



Please write clearly in block capitals.

Centre Number

Candidate Number

Surname

Forename(s)

Candidate signature

## GCSE COMBINED SCIENCE

## Predicted Paper (based on AQA)

### Physics Paper 1H

Time allowed: 1 hour 15 minutes

#### Materials

For this paper you must have:

- 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 work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
<b>TOTAL</b>	

#### Information

- The maximum mark for this paper is 70.
- The marks for the questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.



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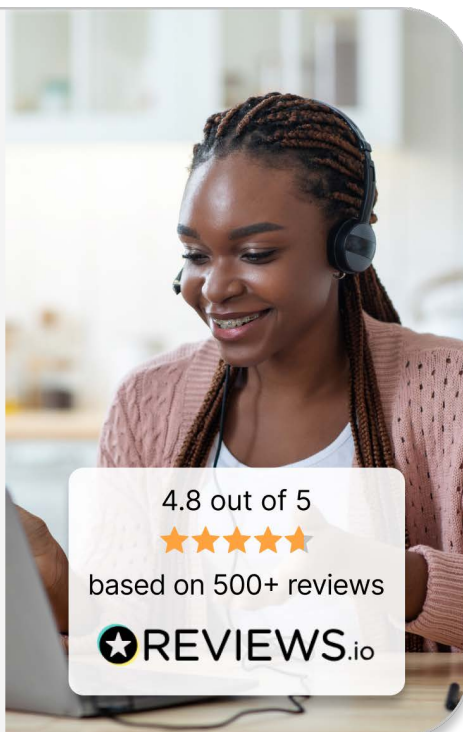
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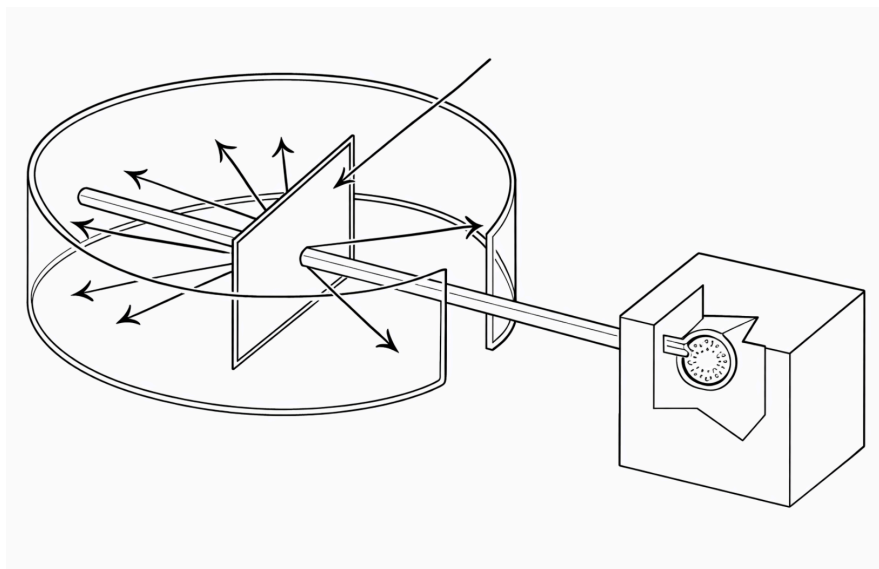


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**Figure 1** shows alpha particles being directed at a thin metal foil and detected on a surrounding screen.



**Figure 1**

1.1

Name the experiment described in **Figure 1**.

[1 mark]

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1.2

What is the charge of an alpha particle?

[1 mark]

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1.3

Describe the behavior of most alpha particles in the experiment shown in **Figure 1**. What does this result tell us about the 'empty space' within the atom?

[2 marks]

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1.4

Outline the key features of the plum pudding model.

[3 marks]

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1.5

Describe two differences between the plum pudding model and the nuclear model of the atom.

[2 marks]

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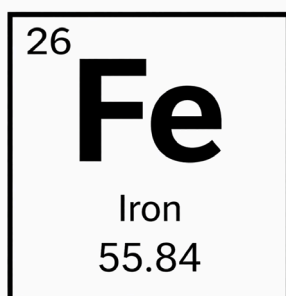


Figure 2

1.6

What is the atomic number of the atom in **Figure 2**? Use this information to describe the particle distribution (protons, neutrons, and electrons) within the atom.

[2 marks]

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1.7

Explain what is meant by the half-life of a radioactive substance.

[1 mark]

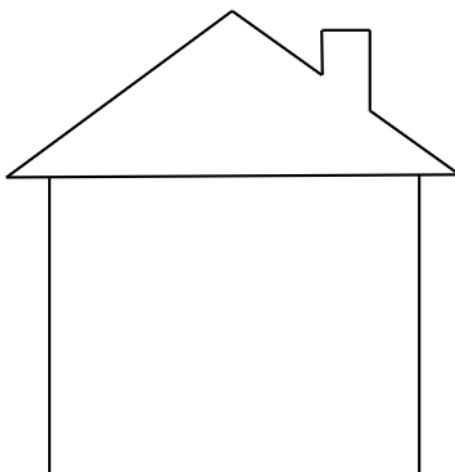
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In Great Britain, the National Grid supplies homes with an alternating potential difference electricity supply.



2.1

Explain the difference between alternating potential difference and direct potential difference.

[2 marks]

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2.2

State the voltage of UK supply.

[1 mark]

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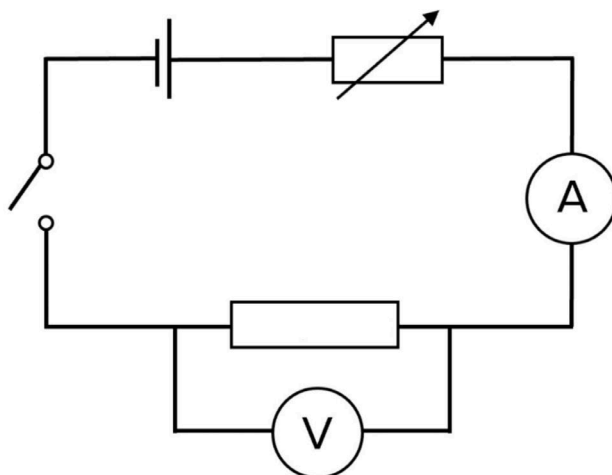


Figure 3

2.3

Identify three components from the circuit in **Figure 3**.

[3 marks]

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2.4

State the function of the voltmeter in this circuit.

[1 mark]

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2.5

What does the ammeter measure?

[1 mark]

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3.1

A student lifts a book from the floor onto a table.

Identify the energy store of the book when it is on the table.

[1 mark]

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3.2

A kettle transfers 2400 J of energy in 2 minutes.

Calculate the power of the kettle.

[3 marks]

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3.3

Describe what is meant by a system in physics and give one example.

[2 marks]

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Question 3 continues on the next page



An electric heater transfers 3000 J of energy to a room in 10 seconds.

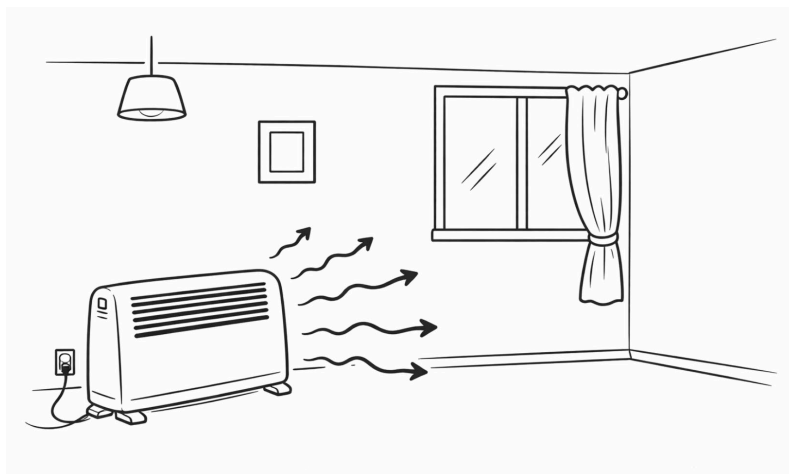


Figure 4

3.4

Explain how energy is transferred from the heater to the room and describe why some of this energy is wasted.

[4 marks]

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Question 3 continues on the next page



3.5

A petrol engine in a car transfers 50 kJ of energy.

The engine is 30% efficient.

Calculate the useful energy transferred.

[3 marks]

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4.1

Describe the arrangement and movement of particles in a gas.

[2 marks]

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4.2

A student measures the volume of an irregular object using a measuring cylinder.

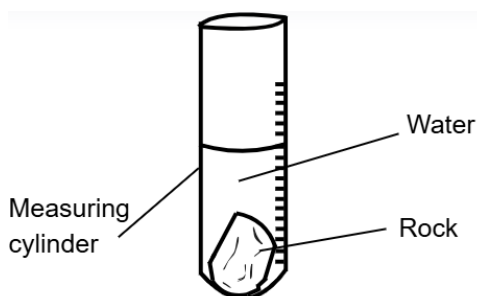


Figure 5

The water level rises from 50 cm<sup>3</sup> to 65 cm<sup>3</sup> when the object is placed in the cylinder.

The mass of the object is 120 g.

Calculate the density of the object.

[3 marks]

density = \_\_\_\_\_ g/cm<sup>3</sup>

**4.3**

Explain two possible sources of error in the method used in Question 4.2.

[2 marks]

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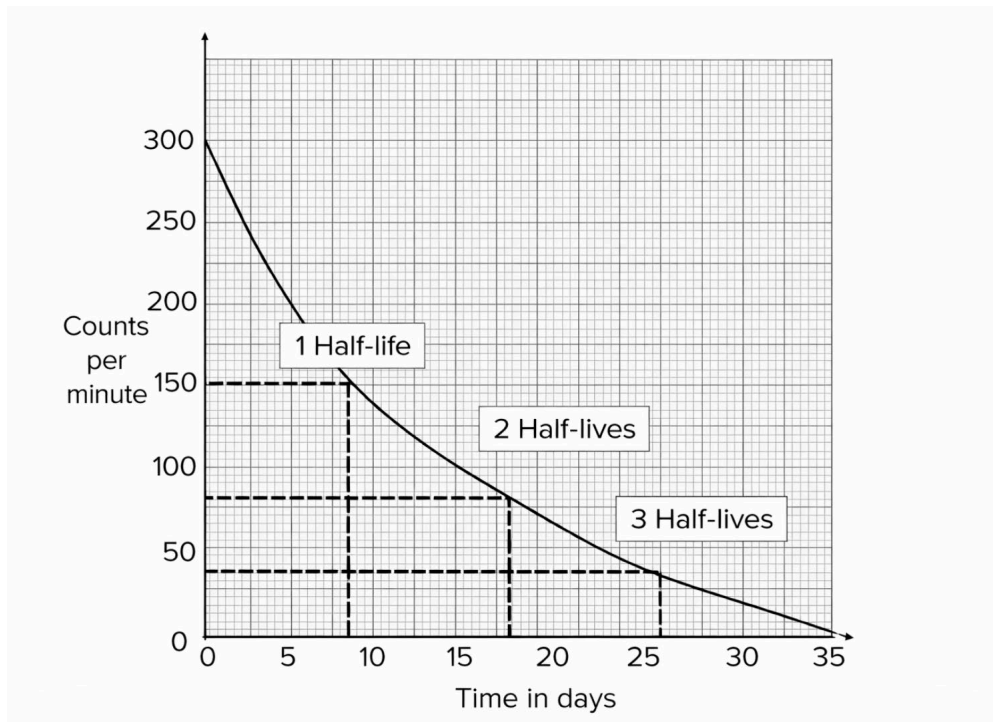
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The rock shown in **Figure 5** is radioactive.

**Figure 6** shows a graph of how the activity of the rock changes over time.



**Figure 6**

4.4

Explain why radioactive decay is described as random and how the graph supports this idea.

[4 marks]

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**5.3**

Electricity is transferred across the National Grid.

Explain why high voltages are used to transfer electricity over long distances.

**[3 marks]**

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**5.4**

Describe how insulation reduces energy transfer and why this is important.

**[3 marks]**

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A student investigates the specific heat capacity of water in a school laboratory.

They use an electric heater, a power supply, and a thermometer to measure how the temperature of water changes as energy is transferred to it.

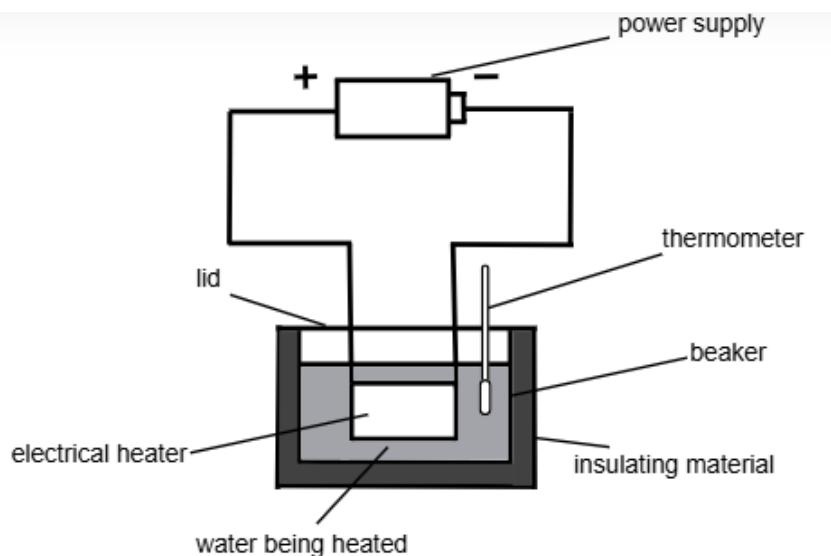


Figure 7

6.1

What happens to the internal energy of the water as it is heated?

[1 mark]

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6.2

State one variable the student should keep constant in this experiment.

[1 mark]

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**6.3**

1.0 kg of water is added to the insulated beaker in **Figure 7**. The water has an initial temperature of  $75\text{ }^{\circ}\text{C}$ . The heater provides 2.5 MJ of thermal energy.

Determine the final state of the water and calculate its final temperature.

Give your answer to 1 decimal place.

(Specific heat capacity of water =  $4200\text{ J/kg}^{\circ}\text{C}$ )

(Specific latent heat of vaporisation of water =  $2.26 \times 10^6\text{ J/kg}$ )

(Specific heat capacity of steam =  $2100\text{ J/kg}^{\circ}\text{C}$ )

[6 marks]

Final state of water = \_\_\_\_\_

Final temperature = \_\_\_\_\_  $^{\circ}\text{C}$



**6.4**

The actual temperature of water at the end of the experiment is lower than what was calculated in Question 6.3.

Suggest why.

Do not refer to energy/heat loss to surroundings in your answer.

[1 mark]

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**END OF QUESTIONS**

