THE PHYSICS QUESTION BANK

FREE SAMPLE

AQA GCSE Physics Foundation Past paper solutions 2023–2025

Every question from the June 2023, 2024 and 2025 AQA GCSE Physics (8463) Foundation tier papers, worked through step by step in clear, simple English, with how the marks are given, examiner tips and the mistakes that cost students marks.

This sample shows real pages from the booklets. The full set contains:

BOOKLET	COVERS	PAGES
June 2023 worked solutions	Paper 1F and Paper 2F	55
June 2024 worked solutions	Paper 1F and Paper 2F	55
June 2025 worked solutions	Paper 1F and Paper 2F	56
Total: 3 printable A4 PDFs, 352 question parts, 600 marks		**166**

HOW THE MARKS ARE GIVEN
What you must write or show for each mark, in plain English.

EXAMINER TIPS
Taken from the examiners' reports for each paper.

COMMON MISTAKES
Where students actually lost marks, so you don't.

WRITTEN FOR FOUNDATION
Short steps, plain English, and every equation, unit and conversion shown.

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JUNE 2025 · 8463/1F

Paper 1 Foundation

Energy, electricity, particle model of matter, atomic structure

About this paper

100 marks, 1 hour 45 minutes, Foundation tier. Paper 1 covers energy, electricity, the particle model of matter and atomic structure. There are 10 questions. Aim for roughly 1 minute per mark, which leaves a few minutes at the end to check.

- Simple calculations where the equation is printed in the question were done well. In June 2025 the Physics Equations Sheet had every equation you needed, including ones you normally have to learn by heart. Pick an equation for a Paper 1 topic: some students used Paper 2 equations and scored nothing. Check the units of the data before you start.
- To rearrange safely, **put the numbers in first**, then rearrange. Students who tried to do both at once often got the rearranging wrong and scored nothing.
- Read the instruction line. Several students lost marks by ticking one box when the question said tick **two**.
- Cross out any working you do not want marked. If you leave two different answers, examiners apply the "list rule" and you can score zero.
- Learn the required practicals. The specific heat capacity method (09.2) was attempted badly, and many students did not say how to find the mass of the water.

Question 1 · Cars, carbon dioxide and energy resources

How much carbon dioxide a petrol car is responsible for, and the environmental effects of different ways of generating electricity.

01.1 CARBON DIOXIDE — 1 mark

Which environmental problem is caused by emitting carbon dioxide: acid rain, ozone damage or global warming?

1. Carbon dioxide is a **greenhouse gas**. It traps heat in the atmosphere, so more of it makes the Earth warmer.
2. So the answer is **global warming** (also called climate change).

ANSWER **Global warming**

HOW THE MARKS ARE GIVEN

- 1 mark: global warming ticked (only one box).

EXAMINER TIP

Just over 80% of students got this. **Why not acid rain?** Acid rain comes from **sulfur dioxide** (and nitrogen oxides), not carbon dioxide. Ozone damage is caused by other chemicals, such as CFCs.

01.2 READING A GRAPH — 1 mark

Use Figure 1 to find how much carbon dioxide is emitted when the car is made.

1. When the car is made, it has not yet been driven, so the distance travelled is **0 km**.
2. Find where the line starts on the vertical axis (where distance = 0). This is the **y-intercept**: the point where a line crosses the vertical axis.
3. The line starts at **6000 kg**.

ANSWER **6000 kg**

HOW THE MARKS ARE GIVEN

- 1 mark: 6000 kg.

COMMON MISTAKE

Only just over half of students got this. The most common wrong answer was 38 000 kg, which is the value at the **end** of the line (after 150 000 km of driving). Think about what "before the car has been driven" means on the graph: zero distance.

01.3 DESCRIBING A GRAPH

1 mark

Use Figure 1: how does the total carbon dioxide change as the distance travelled increases?

1. The line slopes upwards from left to right.
2. So as the distance travelled increases, the total carbon dioxide emitted **increases**.

ANSWER **It increases**

HOW THE MARKS ARE GIVEN

- 1 mark: the carbon dioxide emitted increases (as distance increases).

EXAMINER TIP

Almost 90% of students scored this. Do **not** say it is "directly proportional": the line does not go through the origin, because 6000 kg was emitted before any driving.

01.4 ELECTRIC CARS

1 mark

Choose why an electric car does not emit carbon dioxide while it is driven.

1. An electric car's motor gets its energy from a **battery**. Nothing is burned in the car, so no carbon dioxide comes out of it while it moves.

ANSWER **Electric cars are powered by a battery**

HOW THE MARKS ARE GIVEN

- 1 mark: "powered by a battery" ticked.

GOOD TO KNOW

Why not nuclear energy? The car does not contain a nuclear reactor. Diesel is a fossil fuel and burning it **does** emit carbon dioxide. Also note: the electricity used to charge the battery may have been generated by burning fossil fuels at a power station, so electric cars are not always "zero carbon" overall.

HOW THE MARKS ARE GIVEN

- 1 mark: 6.0/12.
- 1 mark: 0.50 A (0.5 A is fine).

EXAMINER TIP

Just over 90% got both marks. Always check the time is in seconds before using it in an electricity equation.

07.2 ENERGY TRANSFERRED

2 marks

The potential difference across the motor is 8.0 V and 6.0 C flows. Calculate the energy transferred to the motor.

1. Use the equation given:

$$\text{energy transferred} = \text{charge flow} \times \text{potential difference}$$

2. Substitute: $E = 6.0\,\text{C} \times 8.0\,\text{V}$
3. Calculate: $E = 48\,\text{J}$.

ANSWER 48 J

HOW THE MARKS ARE GIVEN

- 1 mark: 6.0 × 8.0.
- 1 mark: 48 J.

EXAMINER TIP

95% of students scored both marks.

07.3 EFFICIENCY EQUATION

1 mark

Choose the equation linking efficiency, total input energy transfer and useful output energy transfer.

1. From the Physics Equations Sheet:

$$\text{efficiency} = \frac{\text{useful output energy transfer}}{\text{total input energy transfer}}$$

2. Sense check: the useful output can never be more than the input, so efficiency is always 1 or less. Only the third option guarantees that.

ANSWER efficiency = useful output energy transfer ÷ total input energy transfer

HOW THE MARKS ARE GIVEN

- 1 mark: the third option ticked.

EXAMINER TIP

About 94% got this. **Why not the second one?** It is upside down: it would give efficiencies bigger than 1.

JUNE 2025 · 8463/2F

Paper 2 Foundation

Forces, waves, magnetism and electromagnetism, space physics

About this paper

100 marks in 1 hour 45 minutes, Foundation tier. Paper 2 covers forces, waves, magnetism and electromagnetism, and space physics. There are 10 questions. Most are short: tick boxes, choosing words from a box and 2 or 3 mark calculations. There are two longer written answers (04.3 for 4 marks and 08.1 for 6 marks). In June 2025 every equation, including the ones you normally have to learn, was printed on the Physics Equations Sheet. In other years you may have to recall some of them, so keep learning them.

- Count the boxes you must tick. Some questions asked for **two** ticks and students lost marks by ticking one, or three. If you change your mind, cross out the wrong tick clearly: two ticks where one is needed scores nothing.
- For calculations, write the equation, then put the numbers in. Examiners saw students who wrote a correct equation and then used a formula triangle wrongly, scoring nothing. Substituting straight into the equation would have earned the first mark.
- Use the Physics Equations Sheet. Some students did not look for the equation they needed, even when the question told them to use the sheet.
- The two longer written answers (04.3 and 08.1) were answered poorly: only about 1% of students got full marks on 04.3, and only about 1% reached Level 2 on 08.1. Practise describing how forces change as a car speeds up, and comparing light waves with sound waves.
- Practical skills cost many marks: uncertainty from repeat readings (10.1), reading a pair of values from a graph for a gradient (10.4), and describing hazards and accuracy improvements clearly (09.2, 09.3).

Question 1 · Reflection and wave properties

A student shines a ray of light at a mirror and measures two angles, then the question looks at a water wave.

01.1 MEASURING ANGLES — 1 mark

Name the equipment used to measure angles A and B in Figure 1.

1. Angles are measured in degrees with a **protractor**.
2. Angle A is the angle of incidence and angle B is the angle of reflection. Both are measured from the dashed line, called the **normal** (a line at 90° to the mirror).

ANSWER **A protractor**

HOW THE MARKS ARE GIVEN

- 1 mark: protractor. A misspelling that is clearly protractor is fine.

EXAMINER TIP

Over 90% of students got this right. Remember that in the reflection practical you mark the ray with small crosses, join them with a ruler, and then measure the angles from the normal, not from the mirror.

04.1 RANGE OF AN INSTRUMENT

1 mark

From Figure 8, what range of volumes can the measuring cylinder measure?

1. The **range** is from the smallest to the largest value the instrument can measure.
2. The scale on Figure 8 starts at 0 and the top mark is 10 cm^3.
3. So the range is 0.0 to 10.0 cm^3.

ANSWER **0.0 to 10.0 cm^3**

Why not 0.0 to 0.2 cm^3? 0.2 cm^3 is the size of **one small division** on the scale (there are 10 small divisions between each 2 cm^3 label). That is the **resolution**, not the range.

HOW THE MARKS ARE GIVEN

- 1 mark: 0.0 to 10.0 cm^3.

EXAMINER TIP

85% got this right.

04.2 ERRORS IN METHOD

1 mark

The ring is lowered in on thin string. How would thick string change the measured volume?

1. The volume of the ring is found by how much the water level rises.
2. Any string that goes under the water also pushes water up. Thick string takes up more space than thin string.
3. So the water would rise by more, and the measured volume would be **larger** than the true volume of the ring.

ANSWER **The measured volume would be larger**

HOW THE MARKS ARE GIVEN

- 1 mark: the measured volume would be larger.

EXAMINER TIP

75% got this right. This is why the method uses **very thin** string: it keeps this error tiny.

04.3 VOLUME BY DISPLACEMENT

1 mark

Water alone = 5.0 cm^3; water and ring = 5.4 cm^3. Find the volume of the ring, X.

1. The ring pushes the water up by its own volume. This is called **displacement**.
2. Volume of ring = (water + ring) − water = 5.4 cm^3 − 5.0 cm^3 = 0.4 cm^3.

ANSWER **X = 0.4 cm^3**

HOW THE MARKS ARE GIVEN

- 1 mark: 0.4 (cm^3).

ANSWER **perpendicular**

HOW THE MARKS ARE GIVEN

- 1 mark: perpendicular. A correct description, such as “at right angles”, was also credited.

COMMON MISTAKE

Only 12% got this. Common wrong answers were parallel, opposite and proportional. Learn the pair: transverse = perpendicular; longitudinal = parallel.

09.2 PLANNING A METHOD (6-MARK) — 6 marks

Describe a method to test the hypothesis that a black flask emits more infrared than a silver flask during 10 minutes of cooling. Kettle and flasks are shown in Figure 23.

1. Boil the water in the kettle. Take care: hot water can scald.
2. Use a measuring cylinder to pour the **same volume** of hot water (for example 200 cm^3) into each flask. The flasks should be the same size and material, only the colour is different.
3. Put a thermometer in each flask and record the **starting temperature** of the water in each.
4. Start a **stopclock**. Leave both flasks side by side on the same bench, in the same room, away from draughts.
5. After **10 minutes**, record the final temperature of the water in each flask.
6. **Calculate the temperature decrease** for each flask: start temperature − final temperature.
7. **Compare** the two decreases. The flask that emits more infrared loses energy faster, so it cools more. If the black flask has the bigger temperature drop, the hypothesis is supported.
8. (Alternative) Instead of thermometers, place an **infrared detector** the **same distance** from each flask, record its reading at the start and after 10 minutes, and compare the readings.

ANSWER **Equal volumes of hot water in each flask; measure each temperature at the start and after 10 minutes; calculate and compare the temperature drops**

HOW THE MARKS ARE GIVEN

- This is marked by levels.
- **Level 3 (5 to 6 marks):** a method that would give a valid result. The key steps are all there and in a logical order. To reach this level your method must let you correctly compare the **temperature decrease** of both flasks (or compare the infrared detected from both flasks).
- **Level 2 (3 to 4 marks):** most steps are there, but the method would not necessarily give a valid result or is not fully in order (for example, only final temperatures are recorded).
- **Level 1 (1 to 2 marks):** some relevant steps, but not linked together, and the method would not give a valid result.
- Useful content: heat the water; equal volumes of hot water in each flask; thermometer in each; record starting temperatures (or use IR detectors at the same distance); start a stopclock; record after 10 minutes; calculate the change; compare to test the hypothesis.