



**ASSUMPTION
ENGLISH**

A Montfortian Gabrielite Education Institution

Preliminary Examination Secondary Four Express

NAME

CLASS

INDEX
NUMBER

Physics Paper 3 Practical

6091/03

Thursday, 20 August 2026

1 hour 50 minutes

Additional materials: 1 sheet of OAS paper

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number at the top of this page.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams, graphs, tables or rough working.

Do not use staples, paper clips, glue, correction fluid or highlighters.

Answer **all** questions.

Graph paper is provided in this Question Paper. Additional sheets of graph paper should be used only if it is necessary to do so.

You will be allowed to work with the apparatus for a maximum of 55 minutes for each section.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
Paper 3	40

At the end of the examination, hand in this question booklet.

Section A

- 1 *In this experiment, you will determine the density of glass spheres.*

You have been provided with

- 5 glass spheres,
- a measuring cylinder,
- a beaker containing 200 cm³ of water,
- a dropper,
- some paper towels.

- (a) Pour 30 cm³ of water from the beaker into the measuring cylinder.

Drop a glass sphere down from the centre of the measuring cylinder. Repeat this step until all 5 glass spheres are completely submerged in the water.

- (b) (i) Draw the experimental set-up in part (a).

Label on your diagram:

- the initial level of the water in the measuring cylinder
- the final level of the water in the measuring cylinder

[1]

- (ii) Record the final volume V_T of the water and glass sphere in the measuring cylinder.

$V_T = \dots\dots\dots$ [1]

- (iii) Calculate the average volume V of one glass sphere.

$V = \dots\dots\dots$ [2]

- (iv) Describe **one** source of error in the measurement of V_T .

.....

 [1]

- (c) (i) Empty the measuring cylinder and dry the glass spheres.

The total mass of the glass spheres is written on the card. Record the total mass M_T .

$M_T =$ [1]

- (ii) Calculate the average mass M of one glass sphere.

$M =$ [1]

- (d) Calculate the density D of the glass from which the spheres are made, given the formula

$$D = \frac{M}{V}.$$

$D =$ [1]

- (e) Explain why you were instructed to use all available glass spheres rather than a single sphere.

.....

 [1]

- (f) Describe **one** improvement that could be made to this experiment.

.....
 [1]

2 In this experiment, you will determine the spring constant k of the spring.

You have been provided with

- a spring with a string loop,
- a plastic ruler,
- a retort stand with boss and clamp,
- a metre rule,
- a 100 g mass hanger,
- some adhesive putty.

(a) Measure the unstretched length L of the spring as shown in Fig. 2.1.

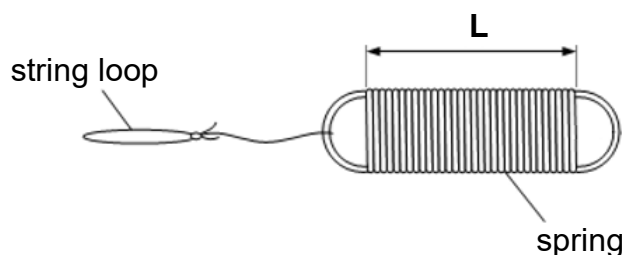


Fig. 2.1

$L = \dots\dots\dots$ [1]

(b) Set up the apparatus as shown in Fig. 2.2.

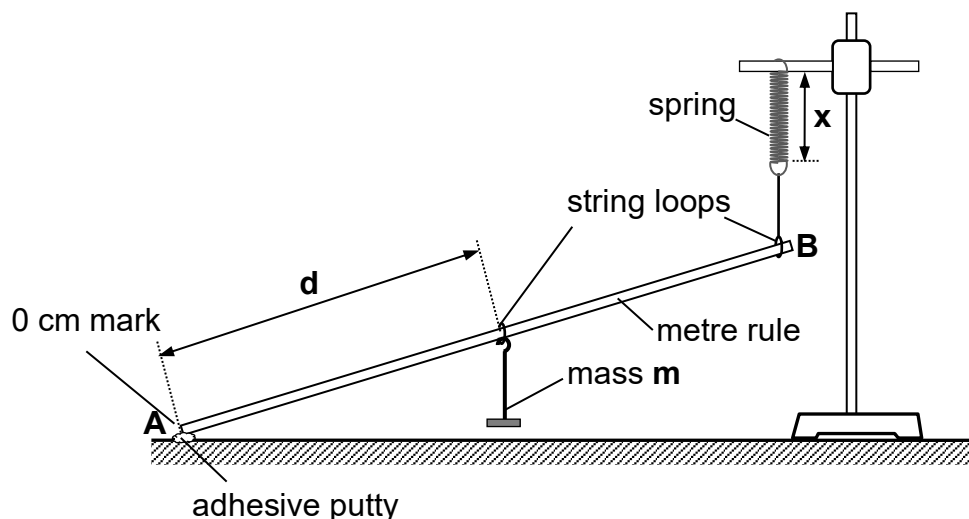


Fig. 2.2

Hang one end of the spring from the clamp rod. Use the string loop at the other end of the spring to suspend the metre rule, 1.0 cm from end **B** of the metre rule. The markings on the metre rule should face up. End **A** of the metre rule should rest on the bench secured by a small piece of adhesive putty.

Hang the 100 g mass hanger at the 40 cm mark of the metre rule using another string loop. The mass hanger should hang freely without touching the bench.

Adjust the position of the retort stand, if necessary, so that the spring is vertical.

(c) Measure and record:

- the distance **d** between end **A** of the metre rule and the point of suspension of the mass hanger,
- the stretched length **x** of the spring.

d =

x = [2]

(d) State an error in the measurement of **x**.

.....

..... [1]

(e) Plan an experiment to determine the spring constant **k** of the spring given that

$$ke = mgd$$

where **m** is the total mass of the mass hanger,

g is the gravitational field strength,

e is the extension of the spring.

Your plan should include

- the key variables that you would control,
- a description of how you would perform the experiment,
- a statement of the graph that you would plot to test the relationship,
- a sketch of the graph if the relationship is true,
- an explanation of how **k** would be found from the graph,

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Section B

3 In this experiment, you will determine the resistivity of a length of resistance wire.

You have been provided with

- a resistance wire on a metre rule,
- a digital micrometer screw gauge,
- two 1.5 V dry cells in battery holders,
- a switch,
- a $5\ \Omega$ resistor,
- an ammeter,
- a voltmeter,
- some connecting wires.

(a) Measure and record the diameter d of the resistance wire, expressing your answer to 0.01 mm.

$d = \dots\dots\dots$ mm [1]

(b) Set up the circuit as shown in Fig. 3.1. Ensure that the 0 cm mark of the metre rule is on the left-hand side.

The distance between the 0 cm mark on the metre rule and the crocodile clip of the moving contact is L .

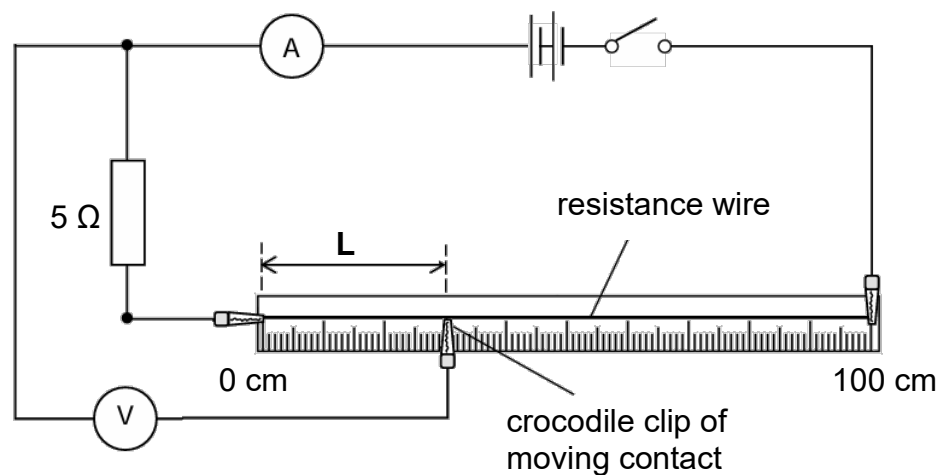


Fig. 3.1

(c) Close the switch. Place the crocodile clip of the moving contact on the resistance for $L = 0.400$ m.

Record the potential difference V and the current I .

$V = \dots\dots\dots$

$I = \dots\dots\dots$ [1]

(d) Calculate

1. the resistance of the circuit using the equation $R = \frac{V}{I}$,

$$R = \dots\dots\dots [1]$$

2. the value of y using the equation $y = \frac{R}{L}$.

$$y = \dots\dots\dots [1]$$

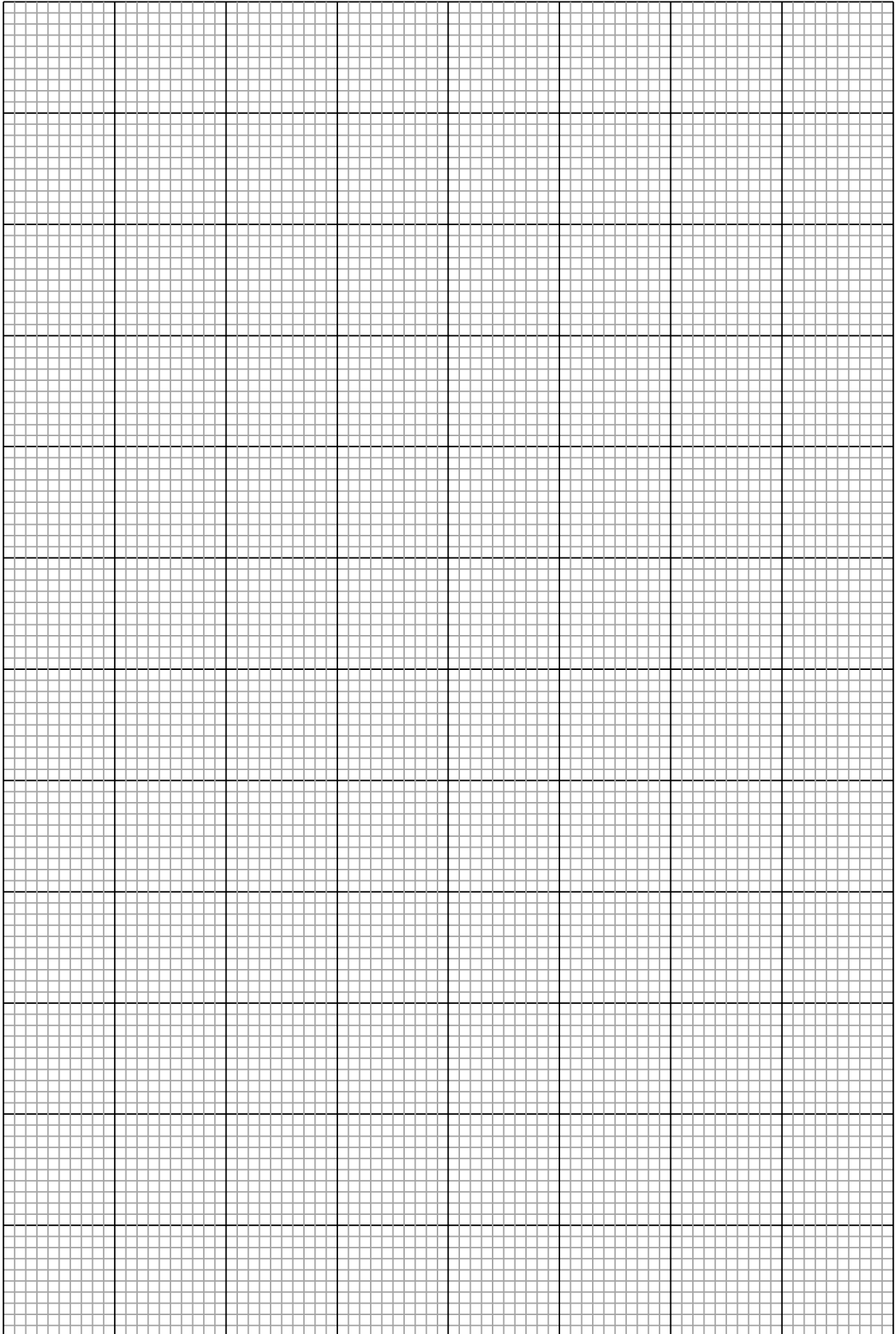
(e) Change the distance L to obtain further values of V and I .

For each value of L , calculate $\frac{1}{L}$, R and y .

Record L in metres. Record all values in a table, including the readings in part (b) and (c).

[5]

- (f) Using the grid provided on the next page, plot a graph of y against $\frac{1}{L}$.



- (g) (i) Determine the gradient of your graph. Show your working clearly on the graph.

gradient = [2]

- (ii) From the graph, read the vertical intercept of the graph.

vertical intercept = [1]

- (iii) Calculate the resistivity ρ of the resistance wire using the equation

$$\rho = \left(\frac{3.14d^2}{4} \right) \times \frac{\text{vertical intercept}}{10^6}.$$

ρ = [2]

- (h) Describe two significant sources of error in the experiment.

1.

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2.

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..... [2]

– End of Paper –