



Centre Number

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Candidate Number

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General Certificate of Secondary Education  
2014–2015

# Double Award Science: Physics

Unit P1  
Foundation Tier



[GSD31]

THURSDAY 26 FEBRUARY 2015, MORNING

### TIME

1 hour.

### INSTRUCTIONS TO CANDIDATES

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

Write your answers in the spaces provided in this question paper.  
Answer **all nine** 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.

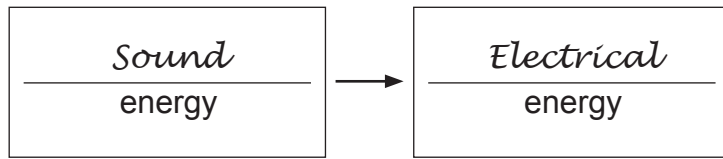
Quality of written communication will be assessed in Question **7(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

<b>Total Marks</b>	
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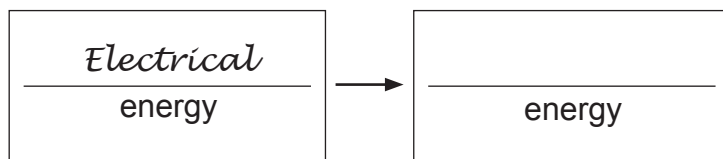
1 A microphone changes **sound** energy into **electrical** energy, as shown in the energy flow diagram below.



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Fill in the spaces below to show the **main** types of energy changes which the device is designed to bring about.

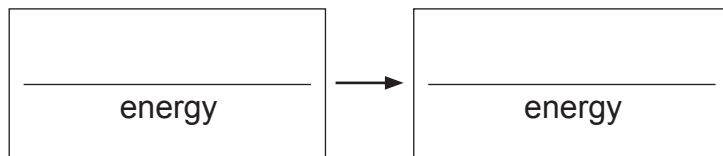
(a) Electrical oven



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[1]

(b) Loudspeaker



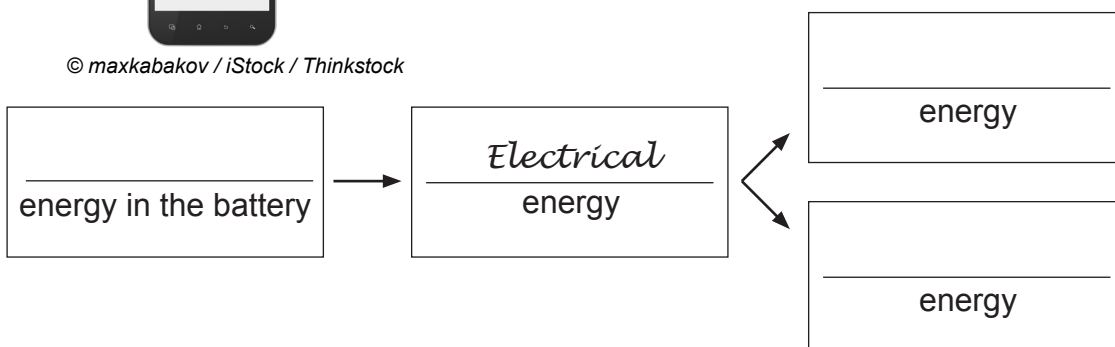
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[2]

(c) Mobile phone



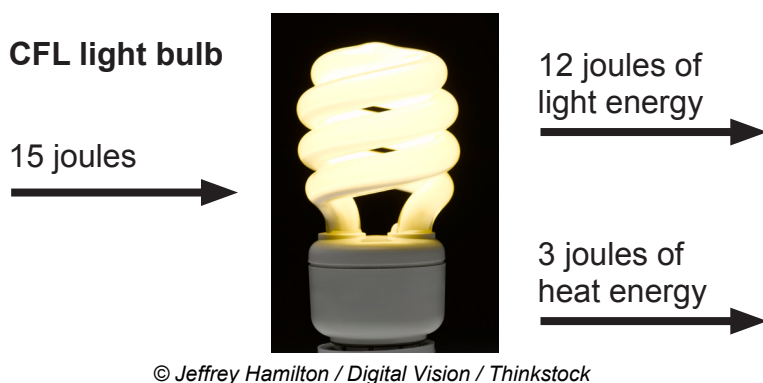
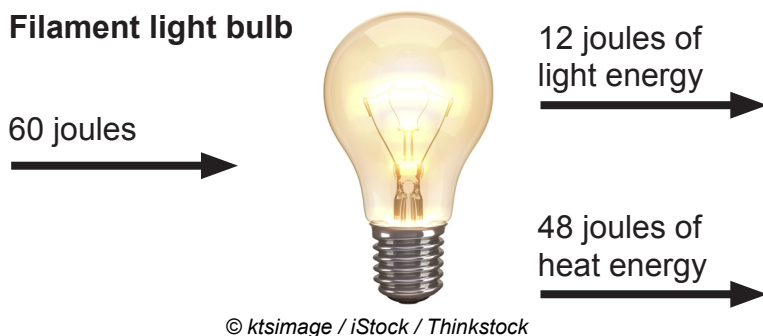
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[3]

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Marks	Remark
○	○

- 2 Filament light bulbs and CFL light bulbs are designed to convert electrical energy into light energy.



- (a) Use the information above to explain fully why the government is encouraging the use of the more modern CFL light bulbs.

\_\_\_\_\_

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

- (b) Calculate the efficiency of the CFL light bulb.

**You are advised to show your working out.**

Efficiency = \_\_\_\_\_ [3]

Examiner Only	
Marks	Remark
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Read the passage below.

Some islands off the west coast of Ireland have no **coal** or **oil**. The islanders depend on **wind** energy to generate electricity. When there is little demand for electricity, the islanders charge their batteries. They can use the batteries if there is no wind.

- (c) (i) Name one renewable and one non-renewable energy resource mentioned in the passage above.

Renewable energy resource \_\_\_\_\_

Non-renewable energy resource \_\_\_\_\_ [2]

- (ii) Name one renewable and one non-renewable energy resource **not** mentioned in the passage above.

Renewable energy resource \_\_\_\_\_

Non-renewable energy resource \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

3 (a) A train is 75 m long. The whole train takes 5 seconds to pass a signal.

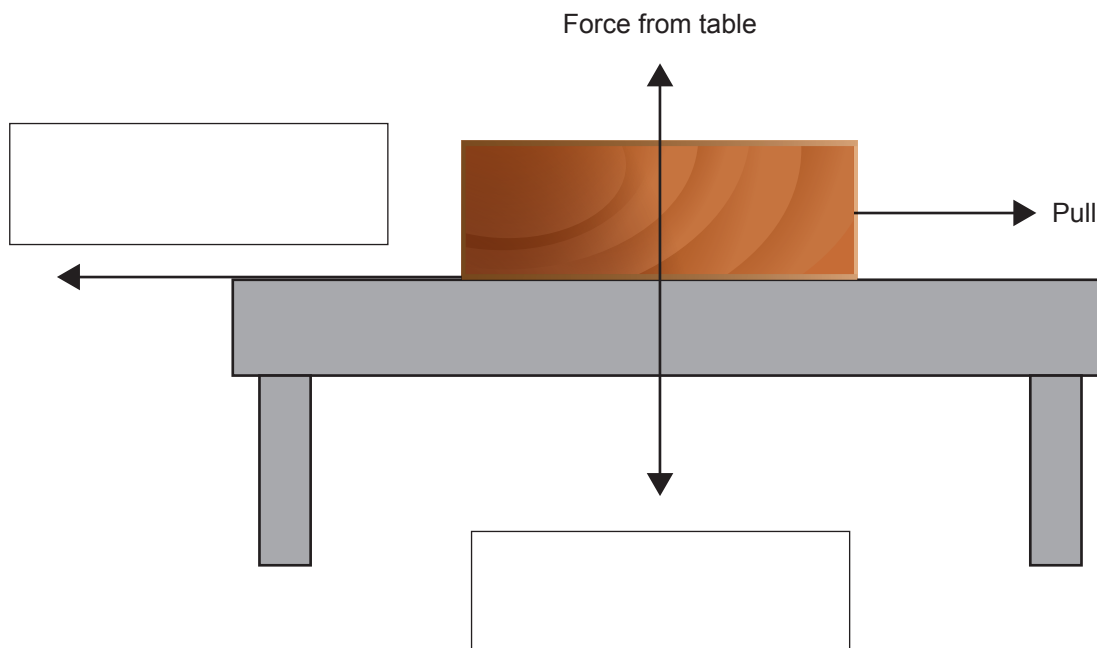


Calculate the speed of the train.

You are advised to show your working out.

Speed of train = \_\_\_\_\_ m/s [3]

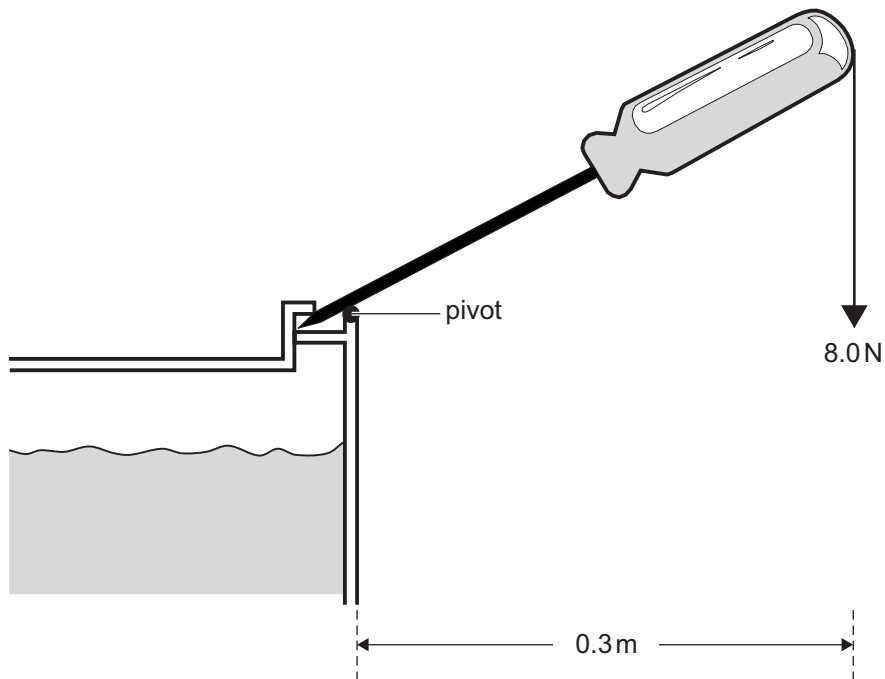
(b) The diagram shows a block of wood being pulled across a table.



Complete the boxes by inserting the names of the two other forces acting on the block of wood. [2]

Examiner Only	
Marks	Remark
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The diagram shows a screwdriver being used to open a tin of paint.  
The force exerted by the painter is 8.0 N.



- (c) (i) Calculate the moment of the 8.0 N force about the pivot.  
Remember to include the unit.

**You are advised to show your working out.**

Moment = \_\_\_\_\_ [4]

- (ii) Tick (✓) the correct box to indicate the direction of the moment of the 8.0 N force.

Clockwise

Vertically downwards

Anticlockwise

[1]

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Marks	Remark

4 (a) Complete the following sentence.

An object has kinetic energy if it is \_\_\_\_\_ [1]

(b) A bus, car and athlete are travelling at 10 m/s.



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Which has the greatest kinetic energy?

\_\_\_\_\_



Explain your answer.

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

(c) Calculate the kinetic energy of a 60 kg cheetah moving at 5 m/s.

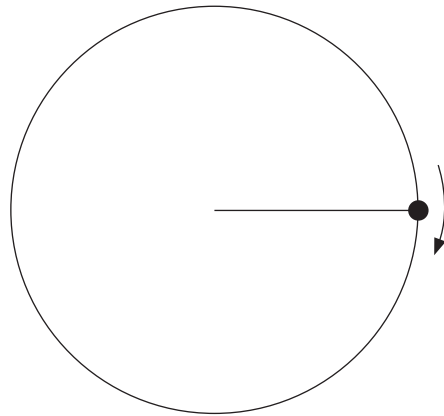
**You are advised to show your working out.**

Kinetic energy of cheetah = \_\_\_\_\_ J [3]

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Marks	Remark
	



5 A steel ball is whirled on a string in a horizontal circle. A bird's eye view of the situation is shown in the diagram below.



(a) Tick (✓) the correct box to show which force provides the centripetal force acting on the steel ball.

- Friction
- Electric force
- Weight
- Tension  [1]

(b) (i) Complete the formula below, **in words**, to find the momentum of an object.

Momentum = \_\_\_\_\_ [1]

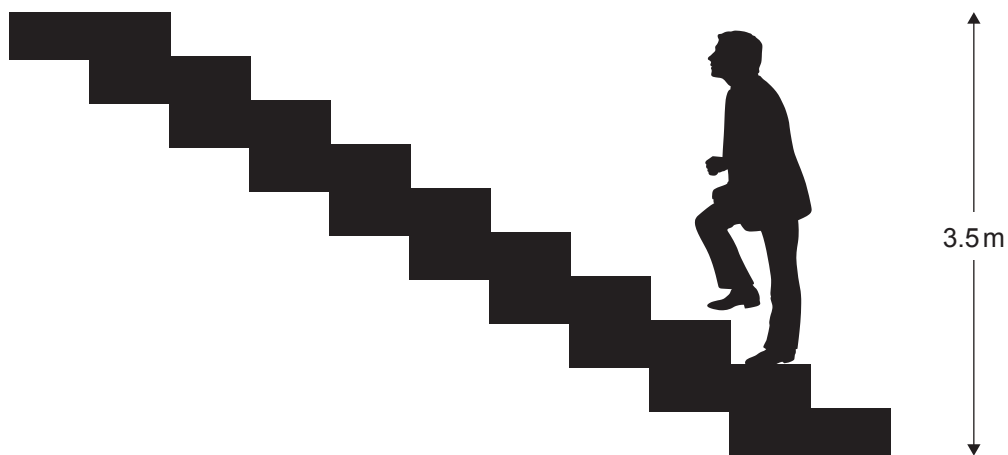
(ii) The steel ball has a mass of 0.5 kg and velocity of 4.0 m/s. Calculate the momentum of the steel ball.

**You are advised to show your working out.**

Momentum = \_\_\_\_\_ kg m/s [2]

Examiner Only	
Marks	Remark
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6 Robert, whose mass is 70 kg, runs up a flight of stairs.



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(a) Calculate Robert's weight in newtons.

Weight = \_\_\_\_\_ N [2]

(b) The vertical height of the stairs is 3.5 m.  
Calculate the work done by Robert.

**You are advised to show your working out.**

Work done = \_\_\_\_\_ J [3]

(c) The time taken by Robert to run up the stairs is 5.0 s.  
Use your answer to part (b) to calculate the power developed by Robert.

**You are advised to show your working out.**

Power = \_\_\_\_\_ W [3]

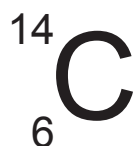


- 8 (a) An atom is made up of protons, neutrons and electrons. Complete the table below to show the relative electrical charge and the location of each particle. Two of the boxes have already been done for you.

Particle	Relative electrical charge	Location in the atom
Proton	+1	In the nucleus
Neutron		
Electron		

[4]

- (b) The symbol for the nucleus of carbon-14 is shown below.



- (i) How many protons does the nucleus of carbon-14 contain?

Number of protons = \_\_\_\_\_ [1]

- (ii) How many electrons does a neutral atom of carbon-14 contain?

Number of electrons = \_\_\_\_\_ [1]

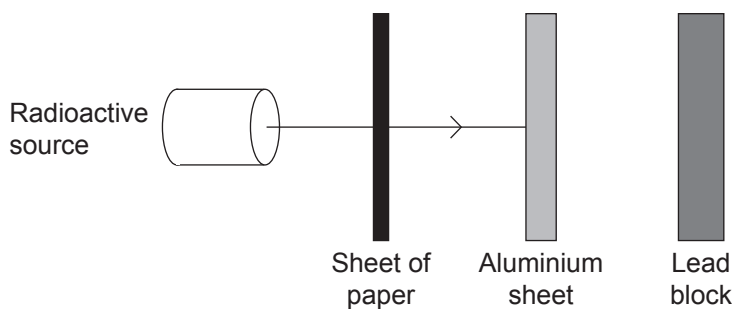
- (iii) How many neutrons does a neutral atom of carbon-14 contain?

Number of neutrons = \_\_\_\_\_ [1]

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Marks	Remark
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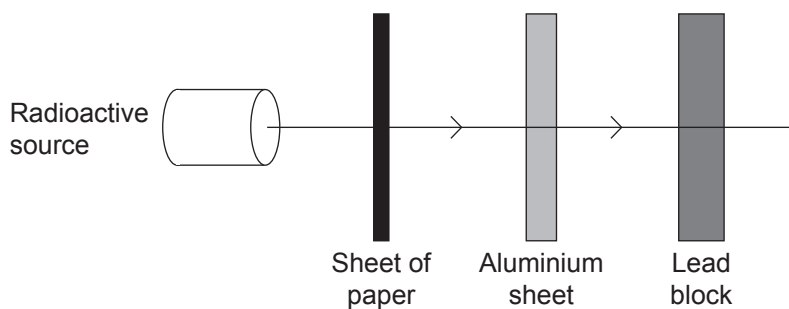
(c) The diagrams show two radiations being emitted by a radioactive substance and being absorbed by different materials. State the name of the radiation being emitted in each case, in the appropriate space.

(i)



Radiation = \_\_\_\_\_ [1]

(ii)



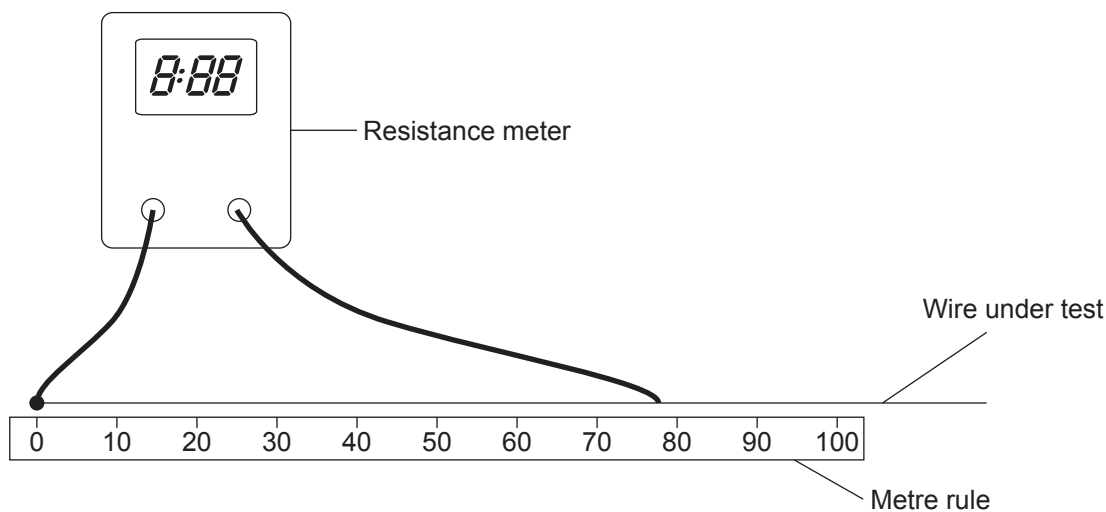
Radiation = \_\_\_\_\_ [1]

(iii) What name is given to the electromagnetic radiation which comes from the nucleus of a radioactive atom?

Radiation = \_\_\_\_\_ [1]

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Marks	Remark

- 9 The apparatus required to investigate the factors affecting the resistance of copper wire is shown below.



According to theory, the resistance  $R$  of a copper wire is proportional to its length  $L$  and the relationship is given by the equation

$$R = k \times L \quad \text{Equation 9.1}$$

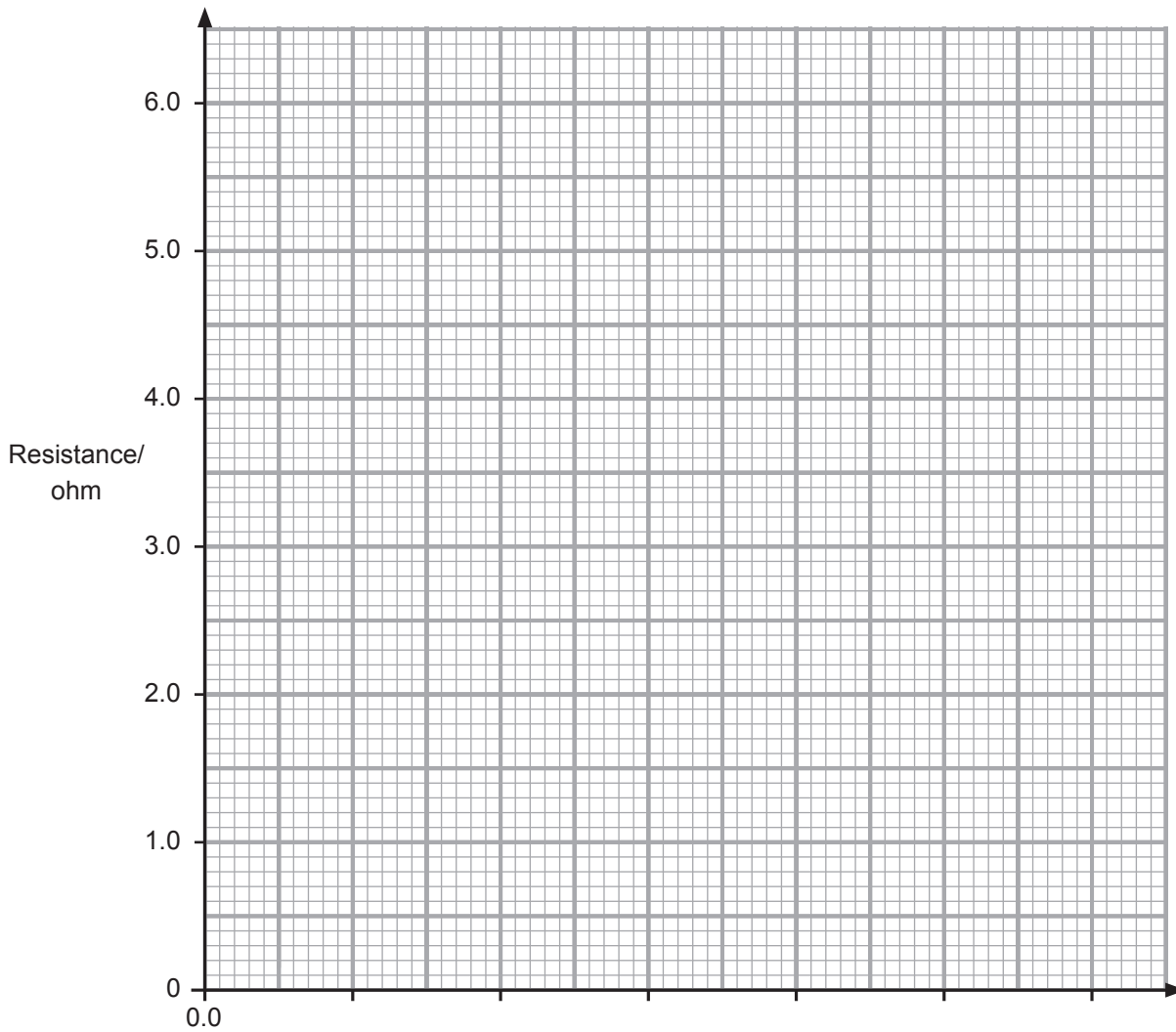
where  $k$  is a constant.

The results recorded in an experiment to verify the above relationship are in the table below.

<b>Length/m</b>	0.0	0.2	0.4	0.6	0.8	1.0
<b>Resistance/ohm</b>	0.0	1.2	2.4	3.6	4.5	6.0

- (a) Choose a suitable horizontal scale and label the horizontal axis. [2]
- (b) Plot the points on the grid of resistance against length. [2]

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Marks	Remark
○	○



- (c) Draw the line of best fit. [1]
- (d) Draw a circle around the point which does **not** show the trend in the graph. [1]
- (e) Use your graph to determine the constant  $k$ , in **Equation 9.1**. Remember to include the units for  $k$ .

**You are advised to show your working out.**

$k = \underline{\hspace{2cm}}$ : Units =  $\underline{\hspace{2cm}}$  [4]

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