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 2

Friday 2 June 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
- a protractor
- 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	

Answer all questions in the spaces provided.

0 1 Metal wires are used in electrical appliances because metals are good conductors of electricity.

0 1 . 1 Metals are good conductors of electricity because they contain particles that are free to move.

Which particles are free to move in metals?

[1 mark]

Tick (✓) **one** box.

Electrons ☐

Neutrons ☐

Protons ☐

0 1 . 2 A charge of 24 coulombs flows through a wire in 60 seconds.

Calculate the current in the wire.

Use the Physics Equations Sheet.

[2 marks]

_____

_____

_____

Current = _____ A

0 1 . 3 What is the name of the device used to measure current?

[1 mark]

Tick (✓) **one** box.

Ammeter ☐

Joulemeter ☐

Ohmmeter ☐

Voltmeter ☐

Question 1 continues on the next page

Turn over ▶

Safety features protect people when they use electrical appliances.

0 1 . 4 A fuse is a safety feature that contains a thin metal wire.

What can cause the thin metal wire in a fuse to melt?

[1 mark]

Tick (✓) **one** box.

The current in the wire becomes too high. ☐

The direction of the current in the wire changes repeatedly. ☐

The frequency of the supply increases. ☐

The voltage across the wire decreases. ☐

0 1 . 5 Circuit breakers are also a safety feature used in electrical circuits.

Which of the following are reasons why circuit breakers are better than fuses?

[2 marks]

Tick (✓) **two** boxes.

Circuit breakers are cheaper. ☐

Circuit breakers are more powerful. ☐

Circuit breakers are smaller. ☐

Circuit breakers can be reset. ☐

Circuit breakers operate much faster. ☐

| 0 | 1 | . | 6 |

Appliances with metal cases have an additional safety feature.

Which wire should be connected to the metal case to protect the user of the appliance?

[1 mark]

Tick (✓) **one** box.

Earth wire ☐

Live wire ☐

Neutral wire ☐

8

Turn over for the next question

Turn over ▶

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

0 2 A student investigated cups for hot drinks that were made from different materials.

The student investigated the time that it took hot water in each cup to cool to 60 °C.

Figure 1 shows the materials the cups were made from.

Figure 1

| Aluminium | Bamboo | Glass | Plastic |

All cups were the same size and were made from the same thickness of different materials.

0 2 . 1 Name **two** other pieces of equipment the student needed to use.

[2 marks]

1 _____

2 _____

0 2 . 2 Why is it important that the cups were all made from the same thickness of material?

[1 mark]

_____

_____

Question 2 continues on the next page

Turn over ▶

Do not write outside the box

0 2 . 3   Plan an investigation to determine the time that it took hot water in each cup to cool to 60 °C.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

0 2 . 4   **Table 1** shows the results from the investigation the student carried out.

Table 1

Material	Time taken to cool to 60 °C in seconds
Aluminium	460
Bamboo	900
Glass	760
Plastic	1300

Figure 2 is a bar chart of the results.

Figure 2
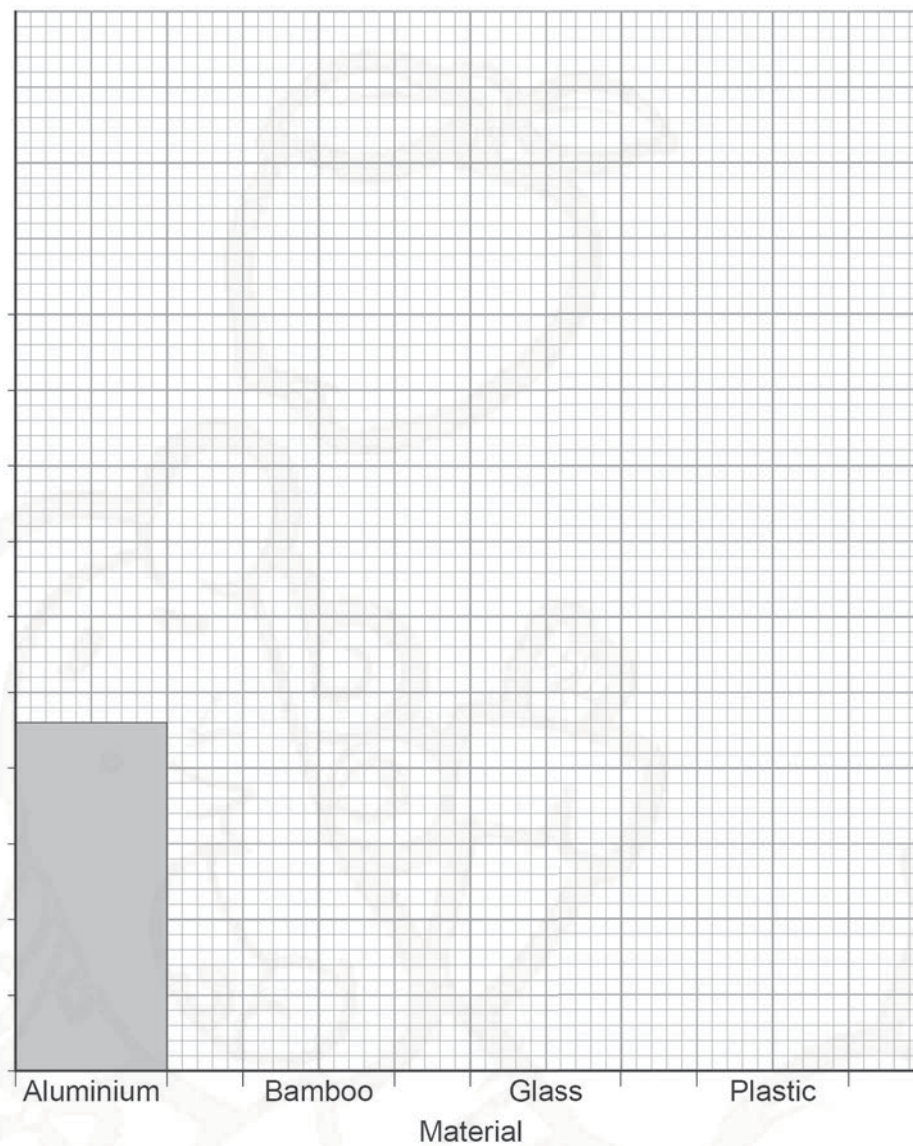
Complete **Figure 2**.

You should:

- label the *y*-axis
- add a suitable scale for the *y*-axis
- plot the data from **Table 1** as a bar chart.

[4 marks]

Question 2 continues on the next page

Turn over ▶

Figure 3 shows a cup containing a hot drink.

Figure 3

0	2	.	5

Complete the sentences.

Choose answers from the box.

[2 marks]

conduction	convection	evaporation
radiation		vibration

The most energetic particles leave the surface of the drink by a process

called _____ .

Hotter liquid rises from the bottom of the cup by a process called

_____ .

0 2 . 6 The drink has a mass of 0.30 kg.

specific heat capacity of the drink = 4000 J/kg °C

Calculate the energy transferred from the drink as it cools from 85 °C to 60 °C.

Use the Physics Equations Sheet.

Give the unit.

[4 marks]

_____

_____

_____

_____

_____

_____

Energy transferred = _____   Unit _____

17

Turn over for the next question

Turn over ▶

Do not write outside the box

0 3 There are many different objects in the solar system.

0 3 . 1 Draw **one** line from each object to its description.

[3 marks]

Object

Description

| A collection of gas, dust and billions of stars. |

Sun

| A rocky object mostly found between the orbits of Jupiter and Mars. |

Asteroid

| An icy object whose orbital radius varies by a large amount. |

Comet

| The largest object in the solar system. |

| The smallest gas planet in the solar system. |

0 3 . 2 What name is given to natural satellites of planets?

[1 mark]

_____

0 3 . 3 How many planets in the solar system have natural satellites?

[1 mark]

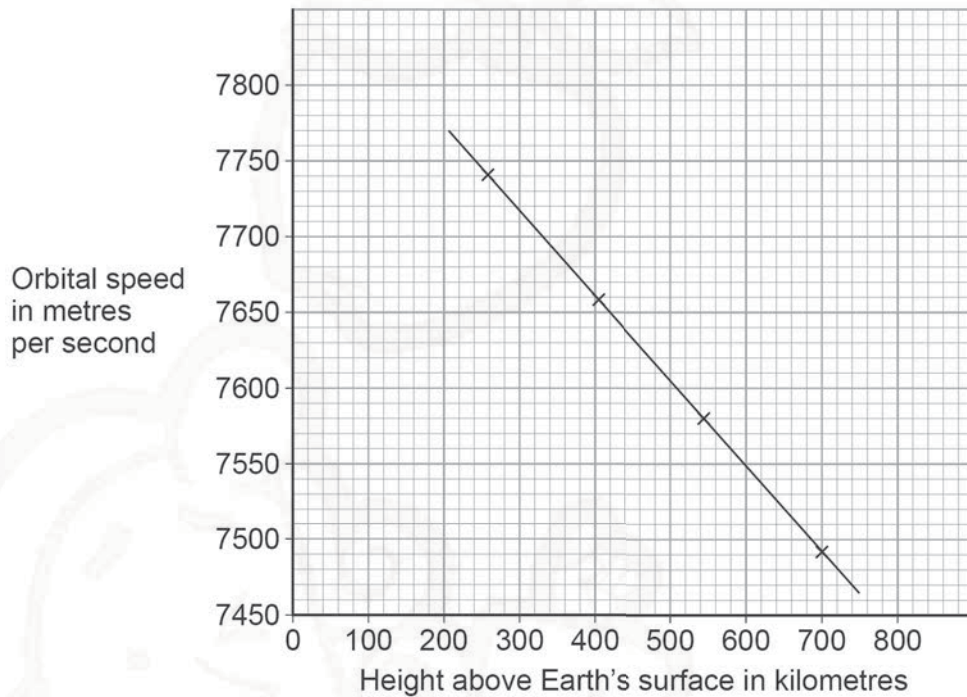Tick (✓) **one** box.

1 ☐

6 ☐

9 ☐

12 ☐

There are many artificial satellites in orbit around the Earth.

Figure 4 shows how the height of a satellite above the Earth's surface affects the orbital speed of the satellite.

Figure 4

0 3 . 4   Explain the relationship between the height of the satellite above the Earth's surface and the orbital speed of the satellite.

[2 marks]

_____

_____

_____

_____

Question 3 continues on the next page

Turn over ▶

0 3 . 5 A geostationary satellite has a circular orbit. The satellite takes 24 hours to orbit the Earth.

orbital radius = 42 000 km

circumference of a circle = $2\pi r$

Calculate the orbital speed of the geostationary satellite.

Use the Physics Equations Sheet.

Give your answer to 2 significant figures.

[5 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

Orbital speed (2 significant figures) = _____ m/s

12

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

Turn over ▶

0 4 **Figure 5** shows a ray of light travelling from air into glass.

Figure 5

0 4 . 1 Give the name of the dotted line in **Figure 5**.

[1 mark]

_____

0 4 . 2 Determine the refractive index of the glass in **Figure 5**.

Use the Physics Equations Sheet.

Take measurements from **Figure 5**.

[3 marks]

_____

_____

_____

_____

_____

Refractive index = _____

Question 4 continues on the next page

Turn over ▶

0 4 . 3   Optical fibres are made using a different type of glass.

Figure 6 shows a ray of light travelling along an optical fibre.

Figure 6
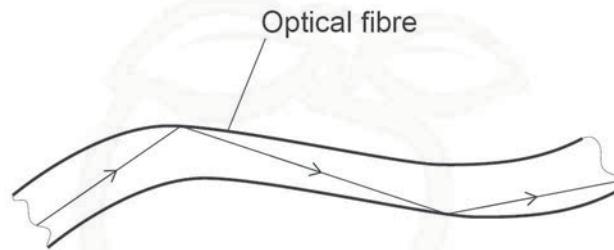
Calculate the minimum angle at which light must strike the boundary between the glass and the air to stay in the optical fibre.

refractive index of the glass = 1.61
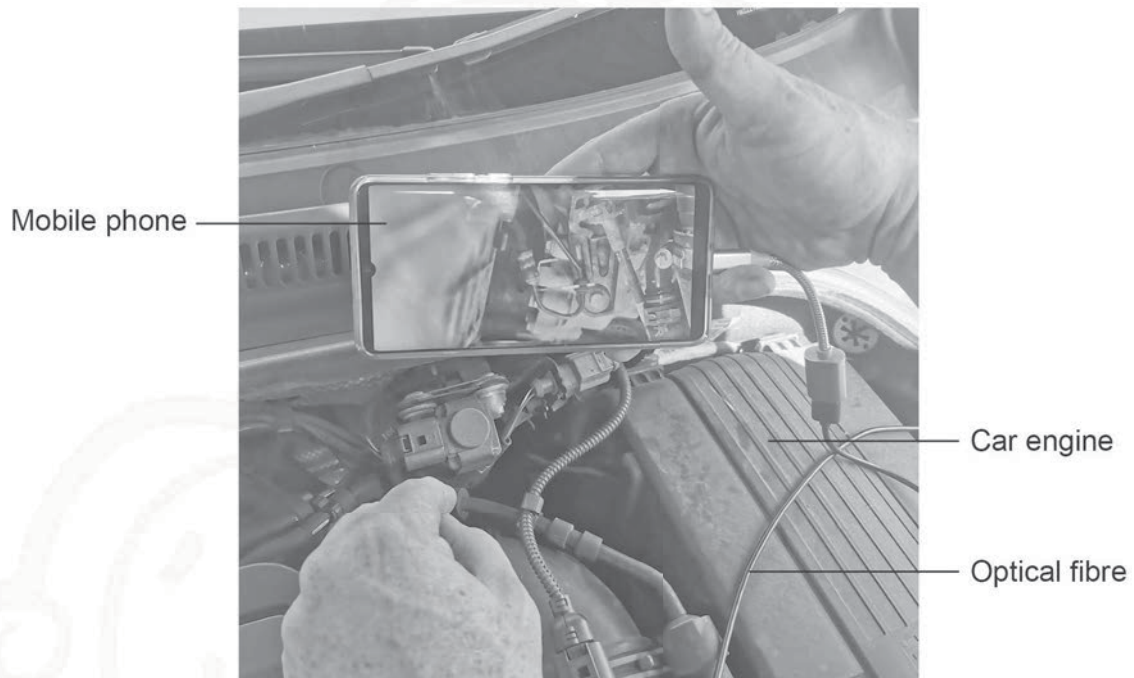
Use the Physics Equations Sheet.

[3 marks]

_____

_____

_____

_____

_____

Minimum angle = _____ °

0 4 . 4 Optical fibres are used in imaging devices called endoscopes.

Figure 7 shows an endoscope connected to a mobile phone being used to see inside a car engine.

Figure 7

The tip of the endoscope contains LEDs which light up the inside of the engine.

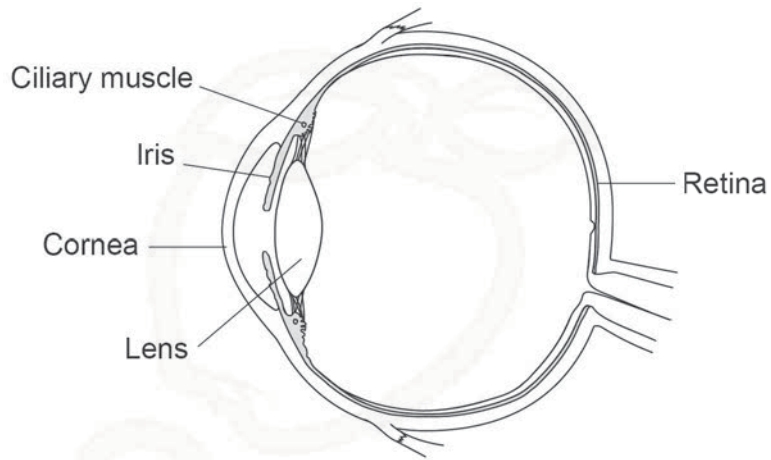Describe how the endoscope enables an image of the inside of the engine to be produced.

[3 marks]

_____

_____

_____

_____

_____

10

| 0 | 5 | | **Figure 8** shows a human eye. |

Figure 8

Ciliary muscle

Iris

Cornea

Lens

Retina

| 0 | 5 | . | 1 | Light from a nearby object is focused on the retina of an eye.

Explain how the eye changes to allow light from a distant object to focus on the retina.

[3 marks]

_____

_____

_____

_____

_____

0	5	.	2

The eye focuses on a distant object of height 1.5 m.

The magnification produced by the eye is 0.0020

Calculate the height of the image formed on the retina.

Use the Physics Equations Sheet.

[3 marks]

_____

_____

_____

_____

_____

Height of image = _____ m

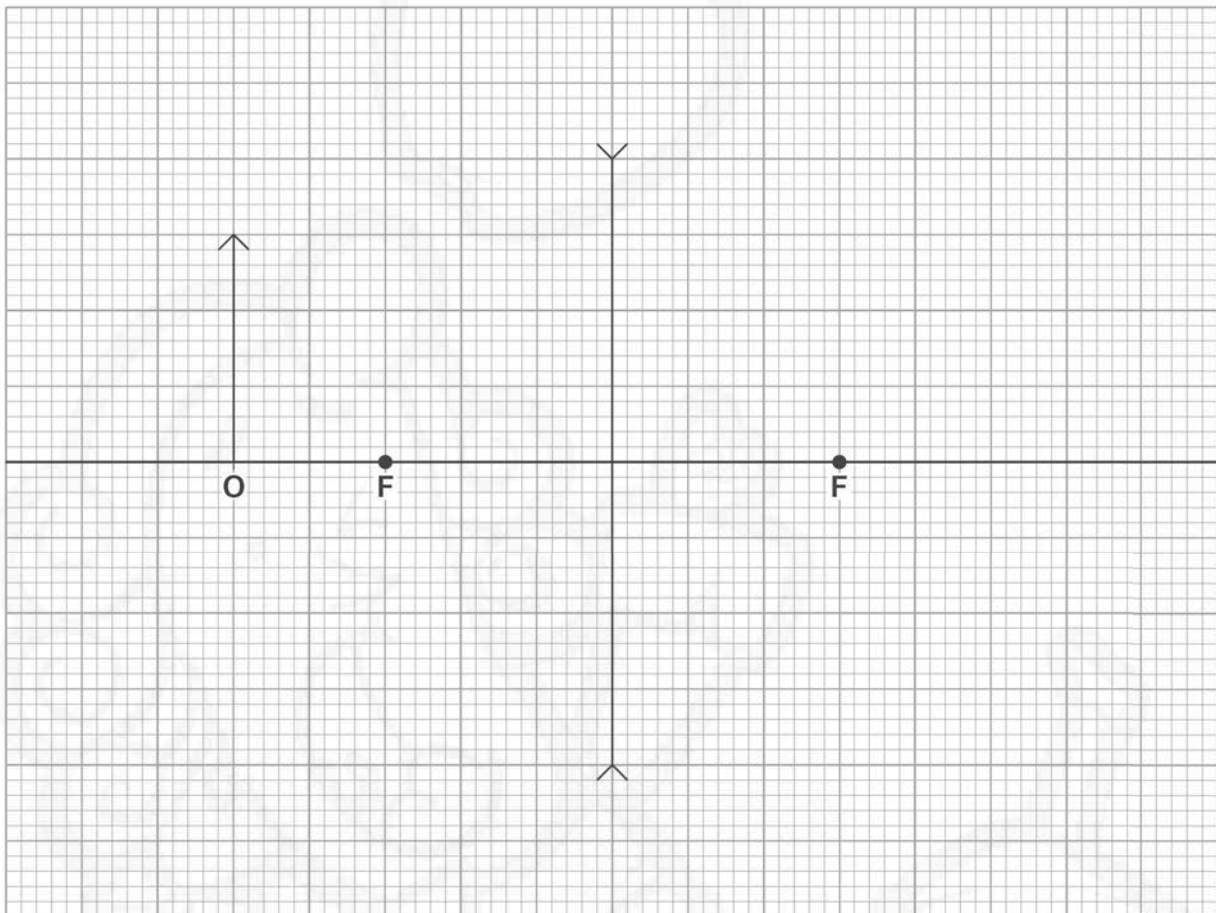**Question 5 continues on the next page**

Turn over ▶

Some people are short-sighted. This can be corrected using a diverging lens.

| 0 | 5 | . | 3 |

Figure 9 shows part of a ray diagram for an object **O** in front of a diverging lens.

F is the principal focus of the diverging lens.
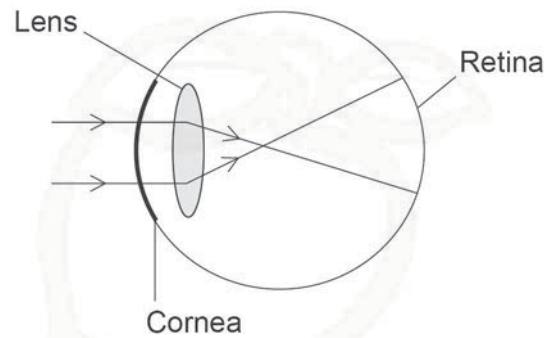
Figure 9

Complete **Figure 9**.

You should:

* complete the ray diagram
* mark the position and height of the image formed by the lens.
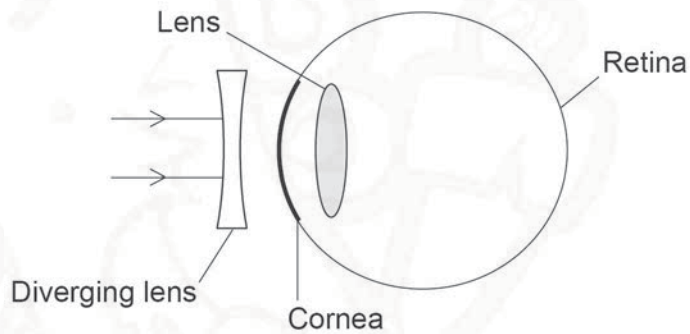
[3 marks]

0 5 . 4 **Figure 10** shows an eye of a short-sighted person focusing rays of light in front of the retina.

Figure 10

Complete **Figure 11** to show how a diverging lens can be used to correct short-sight.

[3 marks]

Figure 11

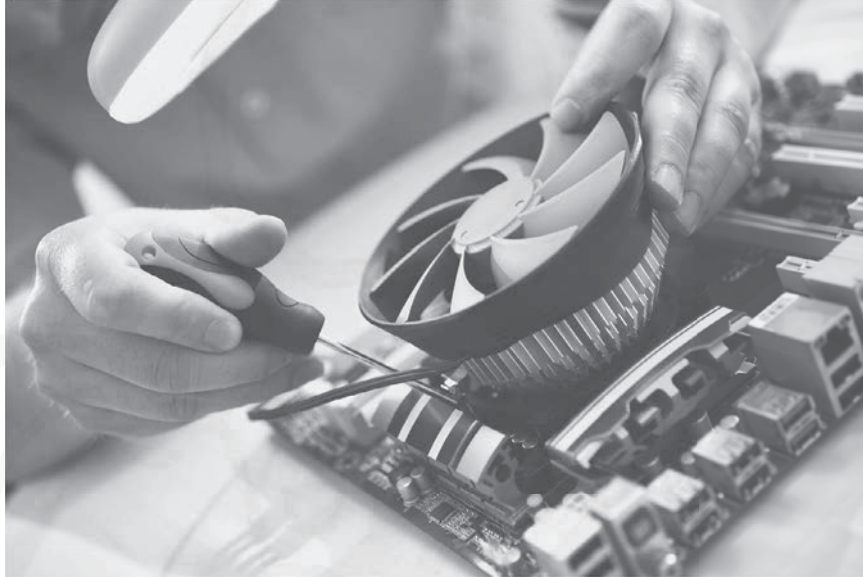**Turn over for the next question**

12

Turn over ▶

0 6   Most computers contain a component that is cooled by a fan.

The speed of the computer fan is automatically adjusted depending on the temperature of the component.

Figure 12 shows a computer fan.

Figure 12

0 6 . 1   The computer fan contains an electric motor.

The electric motor turns the blades of the computer fan by the motor effect.

Describe the motor effect.

[3 marks]

_____

_____

_____

_____

_____

_____

0 6 . 2 Explain how increasing the potential difference across the computer fan can increase the speed of the computer fan.

[3 marks]

_____

_____

_____

_____

_____

_____

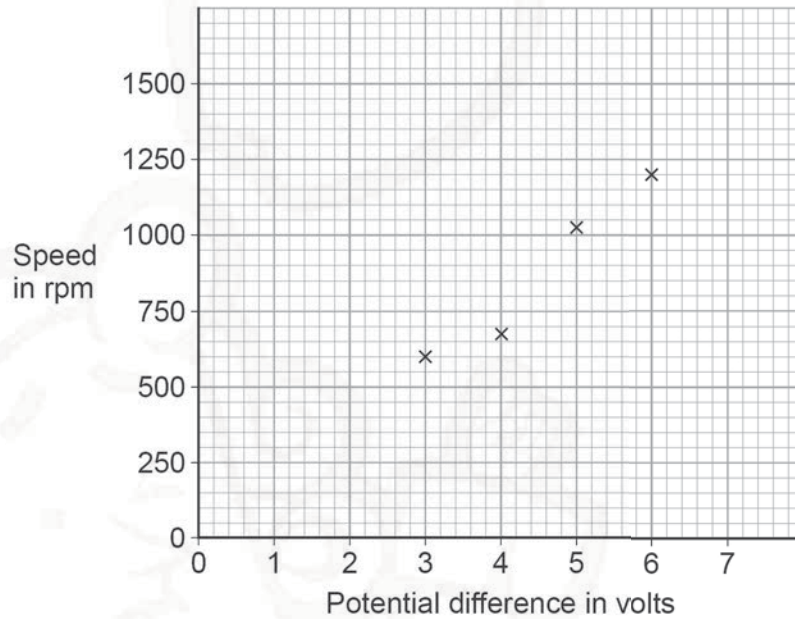**Question 6 continues on the next page**

Turn over ▶

An engineer tested a computer fan. The engineer measured the speed of the computer fan at different potential differences.

The engineer tested **one** fan.

Figure 13 shows the results.

The speed of the computer fan is measured in rotations per minute (rpm).

Figure 13

| 0 | 6 | . | 3 | The engineer made the following conclusion.

'Speed is directly proportional to potential difference for **all** computer fans.'

Explain **two** improvements to the engineer's test that would provide more evidence to support the conclusion.

[4 marks]

1 _____

_____

_____

_____

2 _____

_____

_____

_____

| 0 | 6 | . | 4 | Explain **one** advantage of a computer fan that has an adjustable speed.

[2 marks]

_____

_____

_____

12

Turn over for the next question

Turn over ▶

0 7 In 2011, an accident at the Fukushima nuclear power station in Japan released a large amount of radioactive material into the environment.

Two different isotopes of the element caesium (Cs) were released into the environment.

0 7 . 1 Describe **one** difference and **one** similarity between a caesium-134 nucleus and a caesium-137 nucleus.

[2 marks]

Difference _____

_____

Similarity _____

_____

Table 2 shows information about the two isotopes of caesium that were released during the accident in 2011.

The activity of the isotope is the number of nuclei that decay per second. Activity is measured in becquerel (Bq).

Table 2

Isotope	Half-life in years	Activity of isotope in 2011 in Bq
Caesium-134	2	1.35×10^{16}
Caesium-137	30	1.35×10^{16}

0 7 . 2 Determine the activity of the caesium-134 in the year 2021.

[2 marks]

Activity= _____ Bq

0 7 . 3 Determine the year in which the activity of the caesium-137 will be equal to your answer to Question **07.2**.

[2 marks]

Year = _____

Question 7 continues on the next page

Turn over ▶

0 7 . 4 Caesium-137 decays into barium (Ba) by beta decay.

Complete the nuclear decay equation for caesium-137.

[2 marks]

$$_{55}^{137}\text{Cs} \rightarrow \underline{}\text{Ba} + \underline{}\beta$$

0 7 . 5 During the accident, other isotopes were released into the environment that emit alpha, beta and gamma radiation.

Compare the risk to humans from isotopes that emit alpha, beta and gamma radiation.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

12

Turn over for the next question

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Turn over ▶

0 8   **Figure 14** shows two competitors in a synchronised diving competition.

Both divers perform the same movements and enter the water at the same time.

Figure 14

Both divers have the same mass.

Do not write outside the box

0 8 . 1 The divers fall through a vertical distance of 10 m to the surface of the water.

The divers each have a mass of 74 kg.

gravitational field strength = 9.8 N/kg

Calculate the speed at which the divers enter the water.

Use the Physics Equations Sheet.

[5 marks]

_____

_____

_____

_____

_____

_____

_____

_____

Speed = _____ m/s

0 8 . 2 Explain why a diver with a different mass than those in **Figure 14** would take the same time to fall 10 m.

[2 marks]

_____

_____

_____

_____

7

END OF QUESTIONS

There are no questions printed on this page

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

3 5

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