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

Wednesday 10 May 2023 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	
8	
TOTAL	

Do not write outside the box

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

0 1 **Figure 1** shows the order of different types of waves in the electromagnetic spectrum.

Figure 1

radio waves	**A**	**infrared**	**visible light**	**B**	**X-rays**	**C**

0 1 . 1 Give the names of the types of electromagnetic wave **A**, **B** and **C**.

Choose the answers from the box.

[2 marks]

gamma rays	**microwaves**	**seismic**	**sound**	**ultraviolet**

A _____

B _____

C _____

0 1 . 2 Draw **one** line from each type of electromagnetic wave to its use.

[3 marks]

Type of electromagnetic wave	**Use**
	Bluetooth
Gamma rays	Medical imaging of unborn babies
Infrared	Night vision devices
Radio waves	Security markings
	Sterilizing surgical instruments

Do not write outside the box

0 1 . 3 How does the speed of gamma rays in a vacuum compare with the speed of light waves in a vacuum?

[1 mark]

Tick (✓) **one** box.

Gamma rays travel at a slower speed than light waves. ☐

Gamma rays travel at the same speed as light waves. ☐

Gamma rays travel at a faster speed than light waves. ☐

0 1 . 4 What is the approximate range of wavelengths of the electromagnetic spectrum?

[1 mark]

Tick (✓) **one** box.

10^{-15} to 10^{4} m ☐

10^{-10} to 10^{4} m ☐

10^{-7} to 10^{7} m ☐

10^{-7} to 10^{10} m ☐

Question 1 continues on the next page

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0 1 . 5 Infrared radiation can be used to transfer information through broadband cables.

The frequency of the infrared radiation is 1.6×10^{14} Hz.

The wavelength of the infrared radiation in the cable is 1.5×10^{-6} m.

Calculate the speed of the infrared radiation in the broadband cable.

Give your answer in standard form.

Use the Physics Equations Sheet.

[3 marks]

Speed (in standard form) = _____ m/s

10

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0 2 Biofuels are a renewable energy resource.

0 2 . 1 What is meant by 'a renewable energy resource'?

[1 mark]

0 2 . 2 Which of the following are **two** other renewable energy resources?

[2 marks]

Tick (✓) **two** boxes.

- Coal ☐
- Geothermal ☐
- Natural gas ☐
- Nuclear ☐
- Solar ☐

Question 2 continues on the next page

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Biodiesel is an example of a biofuel.

Waste material from making coffee can be used to make biodiesel.

0 2 . 3 Biodiesel is a renewable fuel.

Explain **one** other advantage of using biodiesel rather than diesel made from crude oil.

[2 marks]

0 2 . 4 10 kg of waste material can produce a volume of 2.0 litres of biodiesel.

A coffee company produces 80 kg of waste material per day.

Calculate the number of litres of biodiesel that could be produced from the waste material per day.

[2 marks]

Number of litres of biodiesel = _____ litres

Do not write outside the box

0 2 . 5 The fuel tank of a van contains 60 litres of biodiesel.

The maximum distance the van can travel using 1 litre of biodiesel is 15 km.

Calculate the maximum distance the van can travel on this tank of biodiesel.

Give your answer in km.

[2 marks]

Maximum distance = _____ km

0 2 . 6 Suggest **two** reasons why the distance the van can travel on 1 litre of biodiesel may vary.

[2 marks]

1 _____

2 _____

11

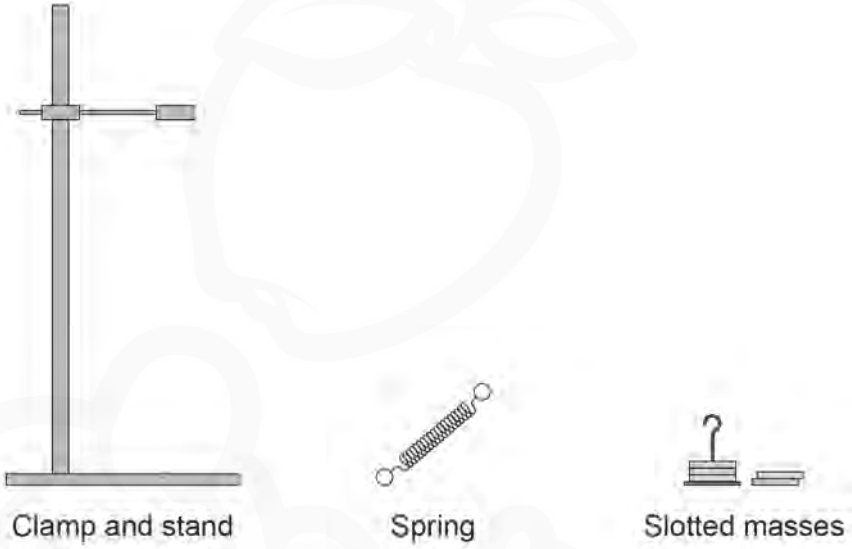
Turn over for the next question

Do not write outside the box

0 3 A student investigated how the extension of a spring is affected by the force applied to the spring.

Figure 2 shows some of the equipment used.

Figure 2



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0 3 . 1 Describe a method the student could use to carry out the investigation.

You may include a diagram showing how the extension could be measured.

[6 marks]

Question 3 continues on the next page

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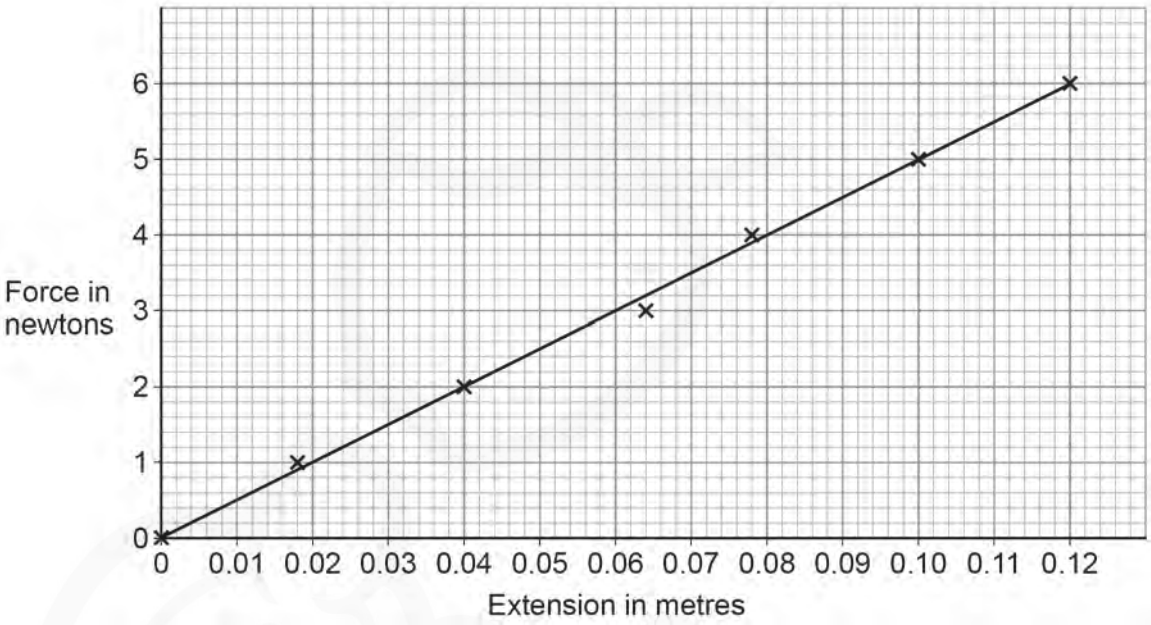
Figure 3 shows the results of the investigation.

Figure 3



0 3 . 2 How does the graph in **Figure 3** show that the extension is directly proportional to the force applied to the spring?

[1 mark]

0 3 . 3 Determine the spring constant of the spring.

Use the Physics Equations Sheet.

[3 marks]

Spring constant = _____ N/m

Do not write outside the box

0 3 . 4 The student used a maximum load of 6.0 N when testing the spring.

Explain what would happen to the spring when the student removed the 6.0 N force.

Use information from **Figure 3**.

[2 marks]

12

Turn over for the next question

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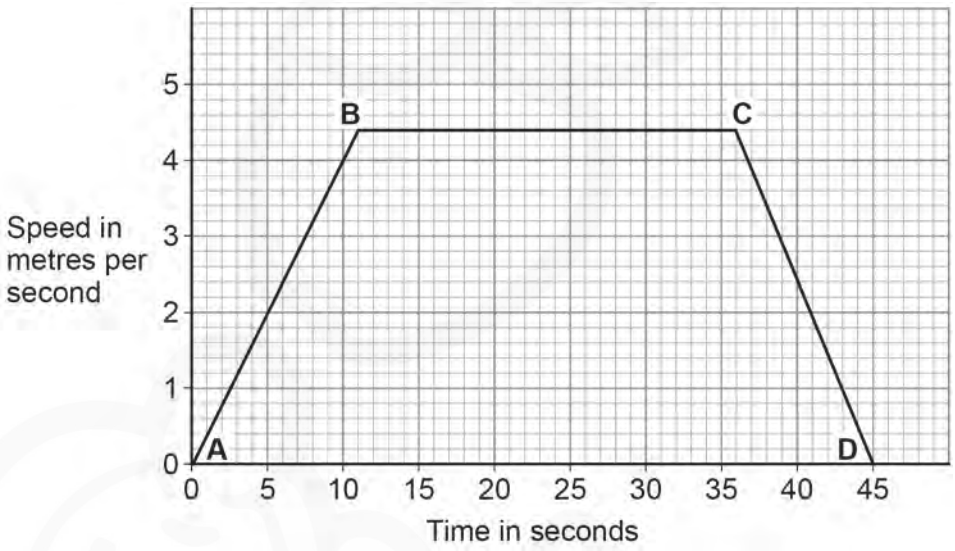
0 4 A cyclist was riding a bike. The cyclist used a fitness tracker to measure the speed of the bike during the journey.

Figure 4 shows a speed-time graph for the cyclist's journey.

Figure 4



0 4 . 1 How does the graph show that the cyclist's acceleration was uniform between points **A** and **B**?

[1 mark]

0 4 . 2 Determine the time for which the cyclist was travelling at a constant speed.

[1 mark]

Time = _____ seconds

Do not write outside the box

0 4 . 3 Determine the cyclist's deceleration between points **C** and **D** on **Figure 4**.

Use the Physics Equations Sheet.

Give the unit.

[3 marks]

Deceleration = _____ Unit _____

0 4 . 4 Determine the distance travelled by the cyclist in the first 20 seconds of the journey.

Use **Figure 4**.

[3 marks]

Distance travelled = _____ m

Question 4 continues on the next page

Do not write outside the box

The fitness tracker used by the cyclist contains an LED.

0 4 . 5 The potential difference across the LED is 2.0 V.

Calculate the charge which flows when 90 mJ of energy is transferred by the LED.

Use the Physics Equations Sheet.

[3 marks]

Charge flow = _____ C

0 4 . 6 Give **one** advantage of using an LED instead of a filament lamp in the fitness tracker.

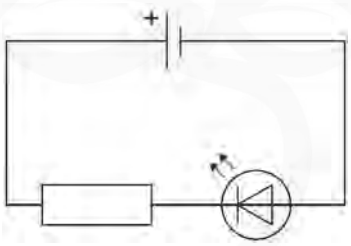
[1 mark]

Do not write outside the box

0 4 . 7 A student investigated an LED.

The student connected the LED in a circuit with a cell and a resistor as shown in **Figure 5**.

Figure 5



Why did the LED **not** light up?

[1 mark]

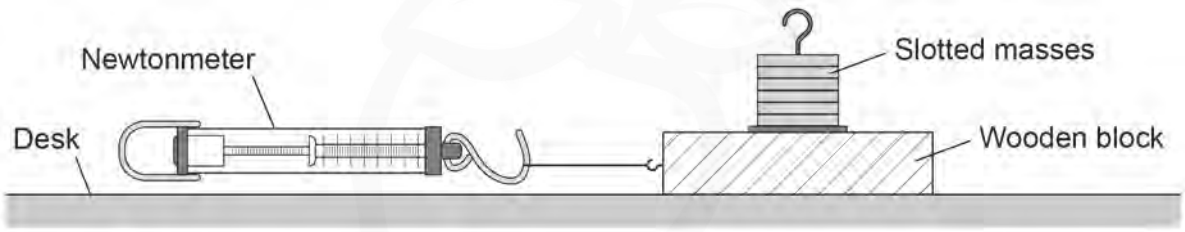
13

Turn over for the next question

0 5 A student investigated how the weight of some slotted masses affected the friction force between a wooden block and a desk.

Figure 6 shows the equipment used.

Figure 6



This is the method used.

1 With no slotted masses on top of the wooden block, pull the wooden block at a constant speed using the newtonmeter.
2 Record the reading from the newtonmeter.
3 Place one slotted mass on the wooden block.
4 Pull the wooden block at a constant speed using the newtonmeter.
5 Record the reading from the newtonmeter.
6 Repeat steps **4** to **5** several times, adding one additional slotted mass each time.

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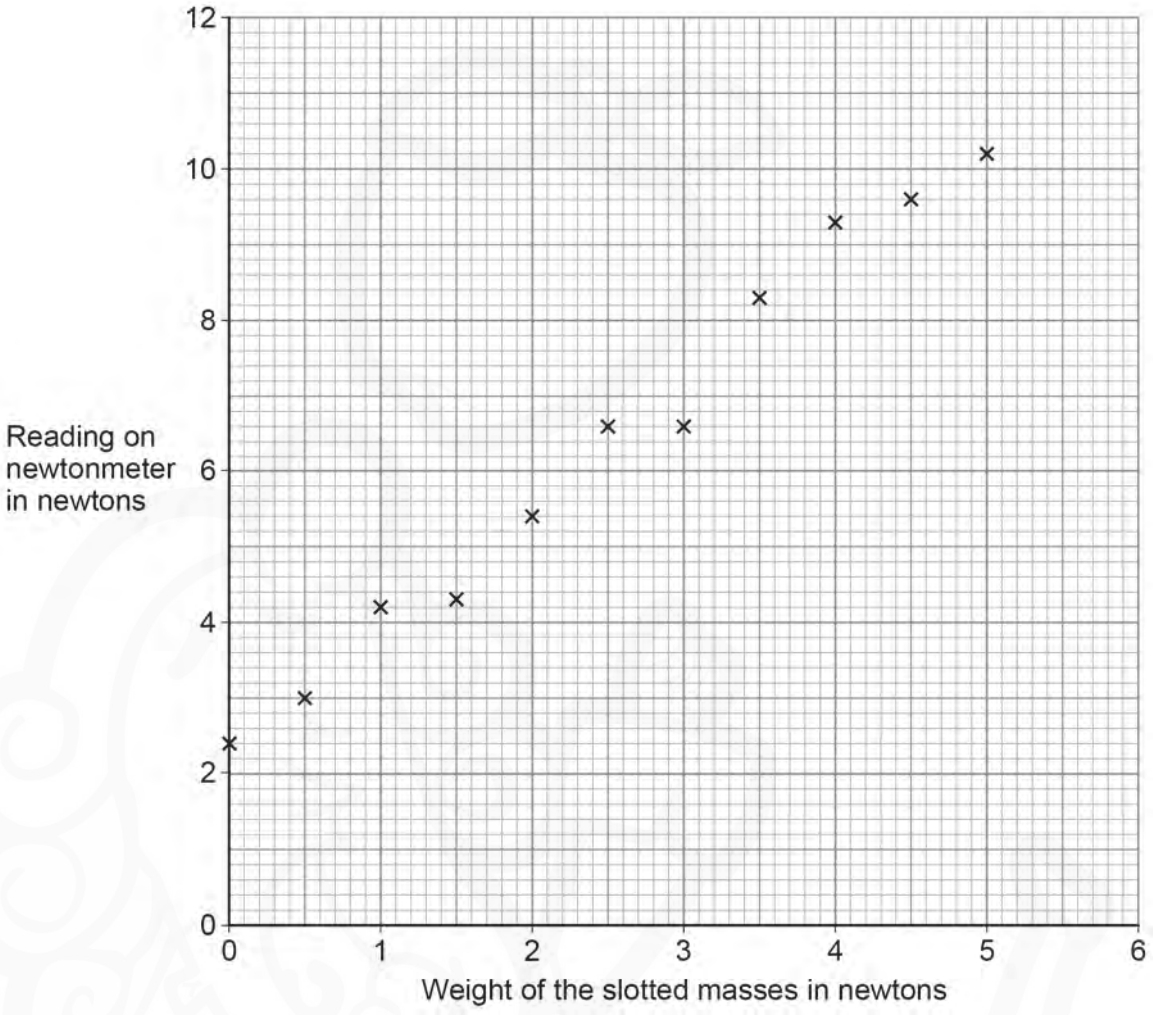
Figure 7 shows the results.

Figure 7



0 5 . 1 Draw a line of best fit on the graph in **Figure 7**.

[1 mark]

0 5 . 2 Determine the mass of each slotted mass added to the wooden block.

gravitational field strength = 9.8 N/kg

Use the Physics Equations Sheet.

[3 marks]

Mass = _____ kg

Question 5 continues on the next page

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0 5 . 3 The force needed to pull the block at a constant speed is **not** zero when there are no slotted masses on the block.

Give the reason why.

[1 mark]

0 5 . 4 The student took measurements using a weight of 6.0 N on top of the wooden block.

The four repeat measurements of the force on the newtonmeter are shown here:

11.8 N 11.6 N 14.2 N 11.4 N

Explain how the student should calculate the mean value.

[2 marks]

0 5 . 5 Explain why it was important that the student pulled the block along the desk at a constant speed.

[2 marks]

9

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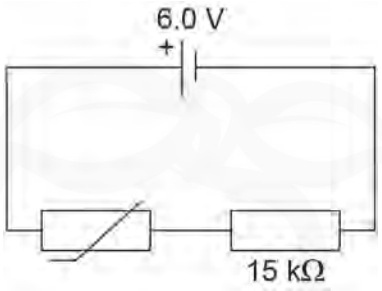
0 6 **Figure 8** shows a circuit containing a thermistor.

Figure 8



0 6 . 1 Describe **one** use of a thermistor.

[2 marks]

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0 6 . 2 At 20 °C the resistance of the thermistor in **Figure 8** is 9.0 kΩ.

Determine the current in the thermistor at 20 °C.

Use the Physics Equations Sheet.

[4 marks]

Current = _____ A

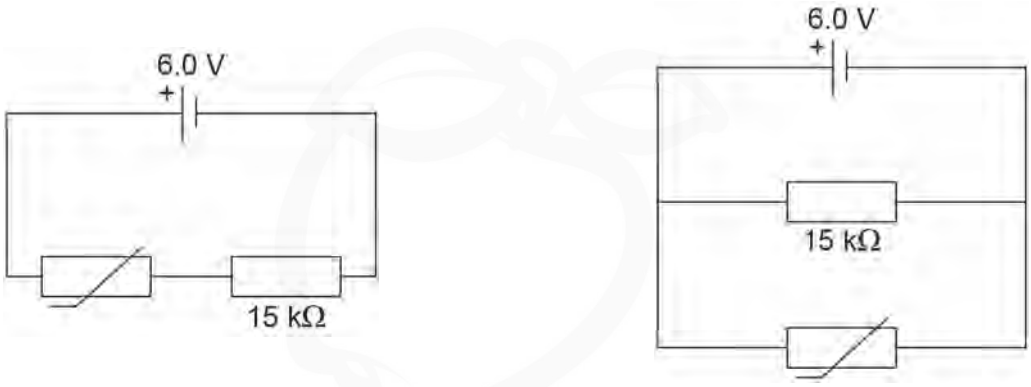
0 6 . 3 Explain how the potential difference across the 15 kΩ resistor in **Figure 8** would change as the temperature of the thermistor increased.

[4 marks]

Question 6 continues on the next page

0 6 . 4 **Figure 9** shows the same components connected in series and then connected in parallel.

Figure 9



Series circuit **Parallel circuit**

The thermistor is at the same temperature in each circuit.

Compare the current in the thermistor in each circuit.

[3 marks]

13

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0 7 A funicular railway is used to move trains up and down a very steep hill.

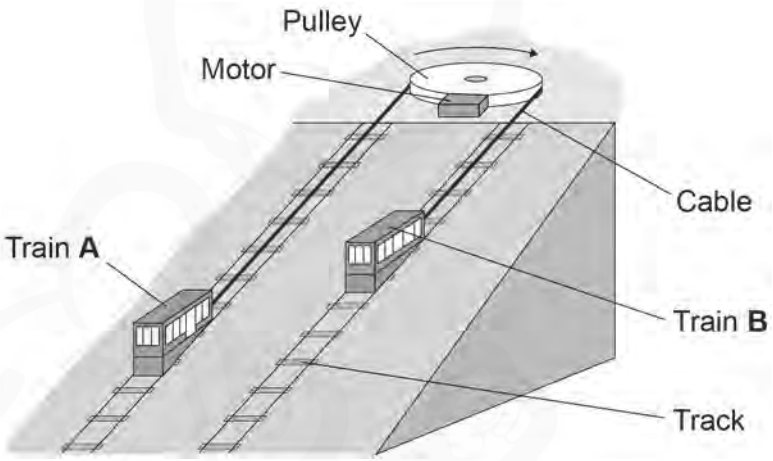
A funicular railway has two trains connected by a cable going around a pulley.

Figure 10 shows a funicular railway.

The pulley is connected to a motor.

As one train moves downwards, the other train is pulled upwards.

Figure 10



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0 7 . 1 The motor applies a constant force of 3200 N to train **A**.

The input power to the motor is 64 kW.

The motor has an efficiency of 0.25

Calculate the distance train **A** moves in 8.0 seconds.

Use the Physics Equations Sheet.

[6 marks]

Distance = _____ m

0 7 . 2 The force provided by the motor is not big enough to pull train **A** up the track.

Explain how train **A** is able to move up the track even though the force provided by the motor is not big enough.

[2 marks]

Question 7 continues on the next page

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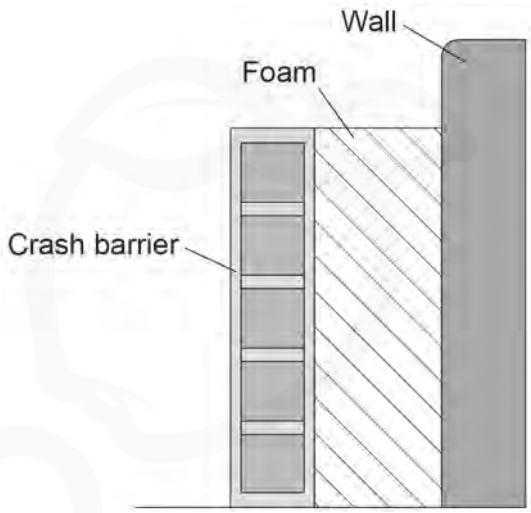
0 7 . 3 **Figure 11** shows a crash barrier at the end of the track.

Figure 11



If a train fails to stop it collides with the crash barrier.

Explain how the crash barrier helps prevent injuries to the passengers on the train.

You should include ideas about momentum in your answer.

[4 marks]

12

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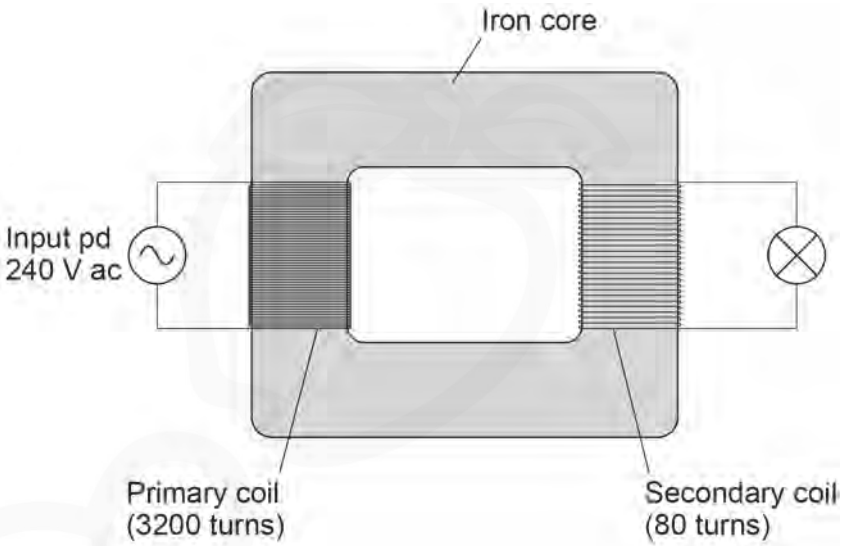
0 8 **Figure 12** shows a basic transformer.

Figure 12



0 8 . 1 Determine the potential difference across the lamp.

Use the Physics Equations Sheet.

[3 marks]

Potential difference = _____ V

Do not write outside the box

0 8 . 2 The transformer in **Figure 12** is 100% efficient.

Compare the current in the primary coil with the current in the secondary coil.

You should include a calculation in your answer.

[2 marks]

0 8 . 3 Mobile phone chargers usually contain a switch mode transformer.

Give **two** advantages of using a switch mode transformer rather than a basic transformer in a mobile phone charger.

[2 marks]

1

2

Question 8 continues on the next page

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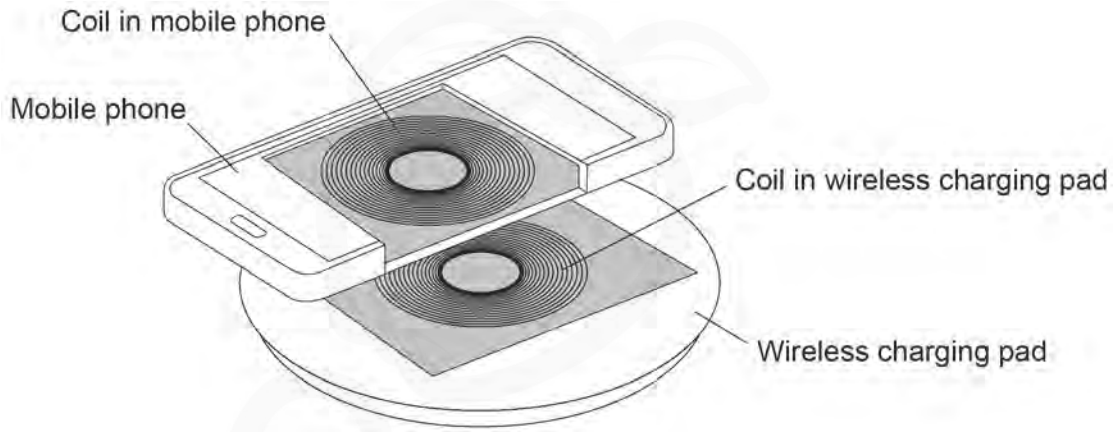
A mobile phone can also be charged by placing it on a wireless charging pad.

Figure 13 shows coils inside the mobile phone and the wireless charging pad.

Figure 13



0 8 . 4 An alternating potential difference across the coil in the wireless charging pad creates an alternating current in the coil inside the mobile phone.

Explain why.

[3 marks]

10

END OF QUESTIONS

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