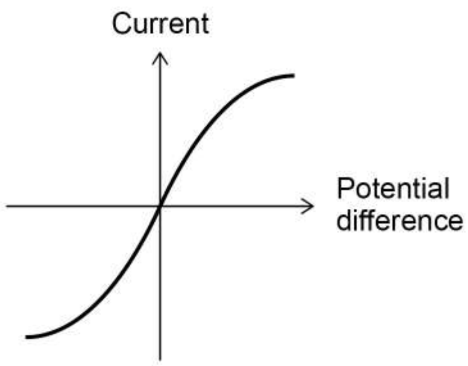
Resistance = ________________ Unit ________________

0 3 . 3 **Figure 8** shows how current varies with potential difference for a resistor at constant temperature and a filament lamp.

Figure 8



Resistor at constant temperature



Filament lamp

Compare the resistance of a resistor at constant temperature with the resistance of a filament lamp.

Use **Figure 8**.

[3 marks]

13

Turn over for the next question

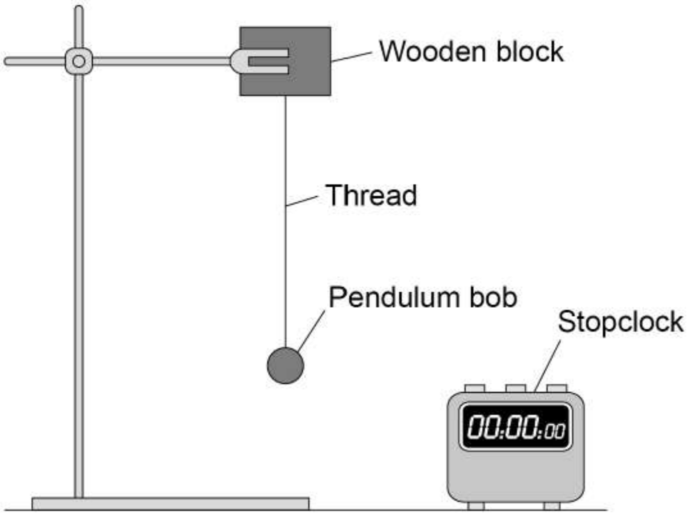
There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

0 4 A pendulum bob is a heavy spherical mass.

Figure 9 shows a pendulum bob suspended by a piece of thread.

Figure 9



0 4 . 1 The pendulum bob is stationary.

Explain why the pendulum bob is stationary.

Use ideas about forces in your answer.

[3 marks]

____

____

____

____

____

____

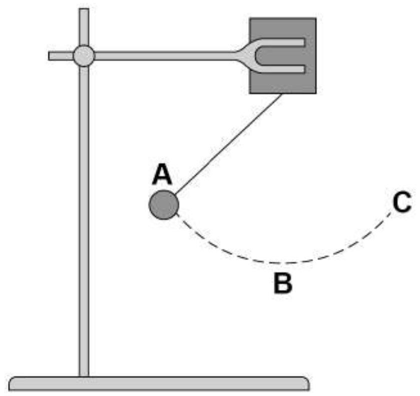
Question 4 continues on the next page

A student pulls the pendulum bob to one side and releases it.

Figure 10 shows the path of the pendulum bob when it is released from position **A**.

Position **A** is at the same height as position **C**.

Figure 10



0 4 . 2 Describe the energy transfers that happen as the pendulum bob moves from position **A** to position **B** and then to position **C**.

[3 marks]

____

____

____

____

____

____

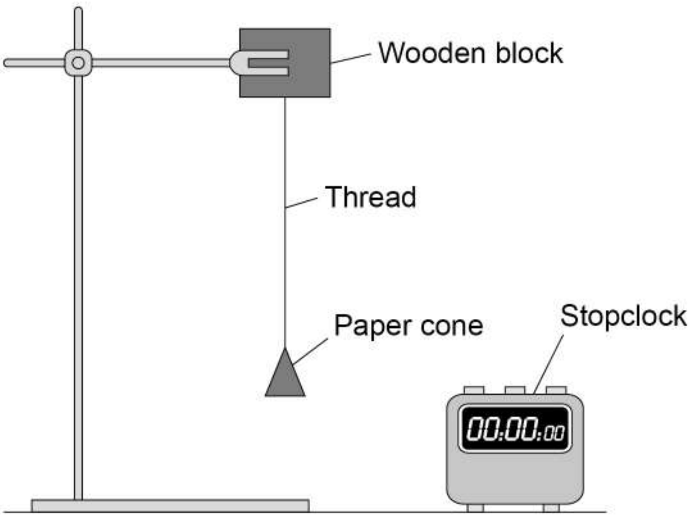
0 4 . 3 Describe how the student could accurately measure the time period of the pendulum using a stopclock.

[3 marks]

Question 4 continues on the next page

0 4 . 4 The student replaced the pendulum bob with a paper cone as shown in **Figure 11**.

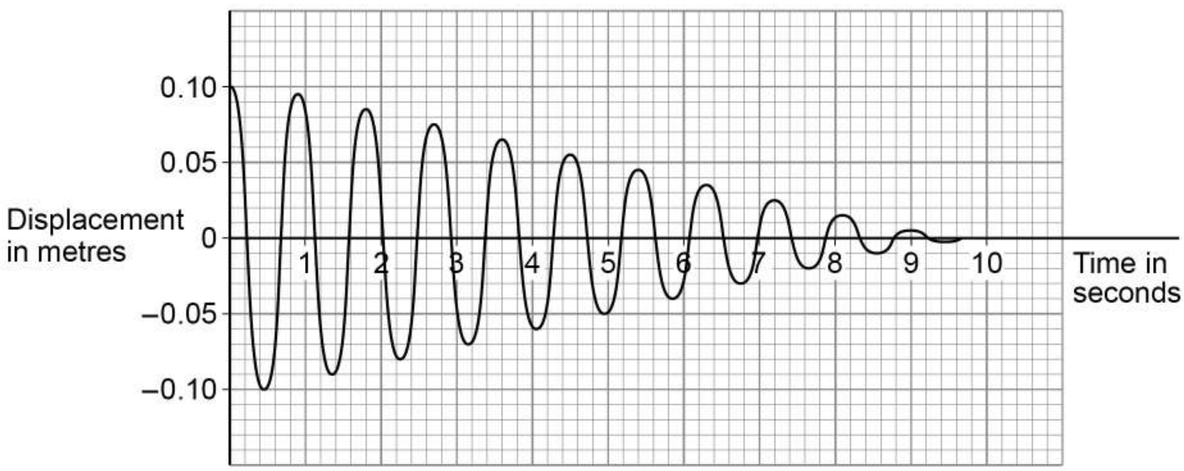
Figure 11



The student pulled the paper cone to one side and released it.

Figure 12 shows how the displacement of the paper cone varied with time.

Figure 12



Explain why the maximum displacement of the paper cone decreased as time increased.

[2 marks]

____

____

____

____

0 5 Visible light and X-rays are both part of the electromagnetic spectrum.

Visible light and X-rays are both transverse waves.

0 5 . 1 Give **one** other similarity between visible light and X-rays.

[1 mark]

____

____

0 5 . 2 Give **three** differences between visible light and X-rays.

[3 marks]

1 ____

____

2 ____

____

3 ____

____

0 5 . 3 What is a transverse wave?

[1 mark]

____

____

Question 5 continues on the next page

At sea ports, some lorries go through X-ray scanners to check what is inside the soft-sided container.

Figure 13 shows a lorry going through an X-ray scanner.

Figure 13

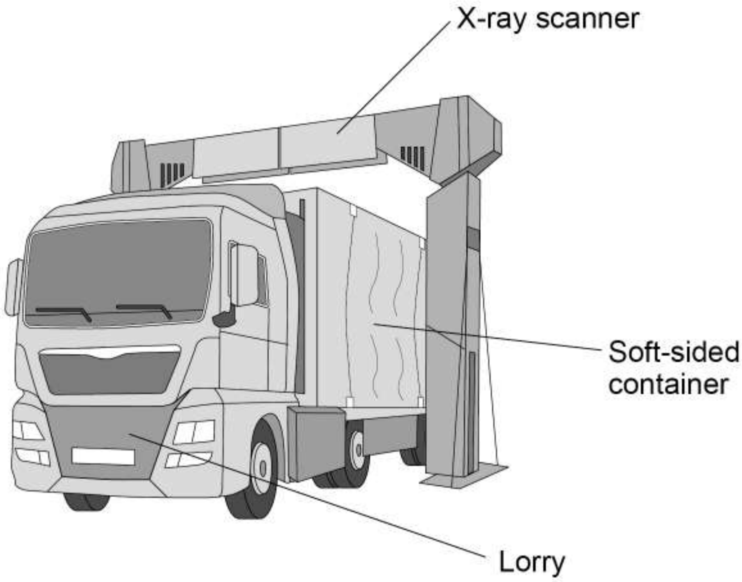
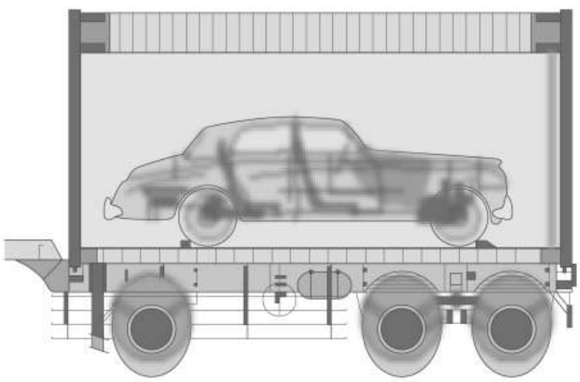


Figure 14 shows an image taken using the X-ray scanner.

Figure 14



0 5 . 4 Explain why X-rays can be used to produce the image in **Figure 14**.

[3 marks]

0 5 . 5 The driver does **not** need to get out of the lorry when the lorry is scanned with X-rays.

Suggest **two** reasons why it is safe for the driver to stay in the lorry.

[2 marks]

1

2

10

Turn over for the next question

0 6 Radioactive isotopes can be used by doctors in hospitals.

0 6 . 1 A doctor measures the amount of ionising radiation in the air using a count-rate meter when no radioactive source was present.

The count-rate meter measures the amount of ionising radiation detected each second.

Explain why the reading on the count-rate meter keeps changing.

[2 marks]

____

____

____

____

The doctor uses a sample of radium-226 during the treatment of a patient.

Radium-226 emits both alpha and gamma radiation.

0 6 . 2 Radium (Ra) is radioactive and can decay into Radon (Rn) by alpha emission.

Complete the equation for radium-226 as it decays by alpha emission.

[2 marks]

$$^{226}_{88}\mathrm{Ra} \rightarrow {}^{\_\_\_}_{\_\_\_}\mathrm{Rn} + {}^{\_\_\_}_{\_\_\_}\alpha$$

The sample of radium-226 is stored in a lead-lined box.

0 6 . 3 Why is the sample of radium-226 stored in the lead-lined box when not in use?

[1 mark]

____

____

0 6 . 4 The doctor took the radioactive source out of the box.

Suggest **two** safety precautions the doctor should take.

[2 marks]

1 ____

____

2 ____

____

Question 6 continues on the next page

0 6 . 5 The doctor measured the count rate from the sample. The count rate was 80 counts per second.

half-life of radium-226 = 1600 years

Calculate the count rate in 6400 years.

[3 marks]

Count rate = ______________ counts per second

0 6 . 6 Objects that come into contact with ionising radiation could be irradiated or contaminated.

Describe the difference between irradiation and contamination.

[3 marks]

0 6 . 7 Radioactive tracers are radioactive isotopes that are injected into the body. The isotope is transported around the body by the blood.

The radiation emitted by the isotope is then detected outside the body.

Table 2 shows some properties of four radioactive isotopes.

Table 2

Radioactive isotope	**Half-life**	**Type of emission**
Argon-39	270 years	beta
Lanthanum-117	10 milliseconds	gamma
Radium-226	1600 years	alpha and gamma
Technetium-99	6 hours	gamma

Explain which radioactive isotope is most suitable to use as a radioactive tracer.

[4 marks]

17

Turn over for the next question

0 7

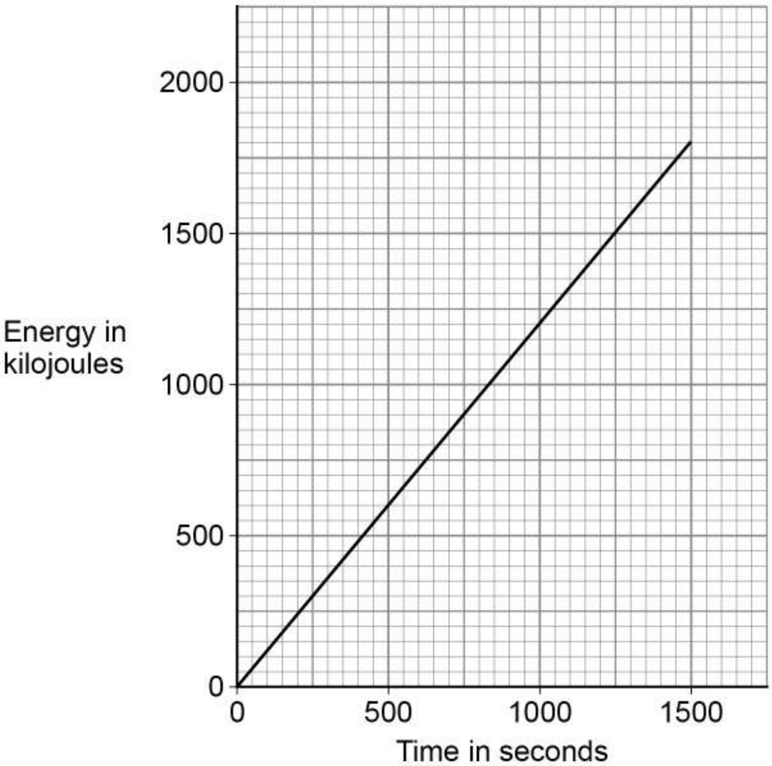
An energy meter measured the amount of energy transferred by a washing machine to heat some water.

Figure 15 shows the energy meter.

Figure 15

Figure 16 shows a graph of the data collected by the energy meter.

Figure 16



0 7 . 1 Describe the relationship between the energy transferred by the washing machine and time, as the water was heated.

[2 marks]

0 7 . 2 The washing machine uses a heating element to heat the water.

The potential difference across the heating element is 230 V.

Determine the current in the heating element while the washing machine was heating the water.

Use the Physics Equations Sheet.

[6 marks]

Current = ____________ A

Question 7 continues on the next page

0 7 . 3 A different washing machine transfers 380 000 joules during a washing cycle.

65% of the energy transferred by the washing machine is used to heat the water from 11 °C to 30 °C.

specific heat capacity of water = 4200 J/kg °C

Calculate the mean mass of water heated by the washing machine.

Give your answer to 2 significant figures.

Use the Physics Equations Sheet.

[5 marks]

____

____

____

____

____

____

____

____

____

____

____

Mean mass of water (2 significant figures) = ______________ kg

13

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

Question number	Additional page, if required. Write the question numbers in the left-hand margin.

Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**