



General Certificate of Secondary Education
2015–2016

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1
Foundation Tier



[GSD31]

FRIDAY 13 NOVEMBER 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 ten** questions.

INFORMATION FOR CANDIDATES

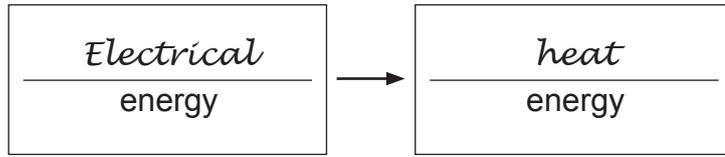
The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **9(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

1 An electric heater is designed to change electrical energy into heat energy.



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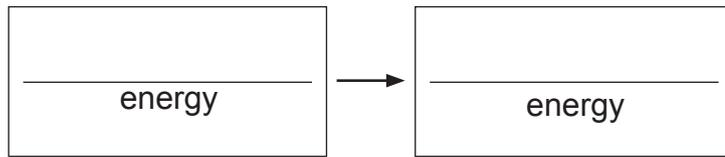


Fill in the spaces below to show the energy change each device is **designed** to bring about.

(i) Microphone



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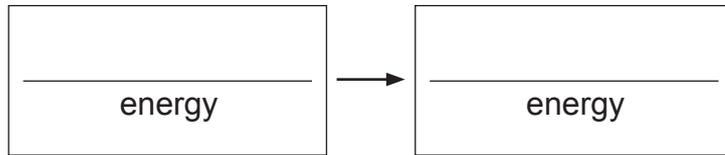


[2]

(ii) Bulb



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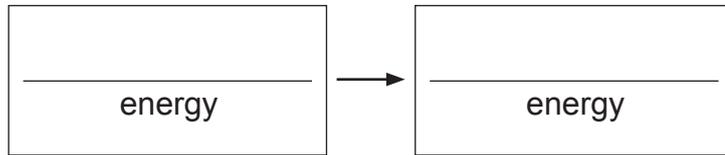


[2]

(iii) Battery



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[2]

Examiner Only	
Marks	Remark
○	○

- 3 (a) When a lawnmower is supplied with 1200 J of chemical energy, the useful work done is 240 J.



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- (i) Calculate the efficiency of the lawnmower.

You are advised to show your working out.

$$\text{Efficiency} = \text{_____} [3]$$

- (ii) Calculate the amount of energy wasted.

$$\text{Energy wasted} = \text{_____} \text{ J } [1]$$

Examiner Only	
Marks	Remark
○	○

On another occasion a gardener uses an ordinary push mower. He pushes with a force of 50 N over a total distance of 120 m.

(b) Calculate the amount of work done. Give your answer in J and in kJ.

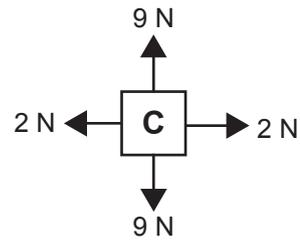
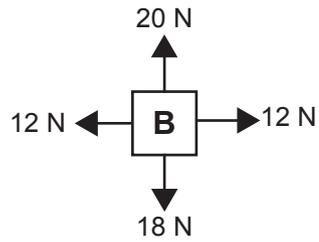
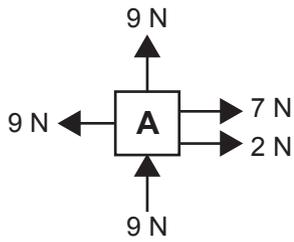
You are advised to show your working out.

Work done = _____ J [3]

Work done = _____ kJ [1]

Examiner Only	
Marks	Remark

(b) The diagrams below show identical objects with different forces acting on them.



(i) Which object could be permanently at rest?

Object _____ [1]

(ii) Which object has an unbalanced force of 2 N?

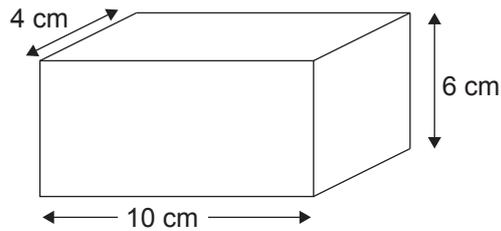
Object _____ [1]

(iii) Which object could be moving at constant velocity?

Object _____ [1]

Examiner Only	
Marks	Remark

5 The diagram shows a block of wood.



(a) (i) Calculate the volume of the block of wood.

You are advised to show your working out.

Volume of block of wood = _____ cm^3 [2]

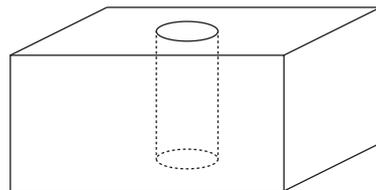
(ii) The mass of the wood is 120 g.

Use your answer to (a)(i) to find the density of the wood.

You are advised to show your working out.

Density of wood = _____ g/cm^3 [3]

(b) A large hole is drilled through the block of wood.



Is the density of the block of wood smaller, larger or unchanged?

Tick (✓) the correct answer.

Smaller

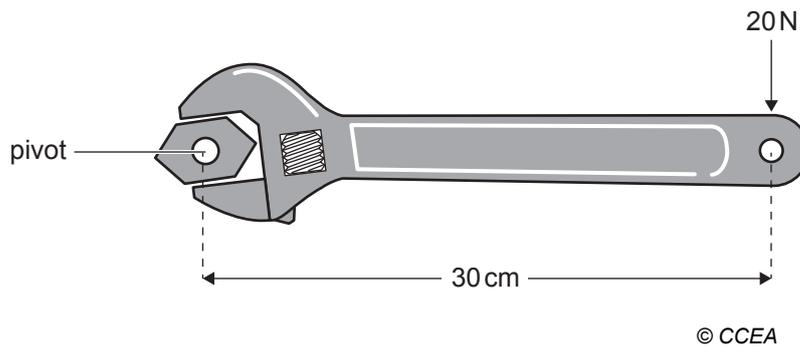
Larger

Unchanged

[1]

Examiner Only	
Marks	Remark
○	○

- 6 A mechanic uses a spanner, of length 30 cm, to loosen a nut. The mechanic applies a force of 20 N vertically downwards at the end of the spanner.

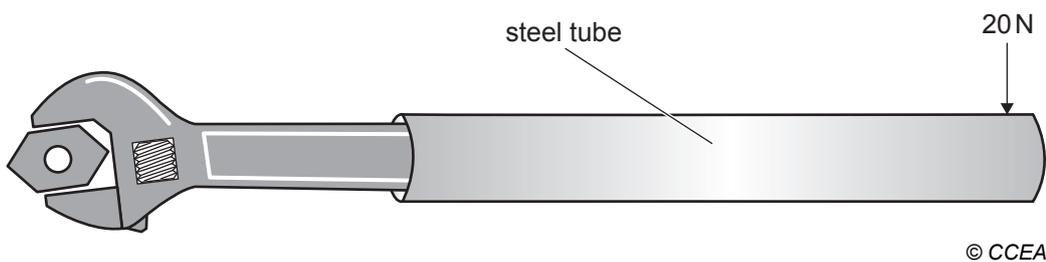


- (i) Calculate the moment of the force, in Nm, applied to the spanner.

You are advised to show your working out.

Moment = _____ Nm [4]

The nut is too difficult to turn. The mechanic attaches a long steel tube to the handle of the spanner, and then applies the same force of 20 N.



- (ii) Explain fully why the mechanic has done this.

_____ [2]

Examiner Only	
Marks	Remark
○	○

- 7 An electric drill does 15 000 J of work in 25 seconds.



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Calculate the output power.
Include the unit for power in your answer.

You are advised to show your working out.

Power = _____ [4]

Examiner Only	
Marks	Remark
<input type="text"/>	<input type="text"/>

8 The symbol for uranium-238 is ${}_{92}^{238}\text{U}$.

(a) (i) How many protons does a nucleus of uranium-238 contain?

Number of protons = _____ [1]

(ii) How many neutrons does a nucleus of uranium-238 contain?

Number of neutrons = _____ [1]

(b) An **isotope** of sodium is **radioactive**.

Explain fully what is meant by the words in bold.

Isotope

 _____ [2]

Radioactive

 _____ [2]

(c) Thirty hours after a sample of radioactive sodium had been prepared, only 25% of it remained.

Calculate the half-life of this isotope.

You are advised to show your working out.

Half-life = _____ hours [3]

Examiner Only	
Marks	Remark
○	○

(b) A body of weight 2 N moves in a circle. At a given instant its velocity is 3 m/s.

Calculate its momentum in kg m/s.

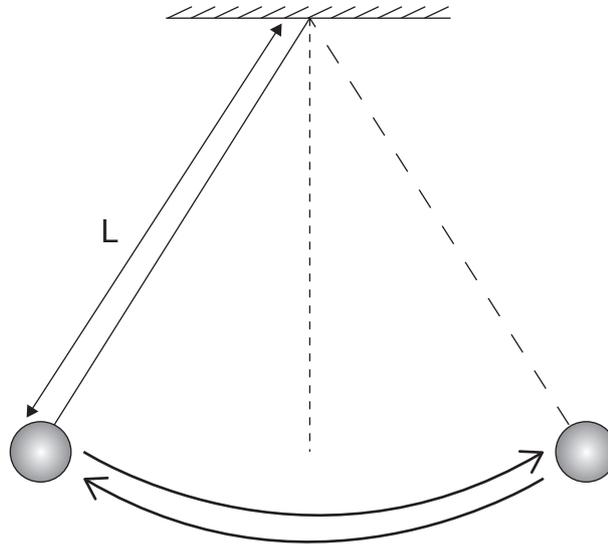
You are advised to show your working out.

Momentum = _____ kg m/s [4]

Examiner Only	
Marks	Remark

- 10 A pendulum consists of a mass hanging on a string. When the pendulum has a length (L), the time (T) for one complete back and forth swing of the mass is given by the relationship:

$$T^2 = kL \quad \text{Equation 10.1}$$



To test this relationship the following results were recorded.

L/m	0.0	0.2	0.4	0.6	0.8	1.0
T/s	0.0	0.90	1.27	1.55	1.79	2.00
T²/s²			1.6			

- (i) Complete the table by entering the values for T^2 , to 1 decimal place. One has been done for you. [2]

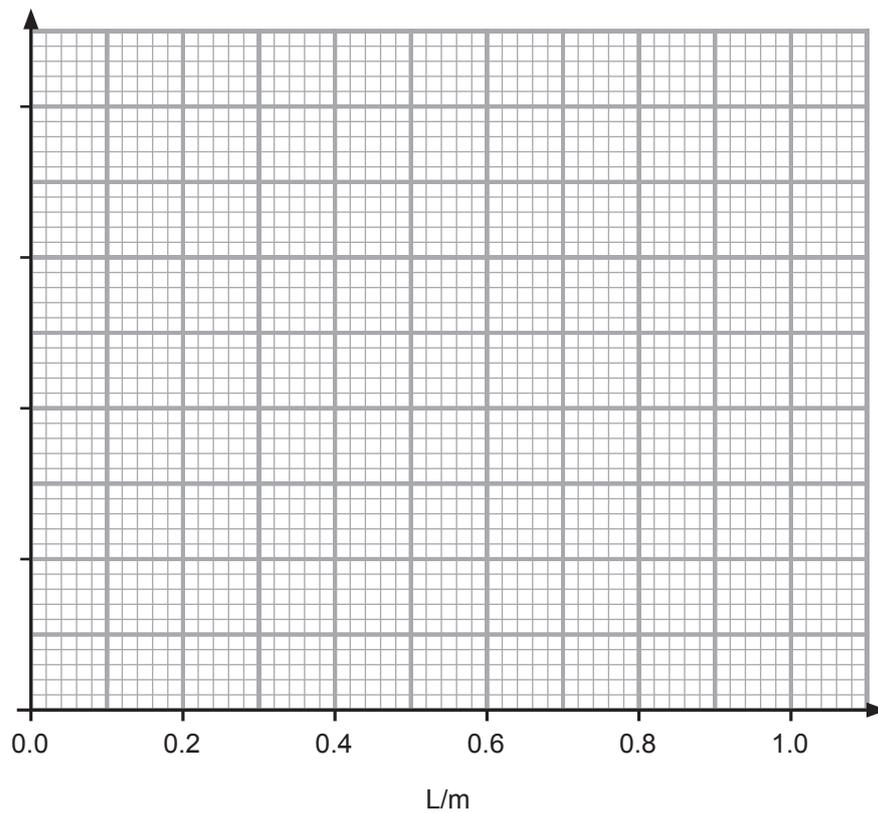
You are asked to plot a graph of T^2 against L .

- (ii) Choose a suitable scale for the vertical axis and label it. [2]

- (iii) Plot the points on the grid. [2]

- (iv) Draw a line of best fit. [1]

Examiner Only	
Marks	Remark
○	○



Examiner Only	
Marks	Remark

(v) Does your graph support the theory described by **Equation 10.1**?

YES / NO Circle your choice.

Explain your answer.

_____ [2]

(vi) Find the value of k from your graph.

k = _____ s²/m [2]

THIS IS THE END OF THE QUESTION PAPER

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