



General Certificate of Secondary Education

Centre Number

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Candidate Number

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# Physics

Unit 3 Practical Skills

**Booklet B**



Foundation Tier

**[GPY32]**

\*GPY32\*

**Assessment**

### TIME

1 hour.

### Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

**You must answer the questions in the spaces provided.**

**Do not write outside the boxed area on each page or on blank pages.**

Complete in black ink only. **Do not write with a gel pen.**

Answer **all** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

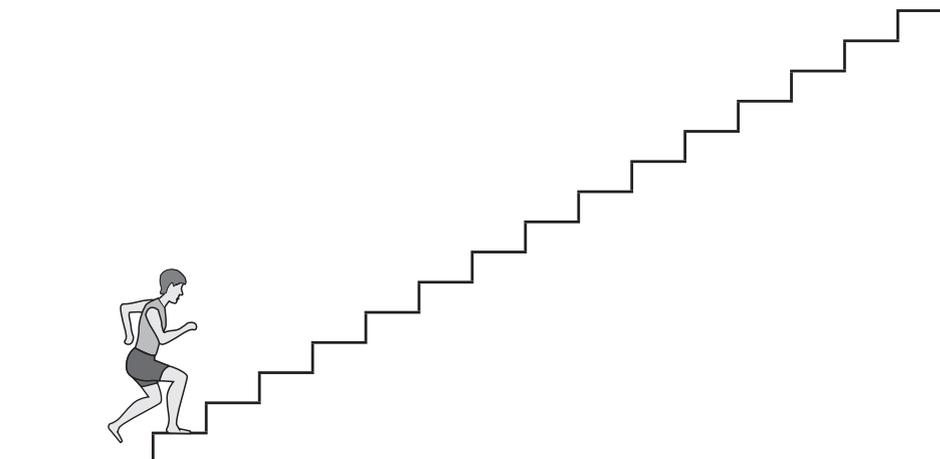
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **2(b)**.

You should have a ruler and a protractor.



- 1 (a) The students in a GCSE Physics class were investigating their personal power. They decided to perform an experiment by running up stairs.



- (i) List the three quantities they must measure in order to carry out this investigation.  
For each one state the unit in which it should be measured.

	Quantity	Unit
1		
2		
3		

[6]

- (ii) Name **two** measuring instruments used in this investigation.

1. \_\_\_\_\_

2. \_\_\_\_\_

[2]



(iii) Complete the **word** equation you would use to calculate their personal power.

Personal power = \_\_\_\_\_ [2]

(iv) A student calculates his personal power to be 350 W.  
Explain carefully the meaning of 350 W.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

(v) The student repeats the experiment by carrying a load up the stairs in the same time as was taken previously.  
What effect does this have on the personal power measurement?  
Explain your answer.

Effect on personal power \_\_\_\_\_

Explanation \_\_\_\_\_

\_\_\_\_\_ [2]

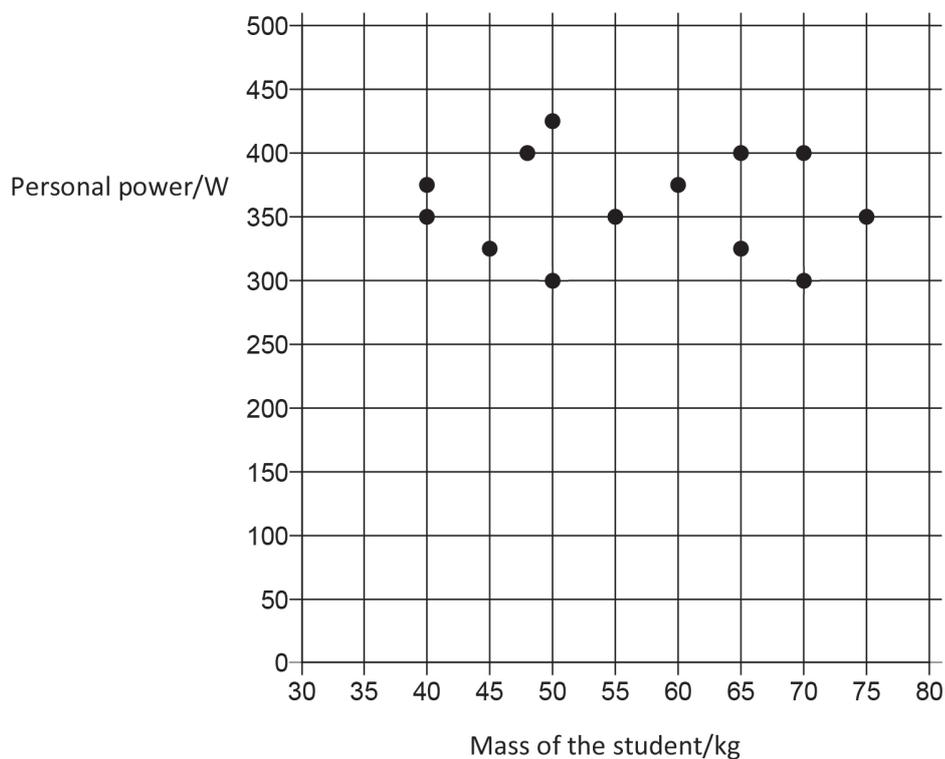
(vi) What should be done to provide a more reliable value of a student's personal power?

\_\_\_\_\_  
\_\_\_\_\_ [2]

[Turn over



(b) After the experiment, the teacher collected the personal power values and masses of the pupils. The teacher used the data to plot the graph shown below.



What do the results shown on the graph above suggest about the relationship between the personal power and the mass of a student?

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[1]





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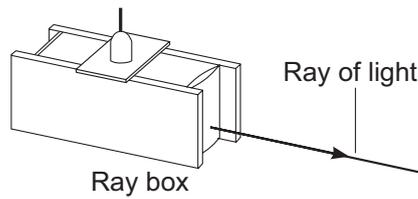
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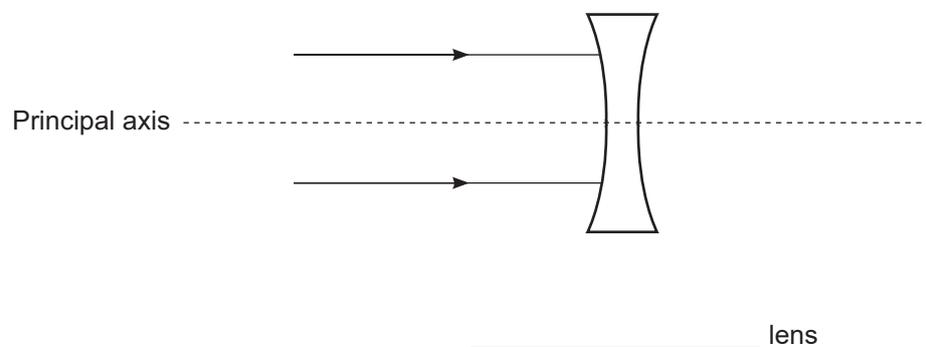
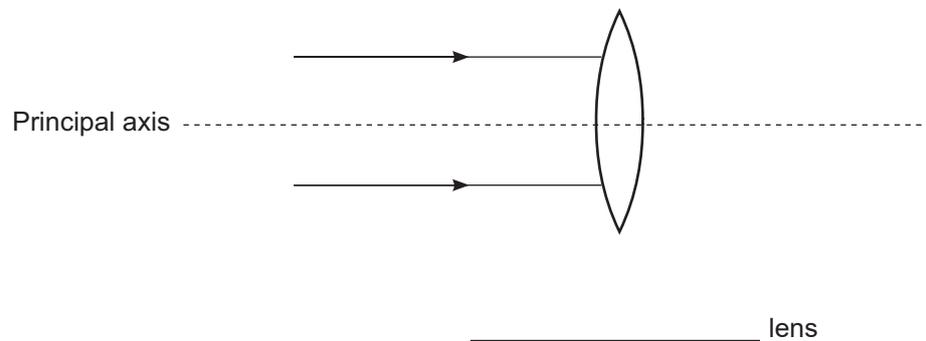


\*20GPY3205\*

- 2 (a) A ray box is used to observe the action of a converging lens and a diverging lens.



- (i) Complete the diagrams below to show the effect the lenses have on two parallel rays of light that pass through each lens. Label each lens.



[5]

Mark on the diagram of the **converging lens**:

- (ii) the Principal Focus of the lens with the letter F [1]

- (iii) the Focal Length of the lens. [1]



(b) Describe in detail how you would use a distant object to measure the Focal Length of a converging lens. In your description you must:

- state the apparatus you use;
- describe fully what you would do;
- state what measurement you must make to find the Focal Length.

**In this question you will be assessed on your written communication skills including the use of specialist science terms.  
Write your answers in the appropriate space provided.**

Apparatus \_\_\_\_\_

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What you would do \_\_\_\_\_

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[Turn over



Measurement \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

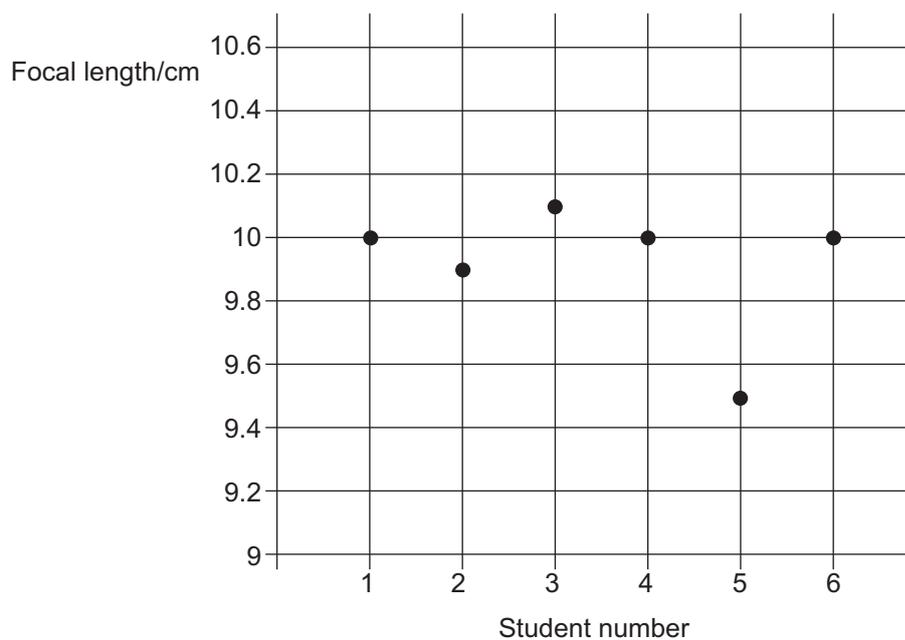
\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[6]

- (c) Several students carried out the measurement of the focal length of the same lens and plotted their results on the graph shown below. Each student is given a number from 1 to 6.



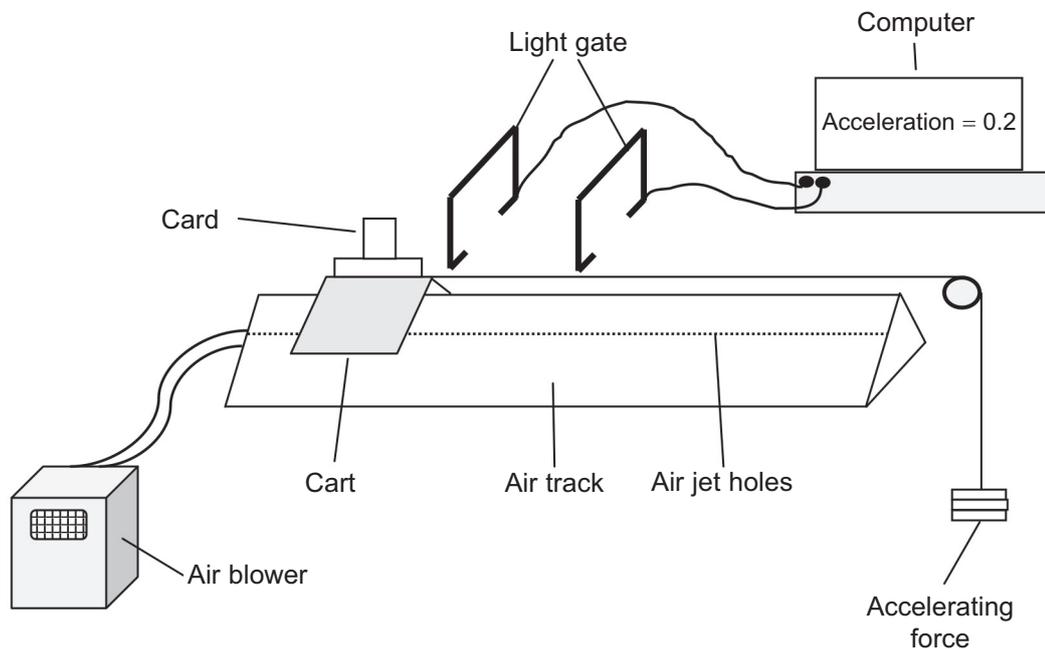
- (i) Circle the measurement which is clearly wrong. [1]

- (ii) Using the graph, what is the best value for the Focal Length?

Focal Length = \_\_\_\_\_ cm [1]



3 (a) The apparatus shown below can be used to investigate Newton's Laws of Motion.



Source: Principal Examiner

The air track has air blown into it and forced out through the air jet holes. This allows the cart to ride very easily along the track on a bed of air.

(i) What force does the air track reduce? \_\_\_\_\_ [1]

(ii) The card on the cart is pulled through the two light gates. The computer measures the speed of the cart at each of the light gates. What quantity relating to the card attached to the cart must be known if the computer is to measure its speed?

\_\_\_\_\_ [1]

(iii) What other quantity must be measured between the gates to allow the acceleration of the cart to be determined by the computer?

\_\_\_\_\_ [1]

[Turn over



The table below shows the results from the investigation as recorded by the student. The total mass of the cart was kept constant at 1.2 kg.

Accelerating Force / N	Acceleration / $\text{m/s}^2$			
	Run 1	Run 2	Run 3	Average
0	0	0	0	0
0.2	0.12	0.14	0.13	0.13
0.4	0.24	0.26	0.25	
0.6	0.37	0.39	0.39	
0.8	0.47	0.49	0.46	0.47
1.0	0.65	0.62	0.64	

- (iv) Complete the table by calculating the average acceleration produced by each accelerating force. Insert your answers to **two decimal places** in the last column of the table. Some average accelerations have been calculated for you. [2]



(v) Using the recorded data and the grid below, plot a graph to confirm a direct proportion relationship between the accelerating force and the average acceleration.

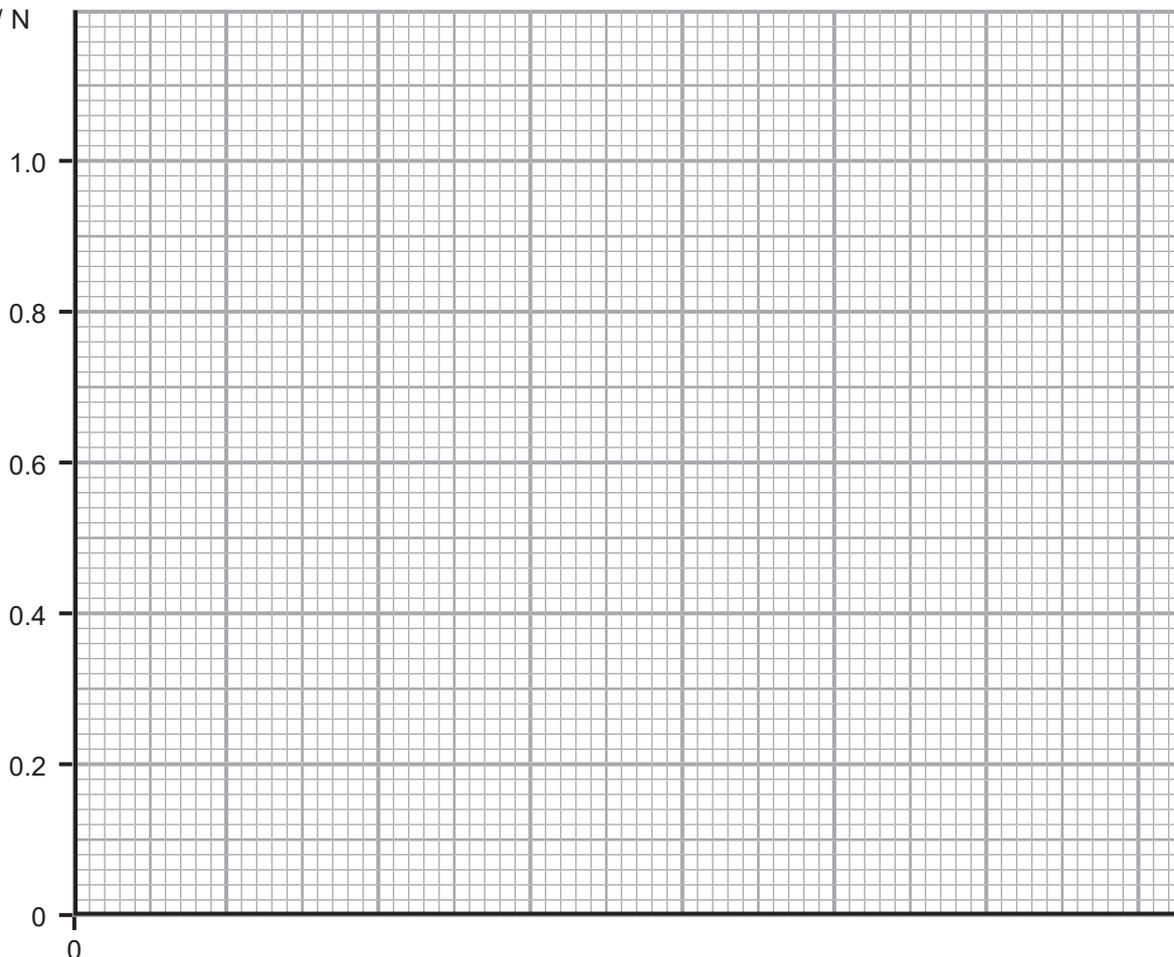
You should choose a suitable scale for the x-axis.

You should label the x-axis.

Draw the line of best fit through the points.

[6]

Accelerating  
force / N



(vi) What two features of the graph are both needed to confirm the relationship as one of direct proportion?

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

[Turn over

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\*20GPY3211\*

- (b) Look at the diagrams below that represent the forces acting on the same moving car at different times.  
The direction of motion is also shown for each time.  
In the box beside each diagram describe the motion of the car. Make your choice from the following;

*Stationary*  
*Moving with a constant speed*  
*Accelerating (increasing speed)*  
*Decelerating (decreasing speed)*



Source: Principal Examiner

[4]



**4** A student is asked to investigate experimentally how the resistance of a metallic conductor depends on its length.

**(i)** What is the independent variable in this investigation?

\_\_\_\_\_ [1]

**(ii)** What is the dependent variable in this investigation?

\_\_\_\_\_ [1]

**(iii)** Temperature is one quantity that is controlled during the investigation. Name two other quantities which must be controlled in the investigation.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

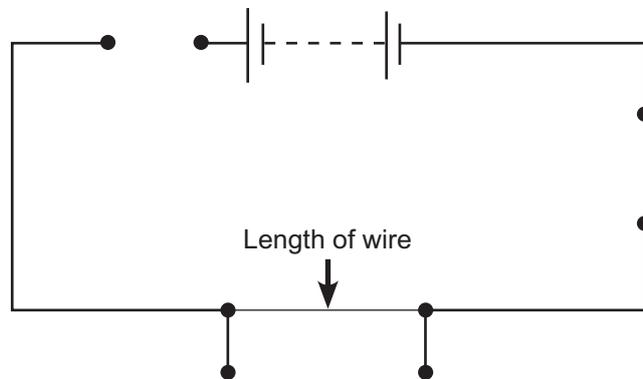
**(iv)** What circuit component is needed to ensure that the temperature is kept constant? Describe how it is used to achieve this.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**[Turn over**



- (v) Complete the circuit diagram below to show how the components needed to carry out the investigation are connected.  
Credit will only be given if the correct electrical symbols are used.



[3]





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\*20GPY3215\*

- (vi) During the investigation the following experimental results were obtained.  
The resistance R of the wire is calculated using the equation below.

$$R = \frac{V}{I}$$

where V is the voltage and I the current.

Length / cm	0	10	20	30	40	50
Voltage/ V	0	3.0	3.0	3.0	3.0	3.0
Current / A	0	2.0	1.0	0.7	0.5	0.4
Resistance / $\Omega$	0			4.3		

Using the values in the table, calculate the resistance of the wire for each length of wire.

Record your values for resistance to **one decimal place** in the table above.

One value has already been calculated for you.

Use the space below for your calculations.

[2]

- (vii) The student decides to plot a graph of resistance against length. Using the values from the table above, plot the graph on the grid opposite.

Label the y-axis with the appropriate quantity and unit.

Select an appropriate scale for the y-axis.

[5]

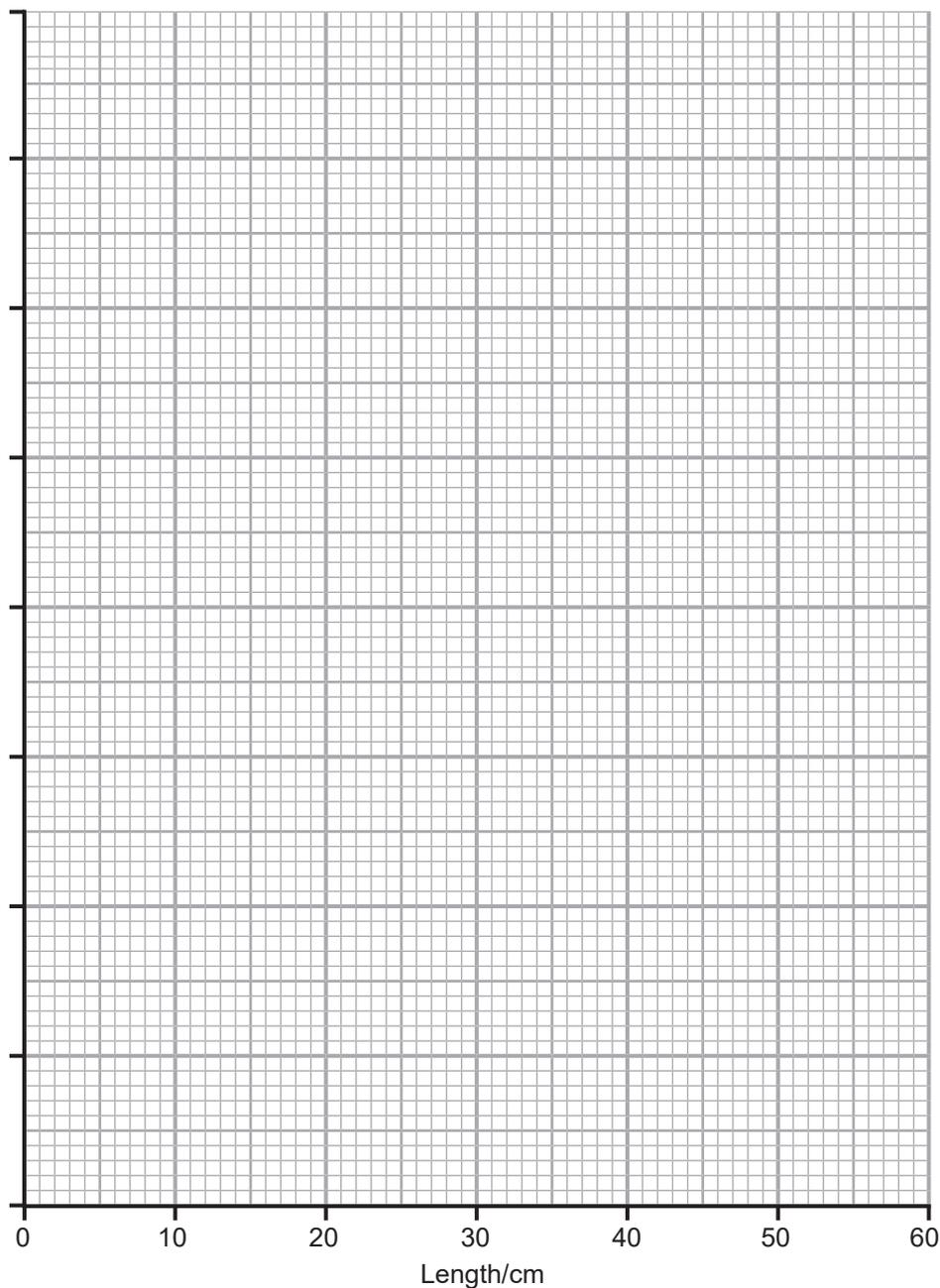


(viii) Draw the line of best fit.

[1]

(ix) Calculate the gradient of the graph.  
Give your answer to two decimal places.

Gradient = \_\_\_\_\_ [2]



(x) State the unit for the gradient.

Unit = \_\_\_\_\_ [1]

The resistance  $R$  and length of wire  $L$  are related by the equation

$$R = KL$$

where  $K$  is a constant.

(xi) How is the gradient numerically related to the value of  $K$ ?

\_\_\_\_\_ [1]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	

<b>Total Marks</b>	
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Examiner Number

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