

New  
Specification



Centre Number

71	
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Candidate Number

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General Certificate of Secondary Education  
2012–2013

## Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

WEDNESDAY 29 FEBRUARY 2012

9.30 am–10.30 am



### 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 ten** 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 may be assessed in **questions requiring extended answers**.

For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
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10	

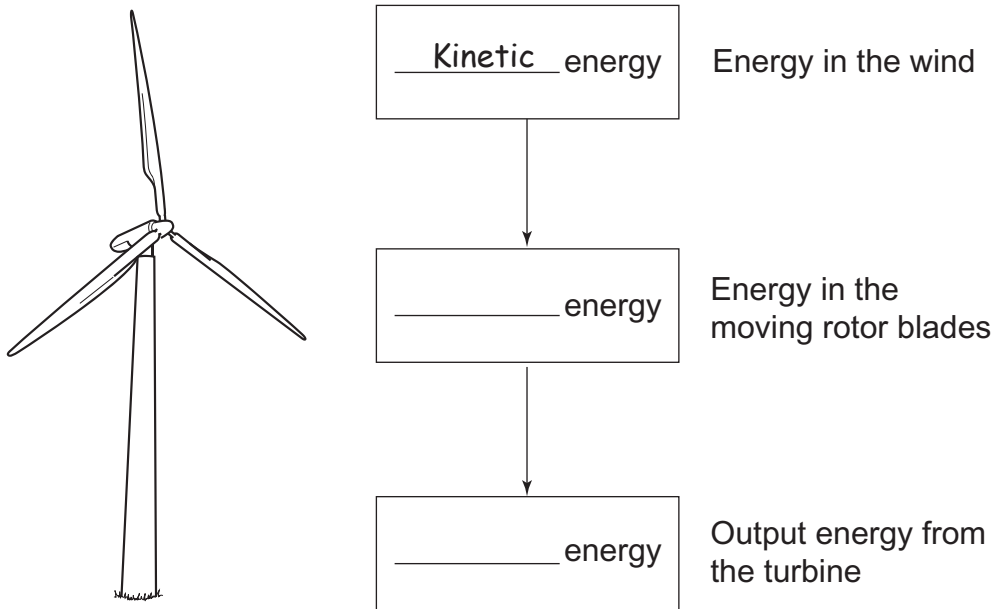
<b>Total Marks</b>	
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1 The largest European wind farm has recently been opened off the coast of Kent.

(i) Complete the energy flow diagram below naming the **main** energy changes taking place in a wind turbine. The first stage has been done for you.



[2]

(ii) Name **two** unwanted forms of energy that result from the use of wind turbines.

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

(iii) State a disadvantage of wind turbines.

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

(iv) State **two** advantages of using wind turbines.

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

Examiner Only	
Marks	Remark
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- 2 Electricity companies are increasing the price of electricity for consumers. Energy-saving lamps will need to be considered.



filament lamp



energy-saving lamp

- (i) Complete the table for the filament lamp.

Type of lamp	Electrical input energy in J	Heat energy produced in J	Light energy produced in J
Filament lamp	100	95	
Energy-saving lamp	100	75	25

[1]

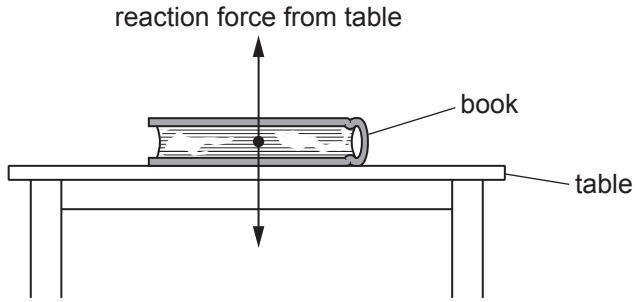
- (ii) Calculate the efficiency of the energy-saving lamp.

You are advised to show your working out.

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

Examiner Only	
Marks	Remark
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3 A book is at rest on a table.



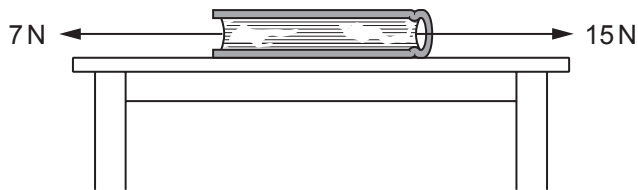
(a) Name the downwards force acting on the book.

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

(b) Explain why the book is at rest.

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

(c) There are now two horizontal forces acting on the book.



(i) Calculate the resultant of these two forces.

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

(ii) Describe fully the motion of the book.

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

Examiner Only	
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4 (a) (i) Name the three particles that make up an atom.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [3]

A nucleus has an atomic number 3 and mass number 7.

(ii) What does this tell you about the particles that make up the nucleus?

\_\_\_\_\_

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

(b) (i) What is a beta ( $\beta$ ) particle?

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

(ii) What part of the atom emits a beta particle?

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

(iii) Name **two** radiations, other than beta particles, that can be emitted by a radioactive substance.

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

A sheet of paper can stop **one** of the radiations emitted by a radioactive source.

(iv) What is the name of this radiation?

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

Examiner Only	
Marks	Remark
○	○

5 A car starts off from rest and reaches a speed of 15 m/s in a time of 20 seconds.

(a) Calculate its acceleration in  $\text{m/s}^2$ .

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

Acceleration = \_\_\_\_\_  $\text{m/s}^2$  [3]

(b) Explain the difference between speed and velocity.

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

(c) What do speed and velocity have in common?

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

Examiner Only	
Marks	Remark
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6 Mass and weight are two quantities used in physics.

(a) Mass is measured in kilograms while weight is measured in newtons.

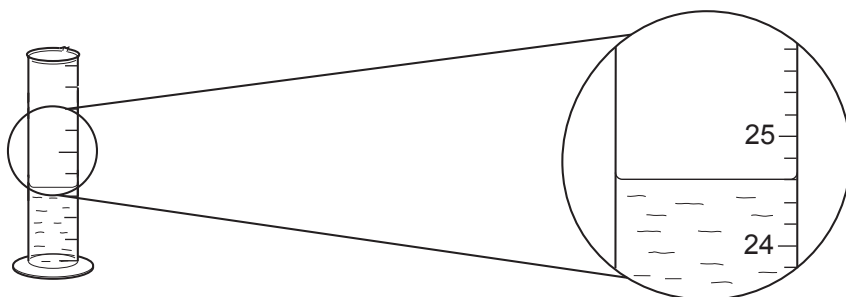
(i) What is mass? \_\_\_\_\_  
\_\_\_\_\_ [1]

(ii) What is weight? \_\_\_\_\_  
\_\_\_\_\_ [1]

(b) Jasmin has a bracelet which she believes to be gold. To find out if this is true she carries out an experiment to measure the density of the material used to make the bracelet.



She pours water into a measuring cylinder.



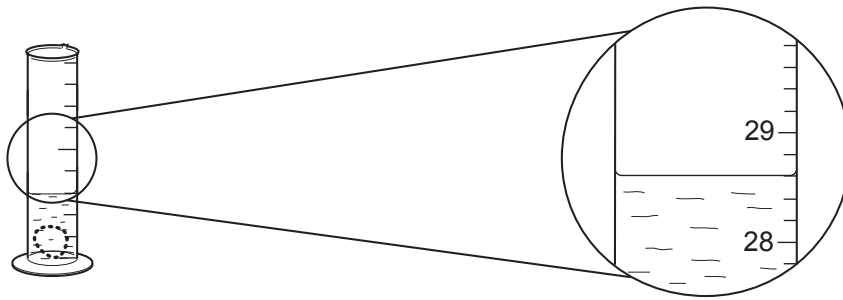
Study the diagram and complete the statement below.

(i) The volume of water in the cylinder is \_\_\_\_\_ cm<sup>3</sup> [1]

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Marks	Remark
○	○



She carefully places the bracelet in the measuring cylinder so that it is completely covered by the water, as shown in the diagram below.



(ii) Calculate the volume of the bracelet.

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

Volume of bracelet = \_\_\_\_\_ cm<sup>3</sup> [2]

When she measures the mass of the bracelet, it is found to be 42 g.

(iii) Calculate the density of the material of the bracelet.

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

Density = \_\_\_\_\_ g/cm<sup>3</sup> [3]

The table below shows the densities of some metals.

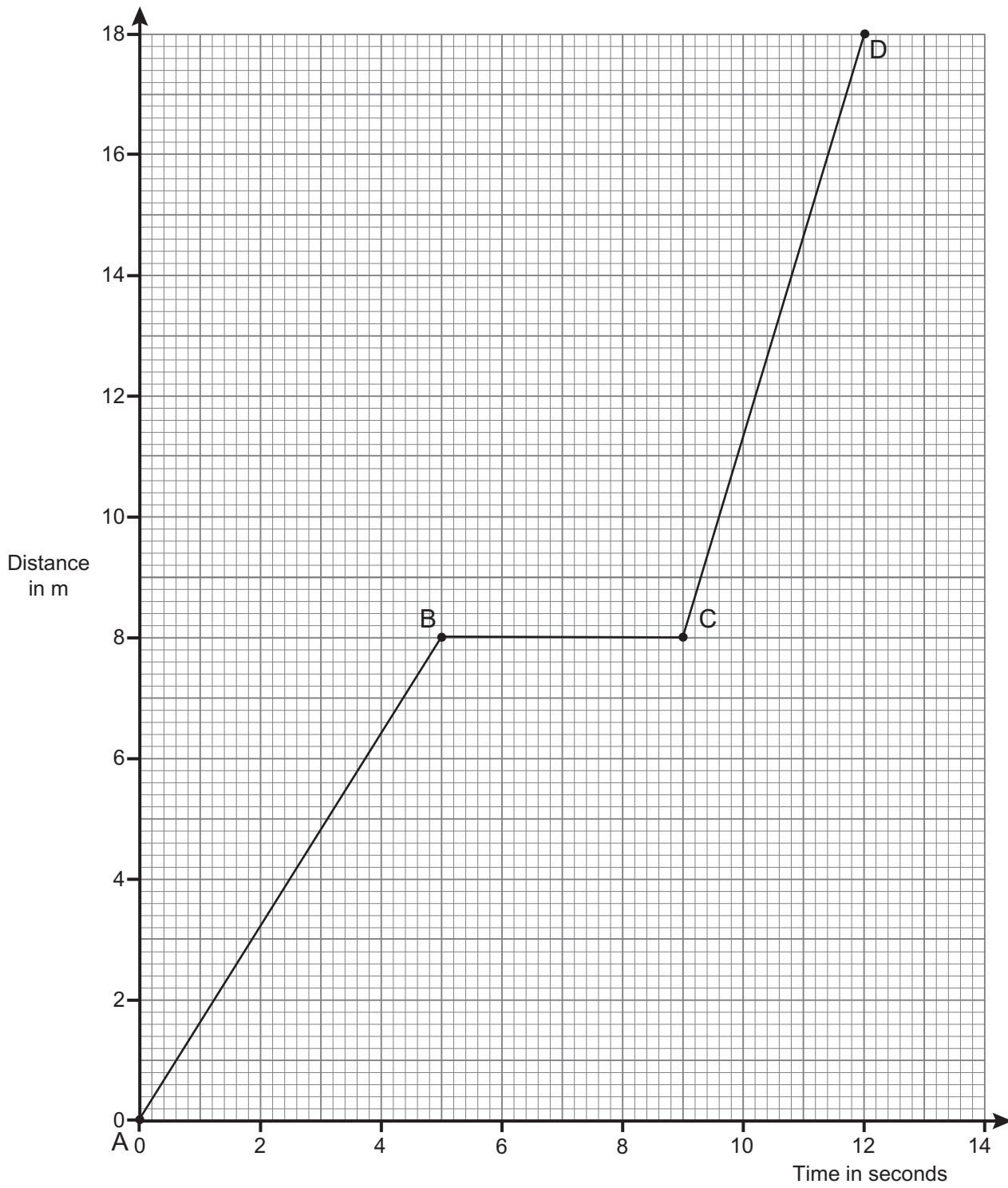
Metal	Density in g/cm <sup>3</sup>
Aluminium	2.7
Brass	8.8
Silver	10.6
Gold	19.3

(iv) Using your answer to part (iii), decide what her bracelet is made of.

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

Examiner Only	
Marks	Remark

7 A distance-time graph for a cyclist is shown below.



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(a) (i) Describe the motion of the cyclist during BC.

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

(ii) What feature of the graph tells you that the speed is greatest during CD?

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

(b) State the distance travelled during the first seven seconds.

Distance = \_\_\_\_\_ m [1]

(c) Use the graph to calculate the average speed of the cyclist over the entire journey.

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

Average speed = \_\_\_\_\_ m/s [3]

Examiner Only	
Marks	Remark

8 A lorry of mass 7500 kg travelling at a velocity 20 m/s decelerates to 0 m/s.

(i) Write down the formula for kinetic energy in the box.

[1]

(ii) Calculate the kinetic energy lost by the lorry as it brakes.

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

Kinetic energy lost = \_\_\_\_\_ J [2]

(iii) State the work done by the brakes of the lorry.

Work done = \_\_\_\_\_ J [1]

The lorry comes to rest in 20 s.

(iv) Calculate the power of the brakes.

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

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

(v) State the power of the brakes in kilowatts (kW).

Power = \_\_\_\_\_ kW [1]

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Marks	Remark
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9 A star's energy is generated by the process of nuclear fusion.

Describe, in detail, what happens in nuclear fusion.

**In this question you will be assessed on your written communication skills including the use of specialist terms.**

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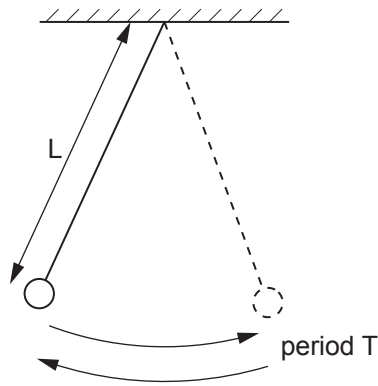
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[6]

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10 The period of a pendulum is the time it takes to swing to the right and back again. Maureen thinks that the period  $T$  of a simple pendulum depends on the length  $L$  of the string according to the formula:

$$T^2 = k L$$



She obtains a set of results and these are shown below.

L in m	0.2	0.3	0.4	0.6	0.7
T in s	0.9	1.1	1.3	1.6	1.7
$T^2$ in $s^2$	0.8		1.7		2.9

(a) Complete the table by entering the other values of  $T^2$ , rounded to one decimal place. [2]

(b) Choose a suitable scale and plot a graph of  $T^2$  on the vertical axis against  $L$  on the horizontal axis. [4]

(c) (i) Draw the line of best fit. [2]

(ii) Does the graph support Maureen's theory?

Explain your answer.

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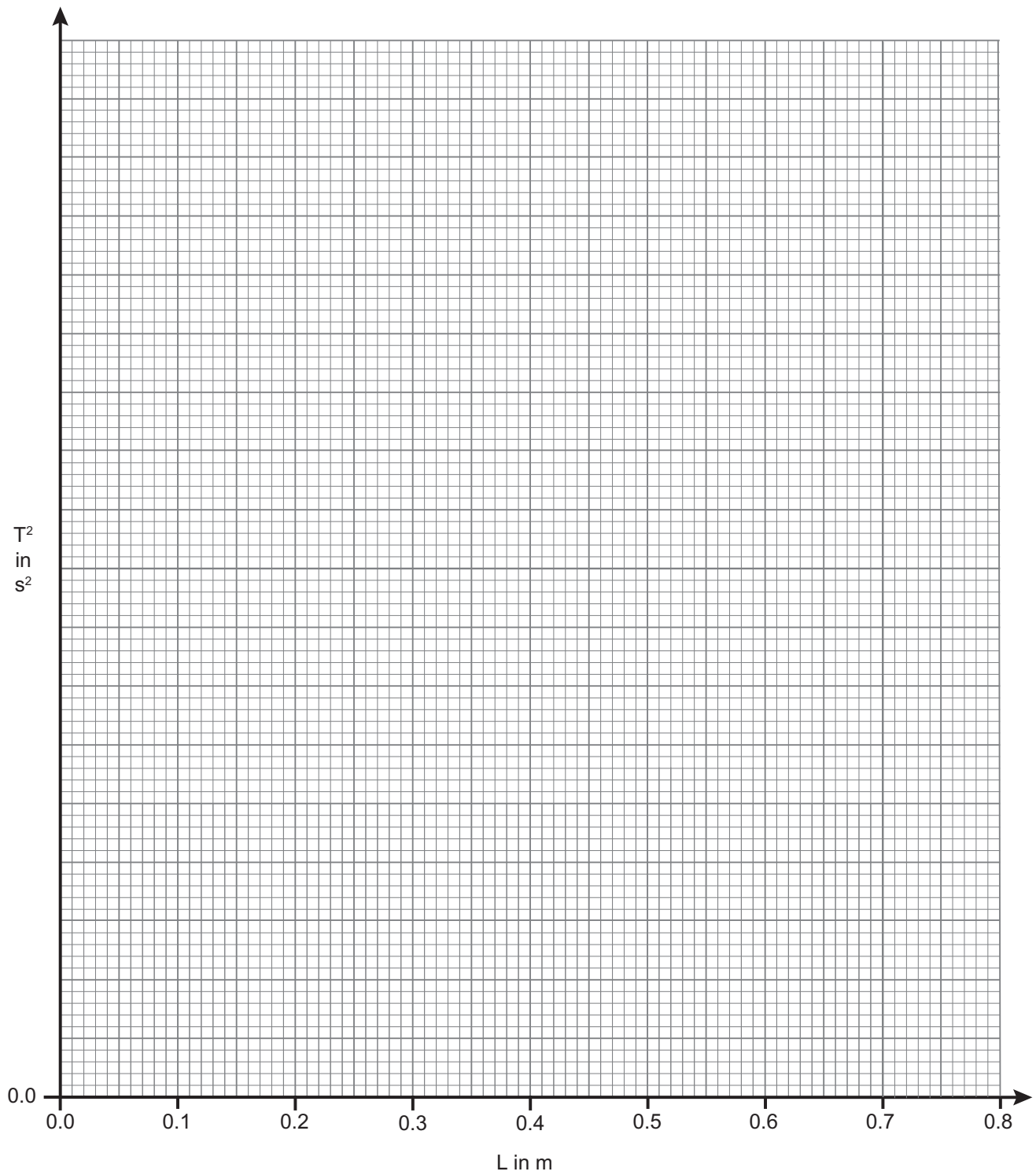
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[2]

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**THIS IS THE END OF THE QUESTION PAPER**

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