

Mr Sully Unfolds Physics
mrsullyphysics.com

Predicted Mock Paper 1

Physics · Foundation Tier · for the 2027 exams

Topics 4.1–4.4: Energy · Electricity · Particle model of matter · Atomic structure

Name _____ Class _____ Date _____

Materials

- A ruler, a protractor and a scientific calculator.
- The AQA **Physics Equations Sheet** (insert). Every equation you need is on it.

Instructions

- Use black ink or black ball-point pen. Pencil only for drawing.
- Answer **all** questions in the spaces provided.
- Show all your working: you can get marks for working even if your final answer is wrong.
- In all calculations, show clearly how you work out your answer.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is **100**.
- You are expected to use a calculator where appropriate.
- You will be assessed on your ability to use good English, organise information clearly and use specialist vocabulary where appropriate.

Time allowed: 1 hour 45 minutes. Aim for about 1 minute per mark.

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
TOTAL	

This is not an AQA paper. It was written by Mr Sully to practise for AQA GCSE Physics (8463) Paper 1 Foundation tier. The question styles follow the AQA specification; the topic choices are a prediction and are not a guarantee of what will come up.

0 1 This question is about energy stores.

01.1 Which energy store increases when a spring is stretched? **[1 mark]**

Tick (✓) one box.

Chemical	☐
Elastic potential	☐
Kinetic	☐
Nuclear	☐

01.2 Complete Table 1 by naming the energy store that **increases** in each example. **[3 marks]**

Example	Energy store that increases
Water heated in a kettle	
A ball lifted onto a high shelf	
A car speeding up	

01.3 A car has a mass of 800 kg and is moving at 15 m/s. **[2 marks]**
Calculate the kinetic energy of the car.
Use the Physics Equations Sheet.

.....

.....

.....

Answer = ... **J**

01.4 Give your answer to 01.3 in kilojoules (kJ). **[1 mark]**

.....

Answer = ... **kJ**

01.5 The driver brakes and the car stops. **[1 mark]**
What happens to the energy in the kinetic store of the car?

.....

.....

0 2 This question is about energy resources used to generate electricity.

02.1 Which **two** energy resources are renewable? **[2 marks]**

Tick (✓) two boxes.

Coal	☐
Geothermal	☐
Natural gas	☐
Nuclear fuel	☐
Tides	☐

02.2 Table 2 shows the percentage of the UK's electricity generated from different resources in one year. **[2 marks]**

Resource	Gas	Wind	Nuclear	Biomass	Solar	Hydro	Coal and oil
Percentage (%)	34	29	15	10	5	2	5

Calculate the total percentage of electricity generated from renewable resources.

Answer = ... %

02.3 Give **one** disadvantage of using solar cells to generate electricity. **[1 mark]**

02.4 Give **one** reason why gas power stations are still used. **[1 mark]**

02.5 Explain **one** environmental problem caused by burning fossil fuels. **[2 marks]**

02.6 Which fuel is used in a nuclear power station? **[1 mark]**

Tick (✓) one box.

- Coal ☐
- Hydrogen ☐
- Oil ☐
- Uranium ☐

0 3 This question is about electric circuits.

03.1 Figure 1 shows three circuit symbols. **[3 marks]**

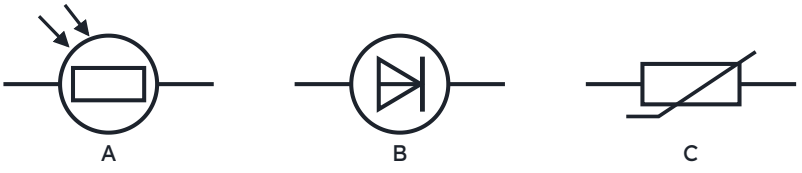

Figure 1

Name components A, B and C.

A ..... B ..... C .....

03.2 How is an ammeter connected in a circuit? **[1 mark]**

Tick (✓) one box.

- In parallel with the component ☐
- In series with the component ☐
- Across the battery ☐
- It does not matter ☐

03.3 A current of 0.50 A flows through a lamp for 2 minutes. **[3 marks]**
Calculate the charge that flows through the lamp.

Answer = ... **C**

03.4 A 12 Ω resistor has a current of 0.50 A through it. **[2 marks]**
Calculate the potential difference across the resistor.

Answer = ... **V**

03.5 A 4 Ω resistor and an 8 Ω resistor are connected in series. **[1 mark]**
What is their total resistance?

Answer = ... Ω

03.6 The light shining on an LDR gets brighter. **[2 marks]**
What happens to the resistance of the LDR? Give one use of an LDR.

0 4 This question is about states of matter and density.

04.1 In which state are the particles close together in a regular pattern? **[1 mark]**

Tick (✓) one box.

Gas	☐
Liquid	☐
Solid	☐

04.2 A student wants to find the density of a small, irregularly shaped stone. **[6 marks]**
Describe a method the student could use.

04.3 The stone has a mass of 54 g and a volume of 20 cm^3. **[2 marks]**
Calculate the density of the stone in g/cm^3.

Answer = ... **g/cm^3**

04.4 Give the density of the stone in kg/m^3. **[1 mark]**

Answer = ... **kg/m^3**

04.5 Explain why a gas has a much lower density than a solid. **[2 marks]**

0 5 This question is about heating and changes of state.

05.1 Complete Table 3. **[3 marks]**

Change of state	Name of the process
Solid → liquid	
Liquid → gas	
Gas → liquid	

05.2 Ice melts at 0 °C. While it melts, its temperature stays at 0 °C. **[1 mark]**
What happens to the internal energy of the ice while it melts?

Tick (✓) one box.

- It decreases ☐
- It increases ☐
- It stays the same ☐

05.3 A kettle heats 2.0 kg of water from 20 °C to 40 °C. **[2 marks]**
The specific heat capacity of water is 4200 J/kg °C.
Calculate the energy transferred to the water.

Answer = ... **J**

05.4 The kettle has a power of 2.0 kW. It is switched on for 3 minutes. **[3 marks]**
Calculate the energy transferred by the kettle.

Answer = ... **J**

05.5 A block of ice of mass 0.50 kg melts completely. **[1 mark]**
What is the mass of the water produced?

Answer = ... **kg**

0 6 This question is about the structure of the atom.

06.1 Complete Table 4. **[3 marks]**

Particle	Relative charge	Relative mass
Proton		1
Neutron	0	
Electron		very small

06.2 An atom of lithium is shown as $^{7}_{3}\mathbf{Li}$. **[2 marks]**
Give the number of protons, neutrons and electrons in the atom.

Protons ..... Neutrons ..... Electrons .....

06.3 Explain why the atom has no overall charge. **[1 mark]**

06.4 Describe **one** difference between the plum pudding model and the nuclear model of the atom. **[2 marks]**

06.5 In the alpha scattering experiment, most alpha particles went straight through the gold foil. A few were deflected. **[2 marks]**
What did each of these results show?

0 7 This question is about radioactive decay.

07.1 Complete Table 5 by writing alpha, beta or gamma. **[3 marks]**

Property	Type of radiation
The most ionising	
Can be stopped by a sheet of paper	
Is an electromagnetic wave	

07.2 What is meant by the half-life of a radioactive isotope? **[1 mark]**

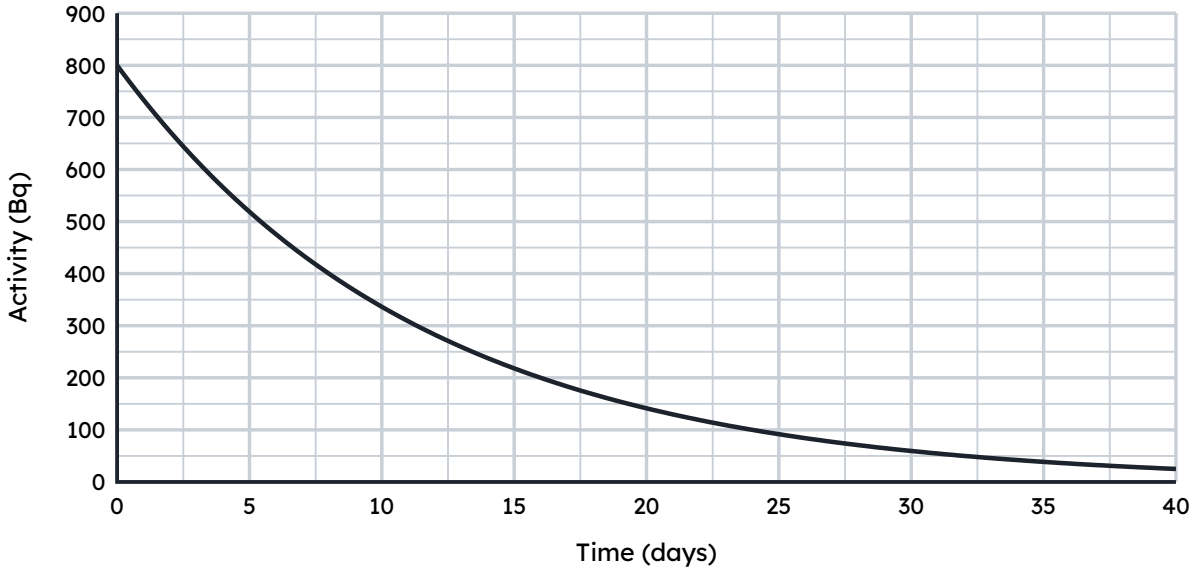

Figure 2

07.3 Figure 2 shows how the activity of a radioactive sample changes with time.
Determine the half-life. Show on Figure 2 how you got your answer. **[2 marks]**

Answer = ... **days**

07.4 Calculate the activity of the sample after 24 days. **[2 marks]**

Answer = ... **Bq**

07.5 Explain the difference between being **contaminated** and being **irradiated** by a radioactive source. **[2 marks]**

0 8 This question is about mains electricity in the home.

08.1 What is the frequency of the UK mains supply? **[1 mark]**

Tick (✓) one box.

0 Hz	
50 Hz	
230 Hz	
230 V	

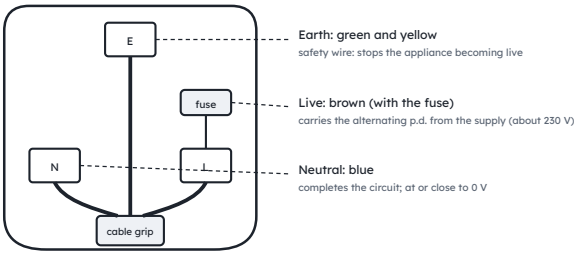

Figure 3

08.2 **[3 marks]**

Complete Table 6.

Wire	Colour of insulation
Live	
Neutral	
Earth	

08.3 A kettle is connected to the 230 V mains. The current is 10 A. **[2 marks]**
Calculate the power of the kettle.

Answer = ... **W**

08.4 Give your answer to 08.3 in kilowatts (kW). **[1 mark]**

Answer = ... **kW**

08.5 The kettle has a metal case connected to the earth wire. **[2 marks]**
Explain how the earth wire keeps the user safe if the live wire touches the case.

0 9 A student investigated how the thickness of a layer of insulation affects how quickly hot water in a beaker cools down.

09.1 Describe a method the student could use. Include how the student could make the investigation a fair test. **[6 marks]**

09.2 Table 7 shows the results. **[2 marks]**

Number of layers of insulation	0	1	2	3	4
Temperature decrease in 10 minutes (°C)	22	15	11	9	8

Describe the pattern shown by the results.

09.3 The student's thermometer had a resolution of 1 °C. **[1 mark]**
Suggest how the student could measure the temperature with a higher resolution.

1 0 Figure 4 shows a circuit containing a 10 Ω resistor and a thermistor.

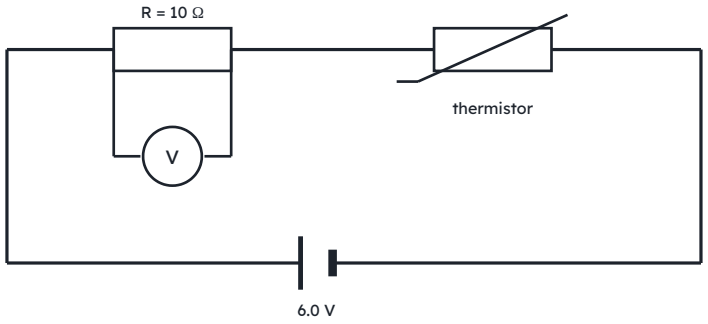

Figure 4

10.1 Why is the current in the resistor the same as the current in the thermistor? **[1 mark]**

10.2 At 20 °C the resistance of the thermistor is 20 Ω. **[3 marks]**
Calculate the current in the circuit.

Answer = ... **A**

10.3 Calculate the reading on the voltmeter. **[2 marks]**

Answer = ... **V**

10.4 The temperature of the thermistor increases. **[3 marks]**
Explain what happens to the reading on the voltmeter.

10.5 A second 10 Ω resistor is connected in parallel with the first resistor. **[2 marks]**
Explain what happens to the current from the battery.

END OF QUESTIONS