OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL GCSE
PHYSICS

9203/2 PAPER 2

Specimen paper 1 hour 30 minutes

Materials
For this paper you must have:
- a ruler with millimetre measurements
- a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the bottom of this page.
- Answer **all** questions.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.

Please write clearly, in block capitals, to allow character computer recognition.

Centre number ☐☐☐☐☐ Candidate number ☐☐☐☐

Surname ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Forename(s) ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Candidate signature _____

Answer **all** questions in the spaces provided.

0 1 These questions are all about collisions.

0 1 . 1 In a physics experiment, two equal-mass carts roll towards each other in opposite directions. Both cars are moving at the same speed.

What is the momentum of both cars after they collide?

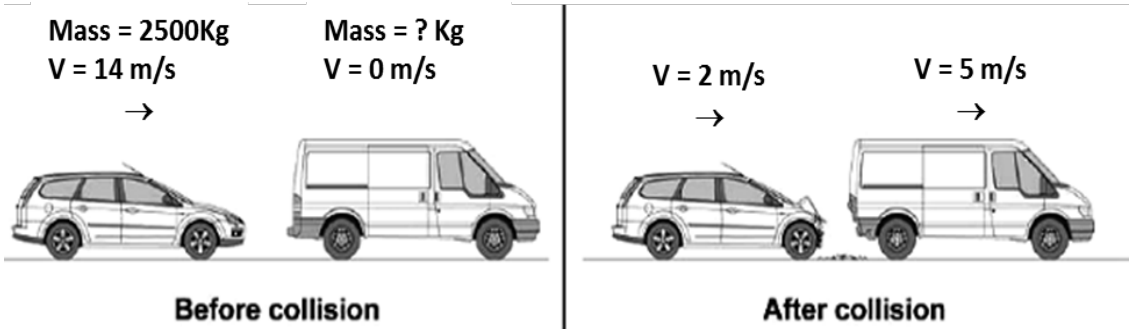
Tick **one** box.

[1 mark]

- Greater than it was before the collision. ☐
- Opposite to what it was before the collision. ☐
- The same as it was before the collision. ☐
- Zero. ☐

0 1 . 2 The diagram shows a car before and after the car collides with a stationary van.

The handbrake of the van is not on.

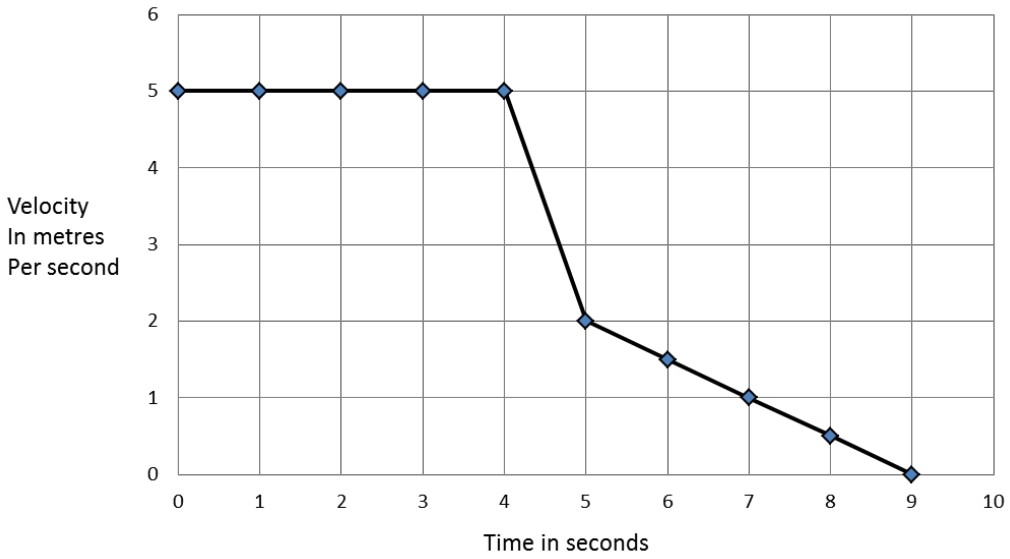


Use the information in the diagram to calculate the mass of the van in Kilograms.

[4 marks]

Mass of van = _____ kg

0 1 . 3 The graph shows the velocity of the car before, during and after the collision.



Use the graph to calculate the distance travelled by the car, in meters, after the collision.

[2 marks]

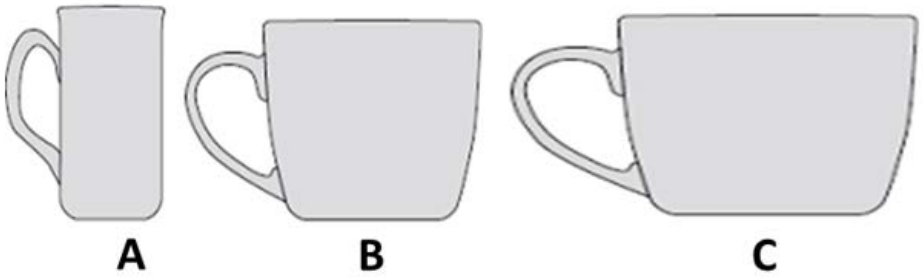
Distance = _____ m

0 1 . 4 The front of the car is designed to crumple when it is in a collision.

Explain why this would reduce the risk of the driver being injured in the collision.

[3 marks]

0 2 The diagram shows three cups.
A student would like to investigate the rate of heat energy loss when each cup is filled with hot water.



0 2 . 1 Write a method to perform this investigation.

Include

- An equipment list
- The independent variable
- The dependent variable
- What variables you need to control
- What you will need to measure
- Safety issues

[6 marks]

0 2 . 2 Complete the **headings** in the table of results to collect this data.

[2 marks]

0 2 . 3 The table of results above does not allow any room to take repeat readings.

Suggest **two** reasons why it is always a good idea to repeat your experiment.

[2 marks]

_____

_____

_____

_____

0 3 The refractive index of some types of glass and some liquids is given in the table.

Type of glass	Refractive index		Liquid	Refractive index
Bakeware glass	1.47		Methanol	1.33
Car headlight glass	1.48		Water	1.33
Window glass	1.50		Alcohol	1.37
Bottle glass	1.52		Olive oil	1.47
Spectacle glass	1.54		Castor oil	1.48
Lead glass	1.62		Cinnamon oil	1.60

0 3 . 1 State the range of the refractive index of the liquids in the table.

[1 mark]

From _____ to _____ .

0 3 . 2 Which type of glass has a refractive index outside the range for the liquids?

Tick **one** box.

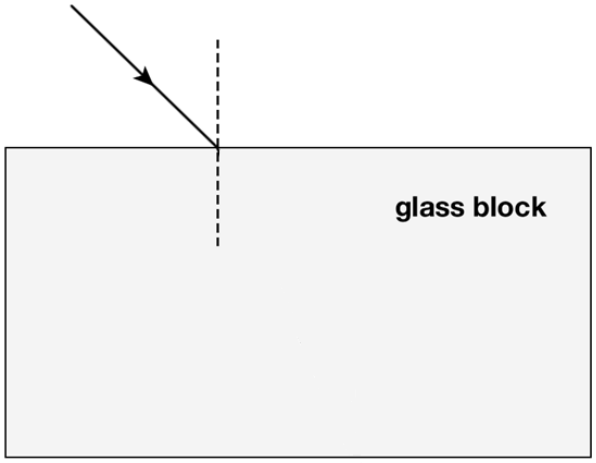
[1 mark]

- Bakeware glass ☐
- Lead glass ☐
- Spectacle glass ☐
- Window glass ☐

0 3 . 3 Complete the diagram to show a ray of light travelling through a glass block.

Label the following on the diagram: angle of incidence, angle of refraction, incident ray, refracted ray, normal.

[4 marks]



0 3 . 4 A light ray is shone at a piece of car headlight glass where the angle of incidence is 46°.

Calculate the angle of refraction.

[3 marks]

Angle of refraction = _____

0 3 . 5 Olive oil is placed into a dish made of bakeware glass.

Predict what will happen to the speed of light when it passes from the olive oil to the bakeware glass.

[1 mark]

0 4 . 1 An electric motor in a car receives 160 000 J of energy and transfers 62 500 J into kinetic energy.

Sketch a Sankey diagram to show the energy transfer in the car.

Include a value for the wasted energy.

[2 marks]

0 4 . 2 What happens to the energy that is not transferred into kinetic energy by the car?

Tick **one** box.

[1 mark]

- The energy is destroyed. ☐
- The energy is dissipated into the surroundings. ☐
- The energy is usefully transferred. ☐
- The energy has contracted. ☐

0 4 . 3 Calculate the efficiency of the car.

Give your answer to 3 significant figures.

[2 marks]

Efficiency = _____

0 4 . 4 The energy transfer described in part **04.1** takes place over 10.0 s.

Calculate the output power of the electric motor in the car.

[2 marks]

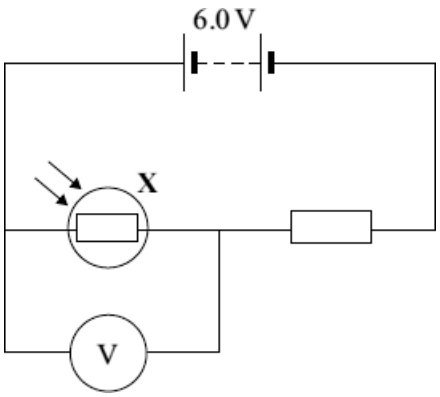
power = _____ W

0 4 . 5 Calculate the speed the car is moving at if the mass of the car is 1500 kg.

[3 marks]

Speed = _____ m/s

0 5 The diagram shows a simple light-sensing circuit.



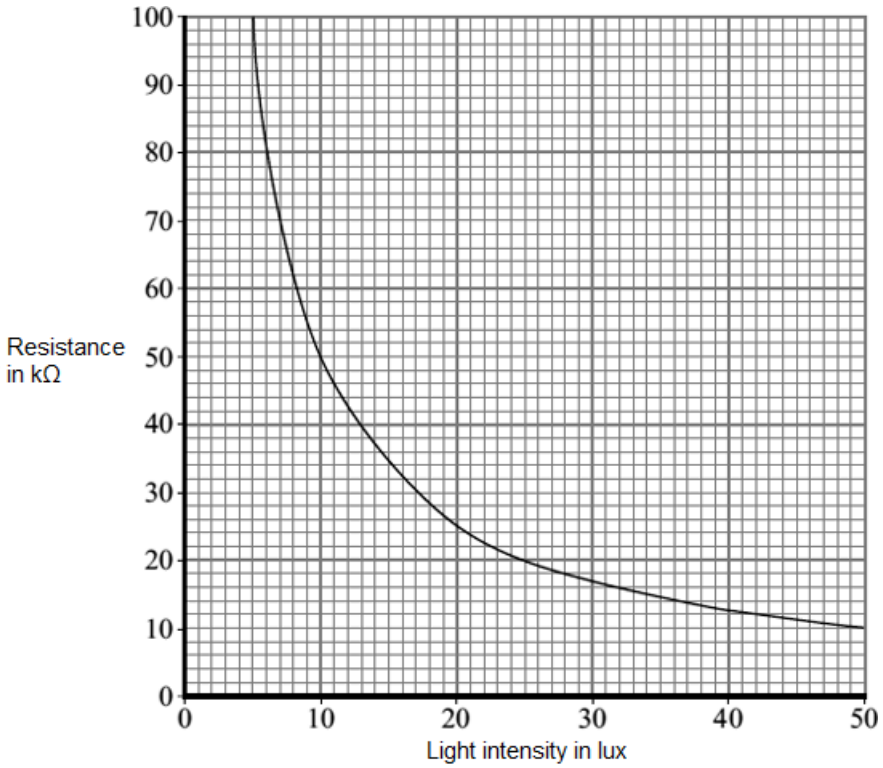
0 5 . 1 What is component **X**?

Tick **one** box.

[1 mark]

- Light dependent resistor ☐
- Light emitting diode ☐
- Thermistor ☐
- Variable resistor ☐

The graph shows how the resistance of the component labelled **X** varies with light intensity.



0 5 . 2 Determine, using the graph, the resistance of component **X** when the light intensity is 20 lux.

[1 mark]

_____

0 5 . 3 When the light intensity is 20 lux, the current through the circuit is 0.0002 A.

Calculate the reading on the voltmeter when the light intensity is 20 lux.

[2 marks]

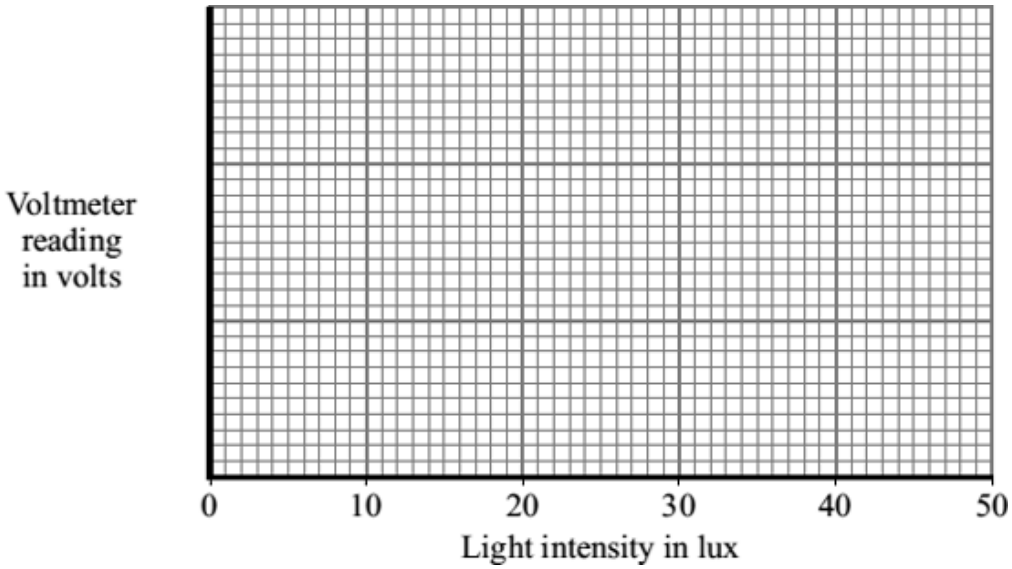
_____

_____

Voltmeter reading = _____ volts

0 5 . 4 Complete the sketch graph, including a suitable scale on the y-axis, to show how the voltmeter reading in the light-sensing circuit varies with light intensity.

[3 marks]



The following passage is taken from the technical data supplied for component **X** by the manufacturer.

> For any given light intensity, the resistance of this component can vary by plus or minus 50% of the value shown on the **graph of light intensity and resistance**.

0 5 . 5 Calculate the maximum resistance that component **X** could have at a light intensity of 20 lux.

[1 mark]

Maximum resistance = _____kilohms

0 5 . 6 Explain why this light-sensing circuit would **not** be used to measure values of light intensity.

[2 marks]

0 6 . 1 In the table below three electrical appliances are listed with their power ratings and the number of hours they are used each week.

Electrical appliance	Power rating in W	Time the appliance is used each week in h	Energy used each week in kWh
Light	150	75	11
Computer	750	40	30
Toaster	1000	1	1
Cooker	6 500	4	

Complete the table by calculating the energy used each week by the cooker.

Write your answer in the table.

[1 mark]

0 6 . 2 Which appliance would cost the least to run per week?

[1 mark]

0 6 . 3 The cost of running the light for one week is £0.88.

Calculate the cost of running the computer for one week.

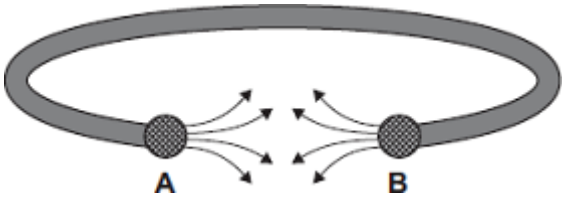
[4 marks]

0 7 . 1 Some people wear magnetic bracelets as shown in **Diagram 1**.

There are magnetic poles at both **A** and **B**.

Part of the magnetic field pattern between **A** and **B** is shown.

Diagram 1



What are the poles on **A** and **B**?

Tick **one** box.

[1 mark]

Pole A is North and Pole B is North ☐

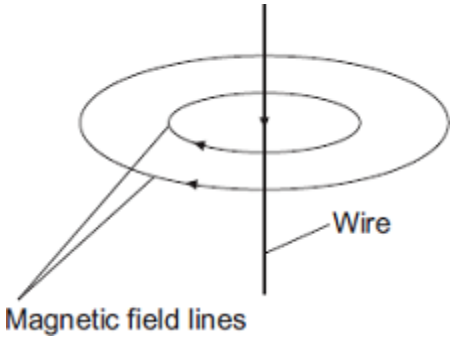
Pole A is North and Pole B is South ☐

Pole A is South and Pole B is North ☐

Pole A is South and Pole B is South ☐

0 7 . 2 **Diagram 2** shows two of the lines of the magnetic field pattern of a current-carrying wire.

Diagram 2



The direction of the current is reversed.

State what happens to the direction of the lines in the magnetic field pattern.

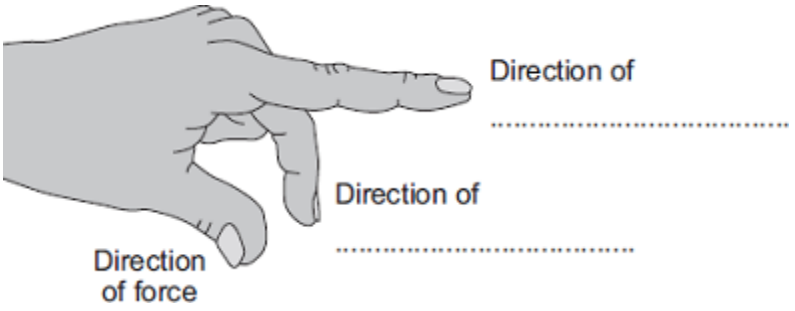
[1 mark]

0 7 . 3 Fleming's left-hand rule can be used to identify the direction of a force acting on a current-carrying wire in a magnetic field.

Complete the labels in **Diagram 3**.

[2 marks]

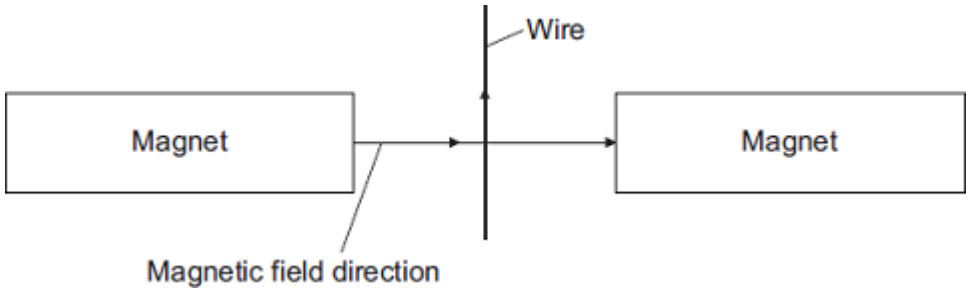
Diagram 3



0 7 . 4 **Diagram 4** shows:

- the direction of the magnetic field between a pair of magnets
- the direction of the current in a wire in the magnetic field.

Diagram 4



In which direction does the force on the wire act?

Tick **one** box.

[1 mark]

Into the plane of the paper ☐

Out of the plane of the paper ☐

Along the magnetic field line ☐

In the opposite direction to the current in the wire ☐

0 7 . 5 Suggest **three** changes that would decrease the force acting on the wire.

[3 marks]

1 _____

2 _____

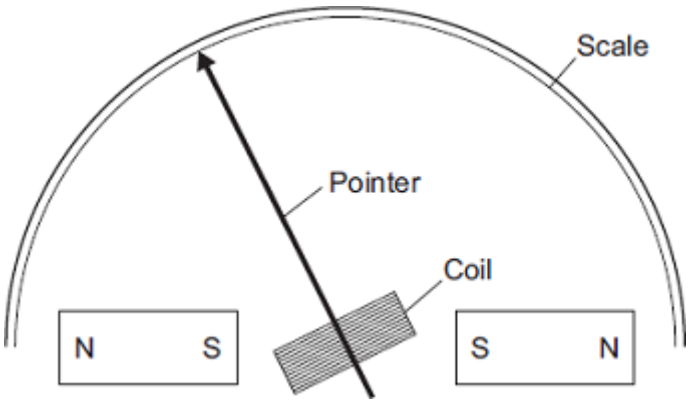
3 _____

0 7 . 6 **Diagram 5** shows part of a moving-coil ammeter as drawn by a student.

The ammeter consists of a coil placed in a uniform magnetic field.

When there is a current in the coil, the force acting on the coil causes the coil to rotate and the pointer moves across the scale.

Diagram 5



The equipment has **not** been set up correctly.

State the change that would make it work.

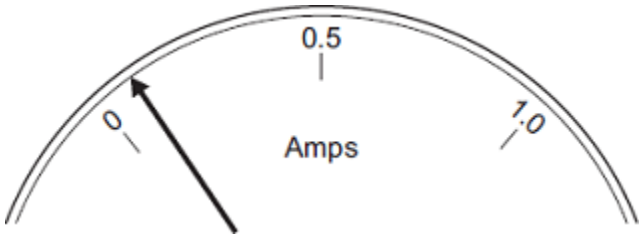
[1 mark]

_____

_____

0 7 . **7** **Diagram 6** shows the pointer in an ammeter when there is no current.

Diagram 6



Name the type of error the ammeter has.

[1 mark]

0 8 . 1 Atoms contain three types of particle.

Which of the following particles are found in the nucleus of an atom?

Tick **one** box.

[1 mark]

- Electrons and neutrons ☐
- Electrons and protons ☐
- Neutrons and protons ☐
- Protons, electrons and neutrons ☐

0 8 . 2 Complete the table below to show the relative charges of the sub atomic particles.

[1 mark]

Particle	**Relative charge**
Electron	–1
Neutron	
Proton	

0 8 . 3 The table below gives information about four radioactive isotopes.

Isotope	Type of radiation emitted	Half-life
iridium-192	gamma ray	74 days
polonium-210	alpha particle	138 days
polonium-213	alpha particle	less than 1 second
technetium-99	gamma ray	6 hours

Two isotopes of polonium are given in the table. In terms of particles in the nucleus:

Describe how these two isotopes of polonium are the same.

[1 mark]

0 8 . 4 Describe how these two isotopes of polonium are different.

[1 mark]

0 8 . 5 A doctor injects a patient with a very small dose of technetium-99 to monitor the blood flow through the patient's heart.

The radiation detected outside of the patient's body can be used to see if the heart is working correctly.

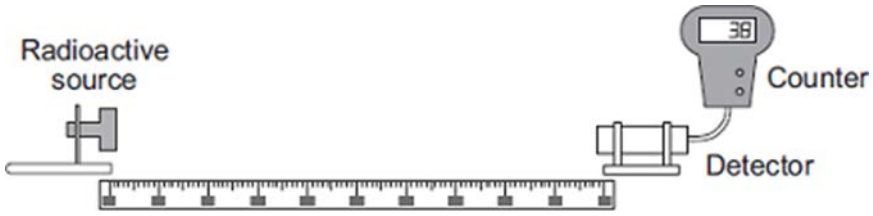
Explain why technetium-99 is more suitable for this use than polonium-210.

[2 marks]

0 8 . 6 Explain why technetium-99 is more suitable for this use than iridium-192.

[2 marks]

0 8 . **7** A teacher used the equipment shown in the diagram to measure the count rate at different distances from a radioactive source.



The results are shown in the table below.

Distance in metres	Count rate in counts per minute	Corrected count rate in counts per minute
0.4	143	125
0.6	74	56
0.8	49	31
1.0	38	20
1.2	32	14
1.4	28	10
1.6	18	0
1.8	18	0
2.0	18	0

The background count rate has been used to calculate the corrected count rate.

Calculate, using data from the table, the value of the background count rate.

[1 mark]

Background count rate = _____ counts per minute

0 8 . 8 Why does the teacher need to calculate a corrected count rate?

[1 mark]

0 8 . 9 The radioactive source used in the demonstration emits only one type of radiation.

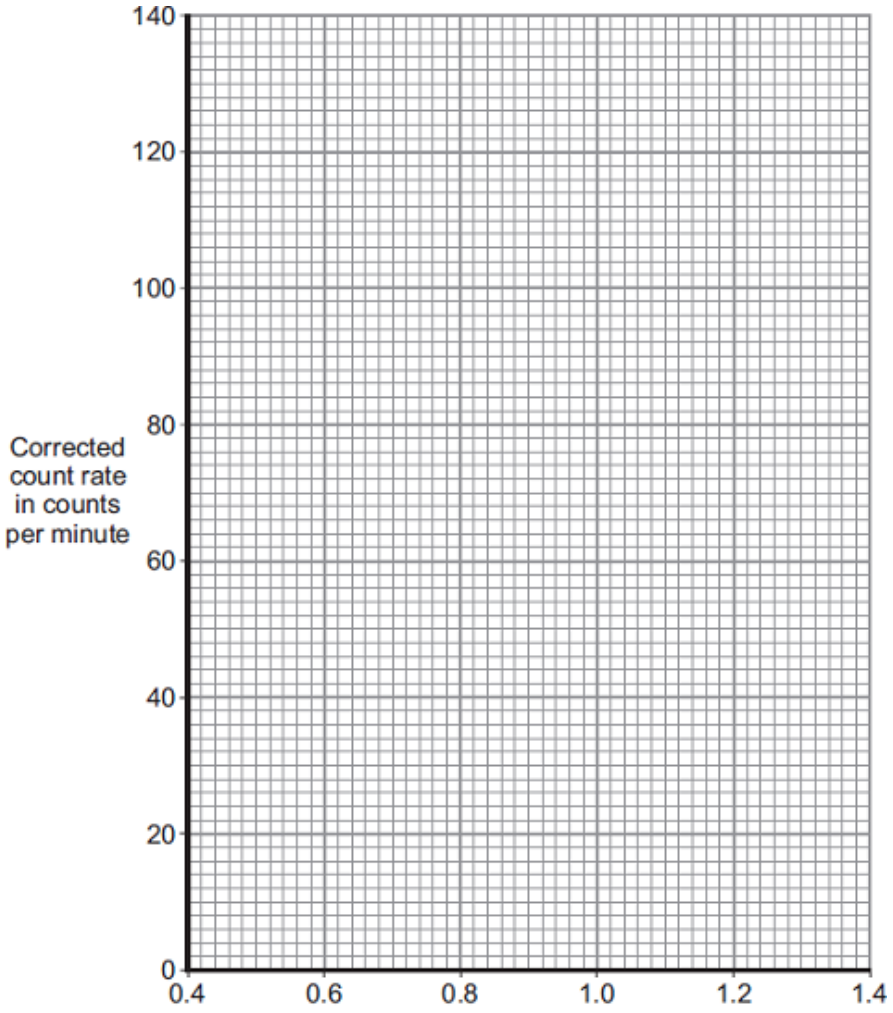
Explain how can you tell from the data in the table that the radioactive source is **not** an alpha emitter

[1 mark]

0 8 . 10 Plot a graph of corrected count rate against distance for distances between 0.4 m and 1.4 m.

Draw a line of best fit to complete the graph.

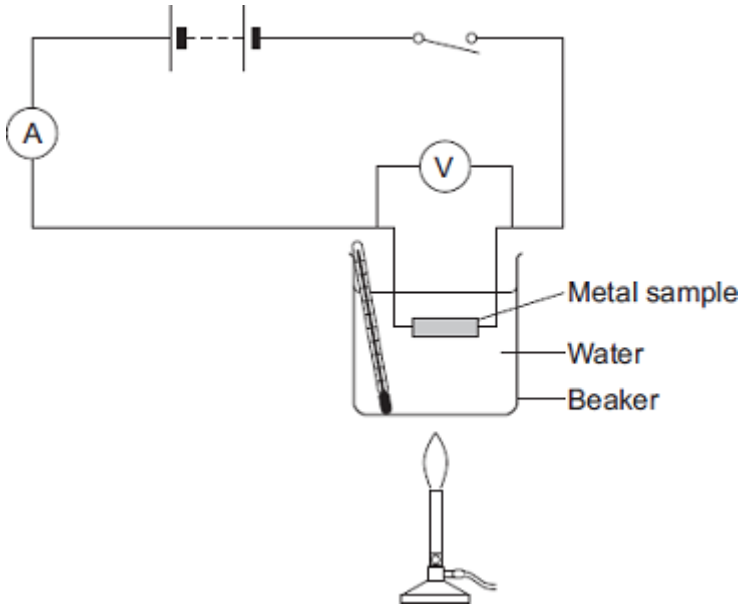
[3 marks]



Turn over for the next question

0 9 . 1 When some metals are heated the resistance of the metal changes.

The equipment for investigating how the resistance of a metal changes when it is heated is shown in the diagram.



Describe an investigation a student could do to find how the resistance of a metal sample varies with temperature. The student uses the equipment shown.

Include in your answer:

- how the student should use the equipment
- the measurements the student should make
- how the student should use these measurements to determine the resistance
- how to make sure the results are valid.

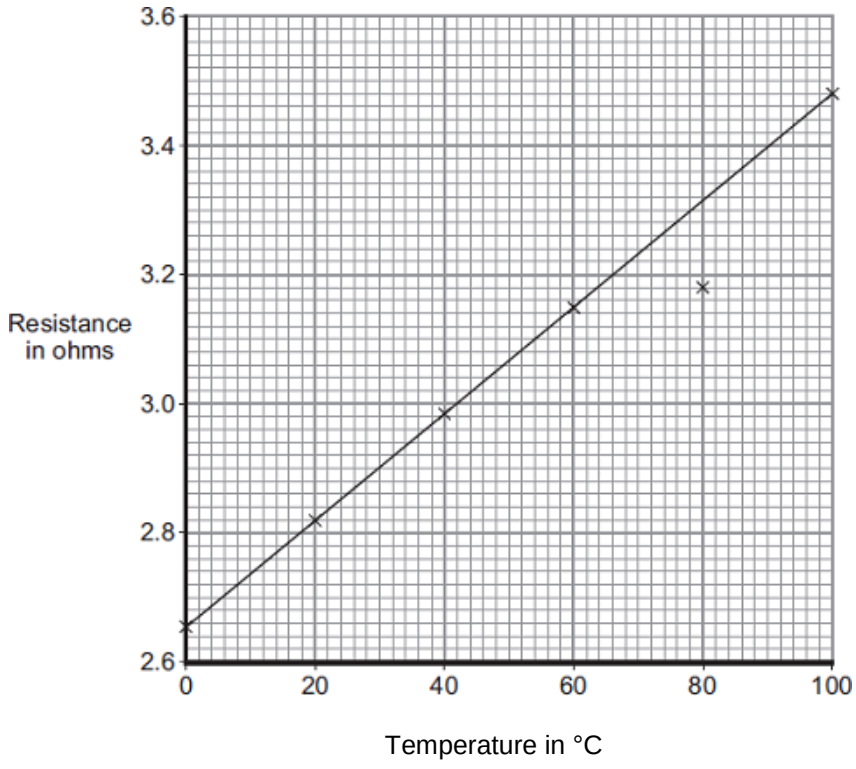
[6 marks]

0 9 . 2 The table shows some data for samples of four metals **P**, **Q**, **R** and **S**.

The metal samples all had the same cross-sectional area and were the same length.

Metal sample	Resistance at 0°C in ohms	Resistance at 100°C in ohms
P	4.05	5.67
Q	2.65	3.48
R	6.0	9.17
S	1.70	2.23

A graph of the results for one of the metal samples is shown.



Which metal sample, **P**, **Q**, **R** or **S**, has the data shown in the graph?

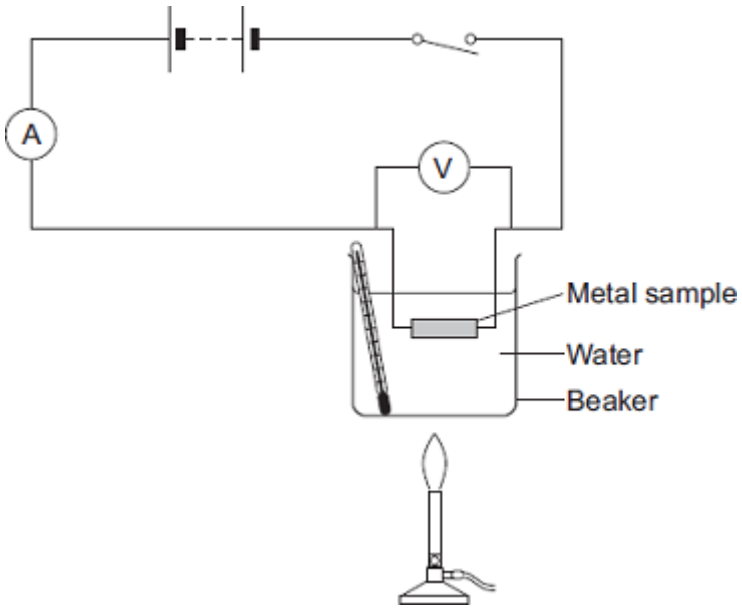
[1 mark]

0 9 . 3 One of the results is anomalous.

Suggest a reason for the anomalous result.

[1 mark]

0 9 . 4 The same equipment used in the investigation could be used as a thermometer known as a 'resistance thermometer.'



Suggest **two** disadvantages of using this equipment as a thermometer compared to a liquid-in-glass thermometer.

[2 marks]

1.

2.

END OF QUESTIONS

There are no questions printed on this page