



Rewarding Learning

General Certificate of Secondary Education  
2016–2017

Centre Number

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Candidate Number

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# Double Award Science: Physics

Unit P1  
Foundation Tier



[GSD31]

FRIDAY 11 NOVEMBER 2016, AFTERNOON

### 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.

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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2 In Northern Ireland some electricity is generated using wind farms. Wind is a renewable energy resource.

(a) Tick (✓) the statement which best describes renewable energy resources.

They produce unlimited amounts of energy.

They produce energy which can be used over and over again.

They produce limited amounts of energy.

[1]

(b) Name two **other** renewable energy resources.

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

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

[2]

(c) Name a non-renewable energy resource which does **not** produce greenhouse gases.

\_\_\_\_\_

[1]

Examiner Only	
Marks	Remark
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- 3 In the gym, a runner jogs 1500 m on a treadmill. The time taken by the runner to run this distance is 5 minutes.



© Antonio\_Diaz / iStock / Thinkstock

- (a) By first converting the time to seconds, calculate the runner's average speed on the treadmill in m/s.

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

Average speed = \_\_\_\_\_ m/s [4]

Examiner Only	
Marks	Remark
○	○



- 4 (a) (i) A student is given a lump of coal with an irregular shape and asked to find its volume.  
Describe how the student could find the volume of the lump of coal.

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[3]

- (ii) State one precaution the student should take to ensure an accurate result.

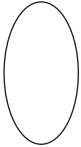

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[1]

- (b) The student finds that the volume of the lump of coal is  $175 \text{ cm}^3$  and its mass is 280 g.  
Calculate the density of the lump of coal, in  $\text{g/cm}^3$ .

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

Density = \_\_\_\_\_  $\text{g/cm}^3$  [3]

Examiner Only	
Marks	Remark
	



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**(Questions continue overleaf)**

5 A crane raises a load, as shown below.



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Information about the process is given in the table below.

Load in N	Time in s	Height raised in m
2000	5	2.5

(a) (i) Select information from the table to calculate the work done by the crane.

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

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

(ii) What is the change in the potential energy of the load when it is raised?

Change in potential energy = \_\_\_\_\_ J [1]

Examiner Only	
Marks	Remark
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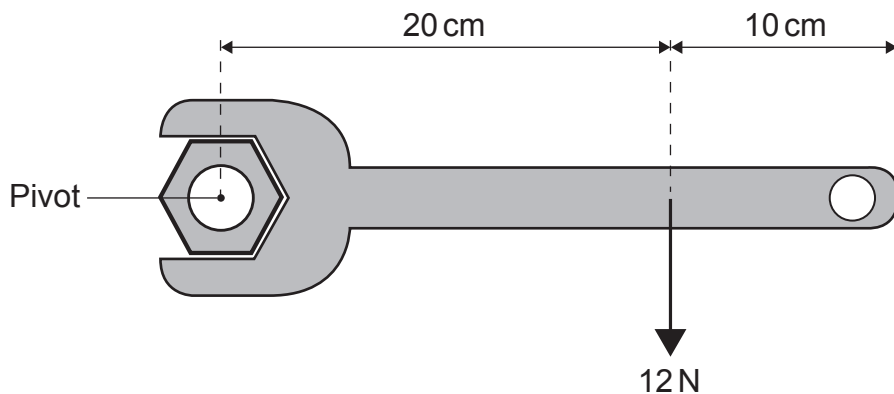
- (b) Calculate the power output of the crane.  
Remember to include the unit with your answer.

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

Power = \_\_\_\_\_ [4]

Examiner Only	
Marks	Remark

6 The diagram shows a spanner being used to tighten a nut.



Source: Chief Examiner

(a) Calculate the moment of the 12 N force about the pivot.

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

Moment = \_\_\_\_\_ N cm [3]

(b) Tick (✓) the box to show the direction of the moment of the 12 N force.

Anticlockwise

Vertically downwards

Clockwise

[1]

Examiner Only	
Marks	Remark
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8 (a) Explain why atoms are electrically neutral.

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[1]

(b) The incomplete table below gives the properties of the three particles which make up an atom. Complete the table.

Particle	Relative mass	Relative charge
	1	+1
Neutron		
Electron	$\frac{1}{1840}$	

[4]

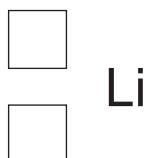
(c) Explain in terms of nuclear particles the meaning of the word **isotope**.

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[2]

(d) The lithium nucleus contains three protons and four neutrons. Complete the symbol below for the lithium nucleus.



[2]

(e) Another atom has the same number of neutrons but a different number of protons.

Tick (✓) the box to show what this other atom is.

An isotope of lithium

An ion

Another element

[1]

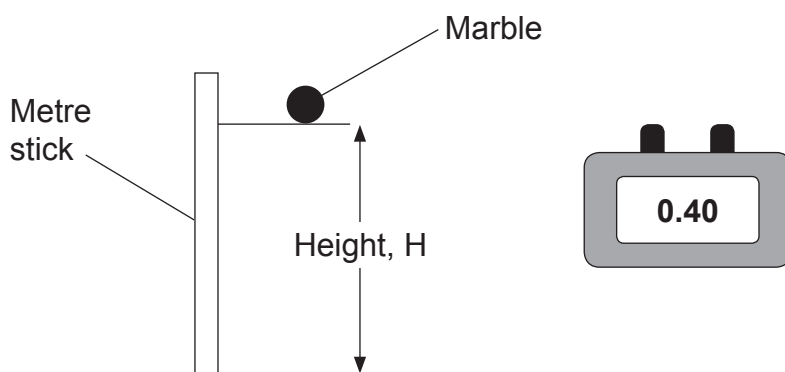
Examiner Only

Marks

Remark



- 9 The acceleration due to gravity can be measured by finding the times,  $T$ , for a marble to fall through various heights,  $H$ , above the Earth's surface.



Source: Chief Examiner

According to theory, the relationship between the height,  $H$  and the time  $T$ , is given by:

$$H = k T^2 \quad \text{Equation 9.1}$$

The following data was obtained.

<b>Height/m</b>	0.2	0.4	0.6	0.8	1.0
<b><math>T^2/s^2</math></b>	0.04	0.08	0.12	0.16	0.20

- (a) On the grid opposite, draw a graph of height  $H$  on the vertical axis versus  $T^2$  on the horizontal axis.

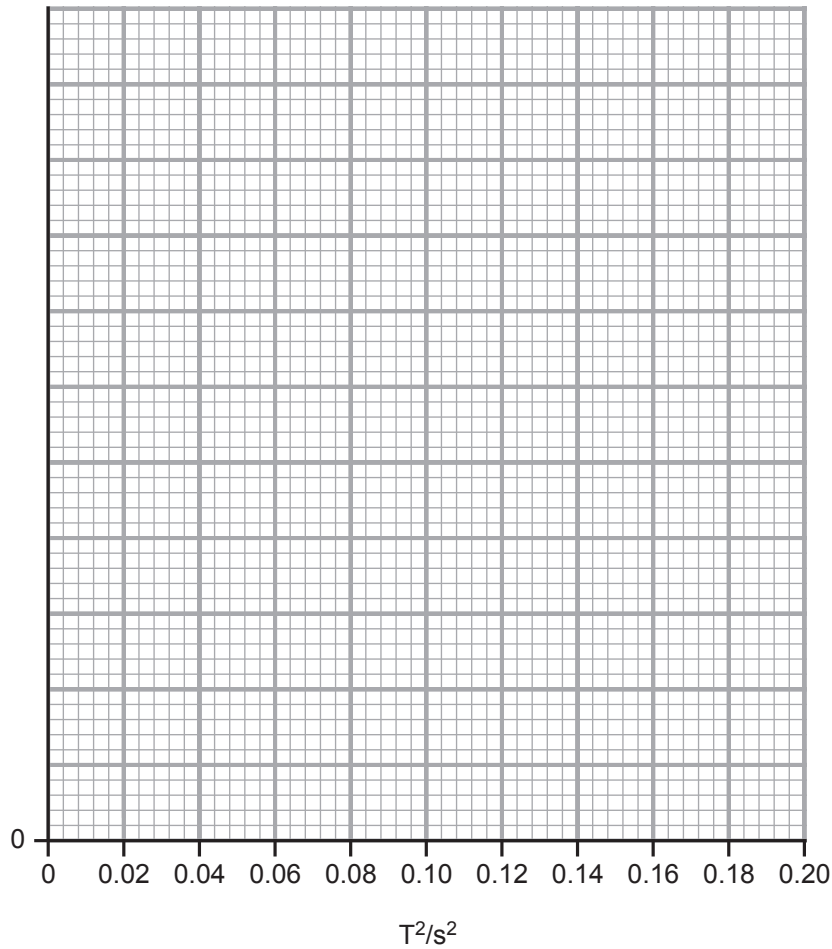
(i) Label the vertical axis and insert the appropriate scale. [2]

(ii) Plot the points. [2]

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

Examiner Only	
Marks	Remark
○	○





Examiner Only	
Marks	Remark

- (b) (i) Use your graph to find the value of  $k$ .  
Remember to include the unit for  $k$ .

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

$k =$  \_\_\_\_\_ [2]

Unit of  $k =$  \_\_\_\_\_ [1]

- (ii) Does your graph support the relationship between  $H$  and  $T^2$  in equation 9.1?

YES      NO      **Circle the correct answer.**

Explain your answer.

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[2]

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

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