



Please write clearly in block capitals.

Centre Number

Candidate Number

Surname

---

Forename(s)

---

Candidate signature

---

## GCSE PHYSICS

## Predicted Paper *(based on AQA)*

Higher Tier Paper 1

Time allowed: 1 hour 45 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.
- Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- 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).
- In all calculations, show clearly how you work out your answer.

### Information

- The maximum mark for this paper is 100.
- 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.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
<b>TOTAL</b>	



## PMT Tuition

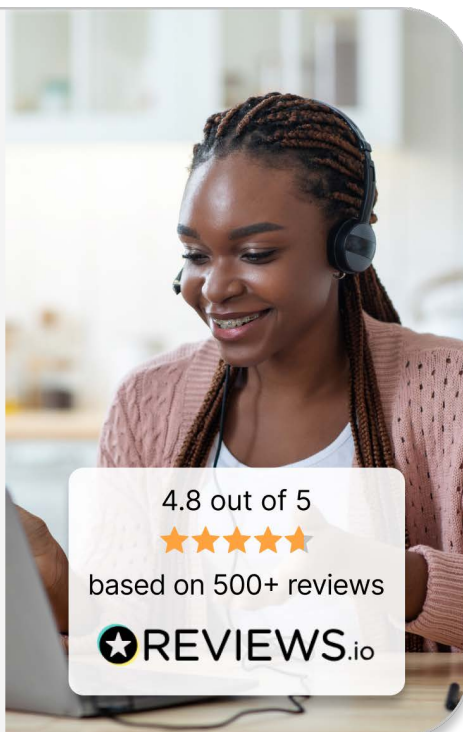
Find a tutor who matches your goals and access **high-quality online tuition** tailored to your needs.

- ✓ **Subject specialists** providing personalised support in your subject
- ✓ **Interactive online lessons** with advanced whiteboard tools
- ✓ **Targeted learning** to strengthen knowledge and improve exam technique

[pmt.education/tutor](https://pmt.education/tutor)



Scan me



4.8 out of 5



based on 500+ reviews

 **REVIEWS.io**

Use code **PREDICTED10** for £10 off your first lesson!



## PMT Courses

**Improve your exam technique!** Our one-day online courses for Paper 1 and 2 help boost confidence.

[pmt.education/courses](https://pmt.education/courses)



 **REVIEWS.io**

Use code **PREDICTED10** for 10% off your first course!



A scientist made a prototype for a theme park ride that involves a cart being lifted, released and then slowed down using springs at the end of the track.

Figure 1 shows the prototype

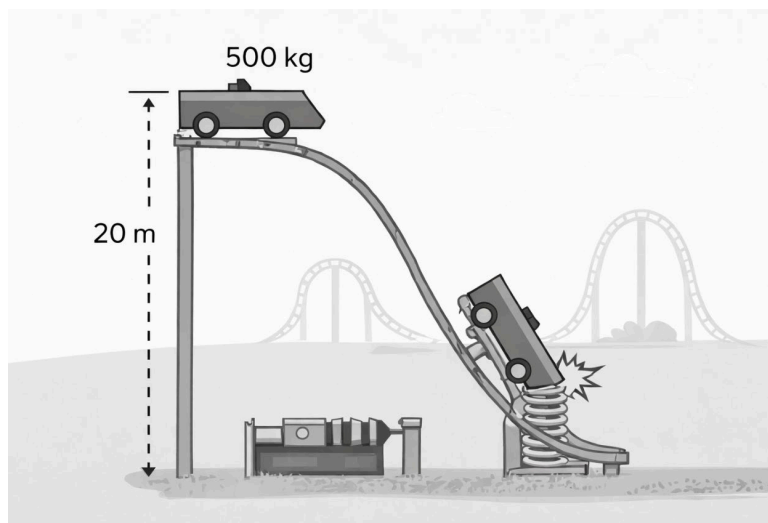


Figure 1

1.1

The cart has a mass of 500kg and reaches a speed of 12 m/s

Calculate its kinetic energy.

[2 marks]

---

---

---

---

---

Question 1 continues on the next page

1.2

At the end of the track, the cart compresses a spring.

Explain what happens to the energy of the cart as the spring is compressed.

**[2 marks]**

---

---

---

---

1.3

A metal part of the ride increases in temperature when energy is transferred to it. The metal has been chosen due to its high specific heat capacity.

Explain why this metal part should have a high specific heat capacity.

**[2 marks]**

---

---

---



An electrician is comparing lighting systems of two houses. A different type of circuit is seen in each house. The lamps in each home are identical.

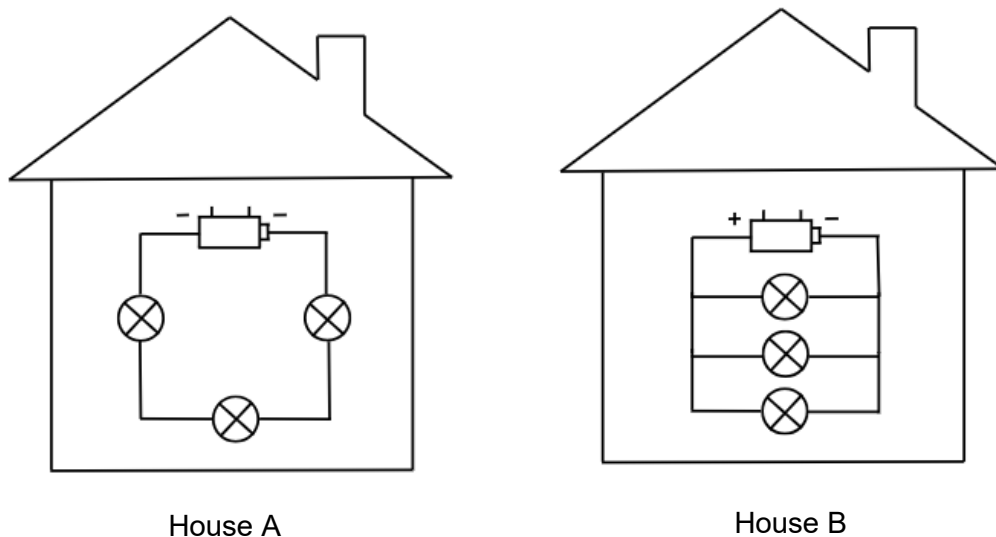


Figure 2

2.1

State the type of circuit seen in House A and House B.

[2 marks]

---



---

2.2

When the lamps were purchased, the resistance of each lamp was included in the information booklet provided.

Explain how the total resistance in the circuit in House A can be calculated.

[2 marks]

---



---

Question 2 continues on the next page



2.3

Explain why the lamps in House A are dimmer than the lamps in House B.

[3 marks]

---

---

---

2.4

If a lamp breaks in House B, explain the effect, if any, on the other lamps in House B.

[2 marks]

---

---

---

2.5

Many domestic appliances, such as lamps, are designed with safety features to protect the user and their home.

Explain one of these safety features.

[2 marks]

---

---

---

---

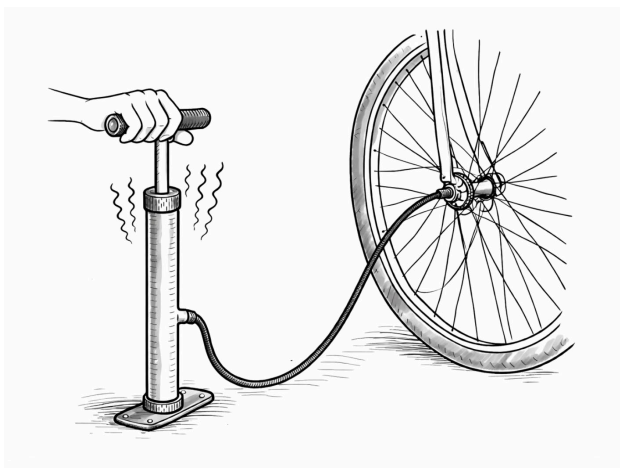
---

---

---



A bicycle pump is used to inflate a tyre.  
As the gas inside the pump is compressed, the metal pump becomes warm.

**3.1**

State what happens to the pressure in the pump when the handle is lifted. Assume the temperature of the gas remains constant.

**[1 mark]**

---

---

---

Question 3 continues on the next page





4.1

A cube of material has a mass of 500g and a volume of 200cm<sup>3</sup>.

Figure 3 shows this cube:

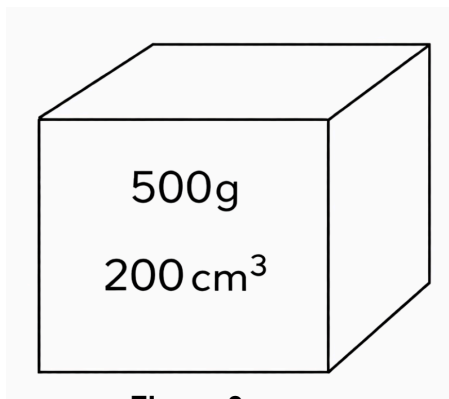


Figure 3

Calculate the density in kg/m<sup>3</sup>.

Use the Physics Equation Sheet.

[4 marks]

---

---

---

---

4.2

A substance changes state from a liquid to a gas.

Explain why the density decreases.

[3 marks]

---

---

---

---

Question 4 continues on the next page



4.3

What is meant by specific latent heat of vaporisation?

[2 marks]

---

---

---

4.4

Dry ice (solid carbon dioxide) changes directly into a gas from a solid.

Name this process and explain what happens to the energy and to the particles during this change in state.

[4 marks]

---

---

---

---

---

---

---

---





## PMT Courses

Boost your confidence ahead of exam day with our **one-day GCSE exam preparation courses**.

- ✓ **Live online course** led by qualified teachers
- ✓ **Practical techniques** to tackle tricky questions with confidence
- ✓ **Free bursary places** for students from disadvantaged backgrounds

[pmt.education/courses](https://pmt.education/courses)



Scan me



Use code **PREDICTED10** for 10% off your first course!



## PMT Tuition

Find the perfect tutor and **get the support you need** with expert online tuition.

[pmt.education/tutor](https://pmt.education/tutor)



Use code **PREDICTED10** for £10 off your first lesson!



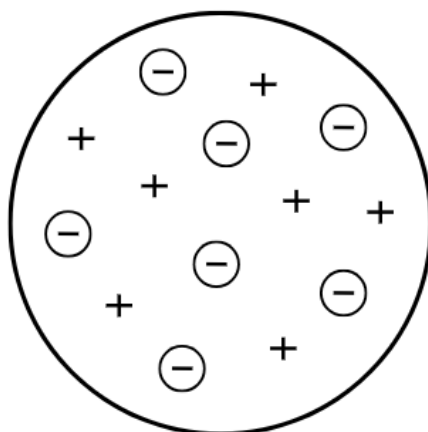


Figure 4

5.1

Describe the model of the atom shown in **Figure 4**.

[3 marks]

---

---

---

---

5.2

Explain what can cause electrons to shift between energy levels within an atom.

[2 marks]

---

---

---

Question 5 continues on the next page





A student investigates how different materials reduce heat loss from hot water.

They pour  $200\text{cm}^3$  of hot water ( $80^\circ\text{C}$ ) into identical beakers. Each beaker is wrapped in a different insulating material. This material is also used to make the lid.

The student records the temperature of the water every 4 minutes for 20 minutes.

The results are shown in **Table 1**:

Time (min)	Foam	Aluminium Foil	Felt	Plastic	No Cover
0	80	80	80	80	80
4	75	73	74	76	70
8	71	68	69	73	63
12	68	64	65	70	57
16	65	61	62	67	52
20	63	58	60	65	48

**Table 1**

6.1

State two control variables in this experiment.

[2 marks]

---

---

6.2

Define *insulation*.

[1 mark]

---

---

Question 6 continues on the next page



6.3

Compare the temperature change seen when using aluminium foil and when using no cover/insulation.

[2 marks]

---

---

---

---

---

6.4

Calculate the average rate of temperature decrease per minute when using the foam insulation.

[3 marks]

---

---

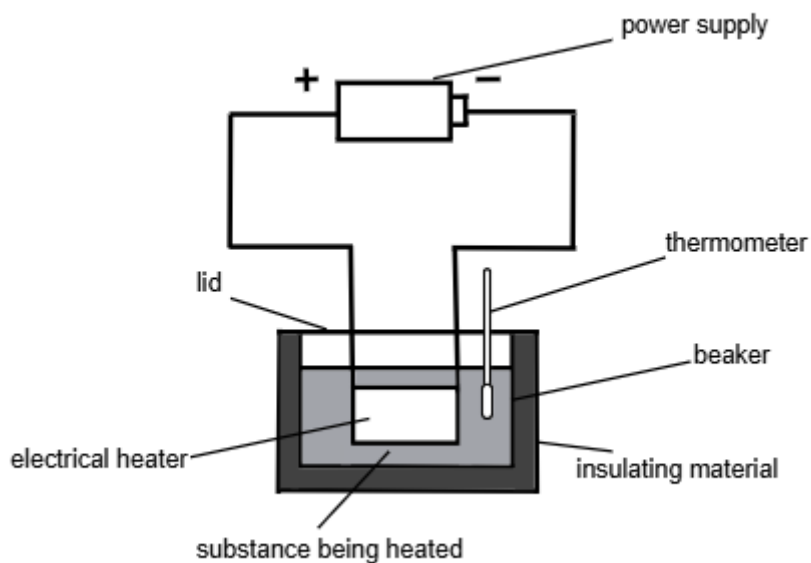
---

---

Rate = \_\_\_\_\_ °C/minute



A student investigates the specific heat capacity of a substance using an electric heater. **Figure 5** shows some of the apparatus the student uses.



**Figure 5**

7.1

Suggest why a lid is used.

[1 mark]

---

---

---

Question 7 continues on the next page



**7.2**

Suggest two precautions the student should take to obtain a high-quality data.

**[2 marks]**

---

---

---

---

**7.3**

During the experiment, the heater transfers 3 kJ of energy to the beaker. The heater is 85% efficient. The beaker has a specific heat capacity of 850 J/kg°C and a mass of 53 g.

Calculate the increase in temperature of the beaker.

**[5 marks]**

---

---

---

---

---

---

---

---

---

**Question 7 continues on the next page**





## PMT Tuition

Help your child succeed with **high-quality online tuition** from subject specialists, providing **targeted support with revision and exam technique**.

- ✓ **Expert tutors**, personally interviewed and **enhanced DBS checked**
- ✓ **Interactive online lessons** with advanced whiteboard tools
- ✓ **Affordable options** for a range of budgets

[pmt.education/tutor](https://pmt.education/tutor)



Scan me



4.8 out of 5



based on 500+ reviews

 **REVIEWS.io**

Use code **PREDICTED10** for £10 off your first lesson!



## PMT Courses

**Exam technique holding you back?** Join our one-day online courses for Paper 1 and 2 to learn how to maximise marks.

[pmt.education/courses](https://pmt.education/courses)



Scan me



 **REVIEWS.io**

Use code **PREDICTED10** for 10% off your first course!



A beam of alpha particles is directed at a thin sheet of gold foil. Most pass straight through, some are deflected, and a very small number bounce back.

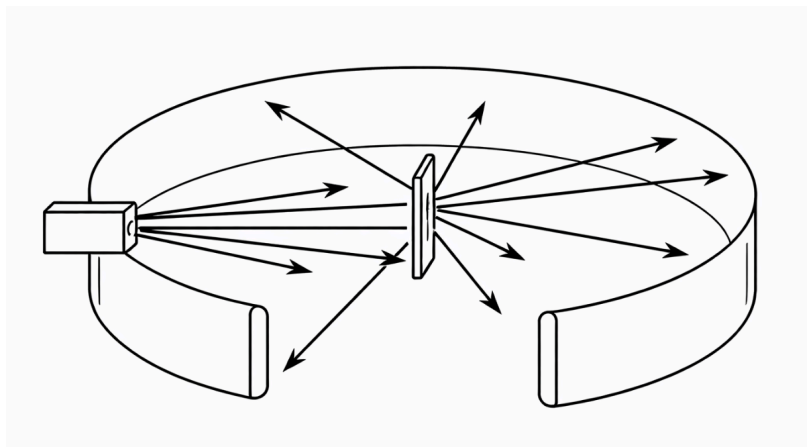


Figure 6

8.1

Name the experiment described in **Figure 6**.

[1 mark]

---

---

8.2

Explain why most alpha particles pass through the gold foil.

[2 marks]

---

---

---

Question 8 continues on the next page



**8.3**

A smoke detector contains 20g of americium-241, an alpha emitter with a half life of 432 years.

Calculate the mass of the original radioactive nuclei remaining after 864 years.

**[3 marks]**

---

---

---

---

**8.4**

A scientist is running an experiment using radiation.

The scientist needs the radiation to be able to pass through the body, be detected outside the body and cause minimal damage to the body.

Explain which type of radiation the scientist needs to use.

**[3 marks]**

---

---

---

---

Question 8 continues on the next page



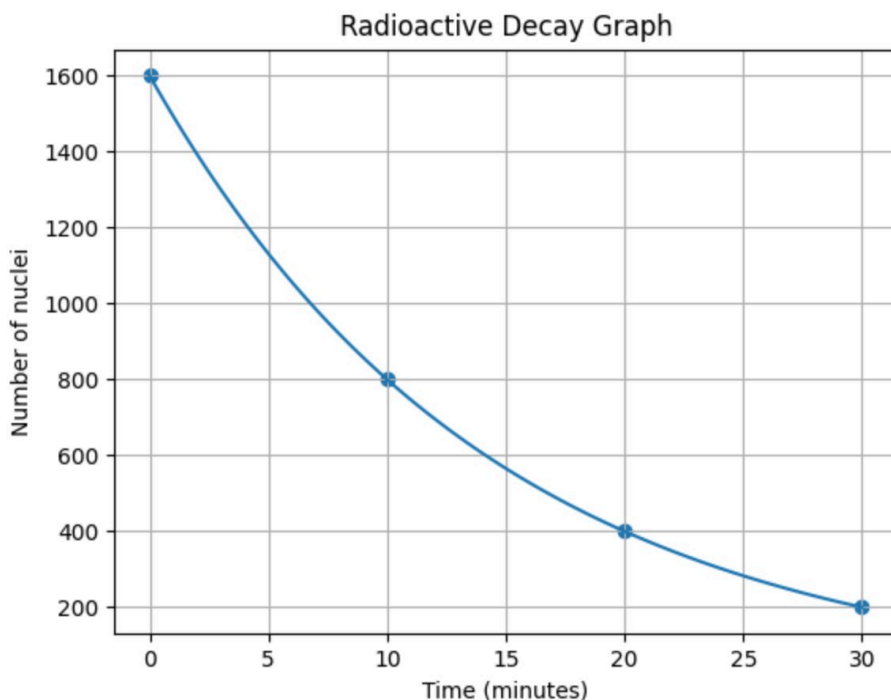


Figure 7

8.5

Using **Figure 7**, find the half life of this sample.

[2 marks]

---



---

8.6

Using **Figure 7**, calculate the percentage decrease in the number of nuclei in the sample between 5 minutes and 20 minutes.

[3 marks]

---



---



---



**9.1**

A car engine contains many moving metal parts that rub against each other.

Oil is added to the engine.

Explain how adding oil reduces energy waste in the engine.

**[2 marks]**

---

---

---

---

**9.2**

Homeowners often install double-glazed windows in their house to improve energy efficiency.

Explain how double glazing reduces energy loss from the house.

**[2 marks]**

---

---

---

---

Question 9 continues on the next page



9.3

A homeowner is considering adding solar panels to their house.

Describe one advantage and one disadvantage of solar energy.  
Do not refer to cost in your answer.

[2 marks]

---

---

---

---

9.4

State one environmental impact of extracting fossil fuels.

[1 mark]

---

---



10.1

A scientist is studying different forms of carbon.

Carbon-12

Carbon-13

Carbon-14

Explain why these atoms are described as isotopes of carbon. [2 marks]

---

---

---

---

10.2

A nuclear power station uses uranium fuel rods to generate electricity.

Explain how a chain reaction is produced in nuclear fission and why it must be carefully controlled within a power station.

[3 marks]

---

---

---

---

---

---

---

Question 10 continues on the next page



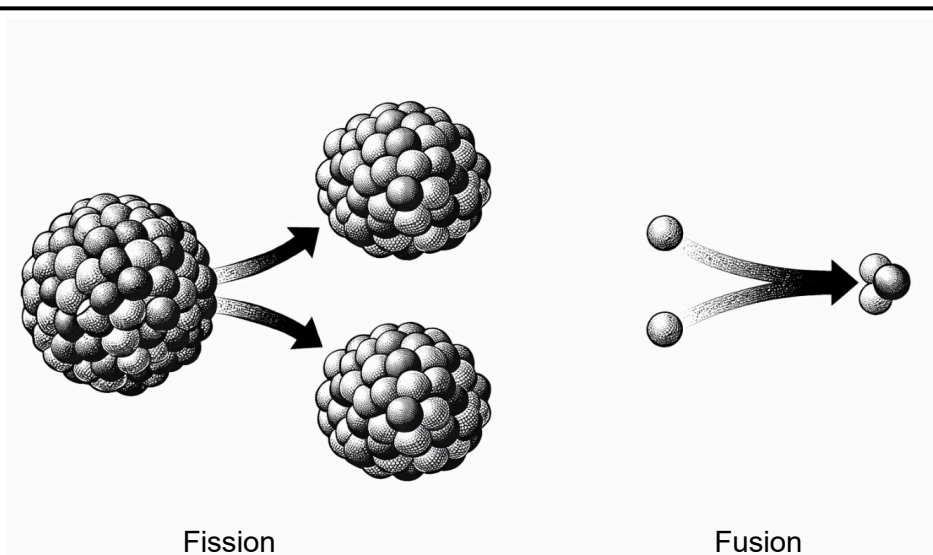


Figure 8

10.3

Figure 8 shows two processes. State two differences between these processes.

[2 marks]

---

---

---

---

END OF QUESTIONS

