



General Certificate of Secondary Education
2017–2018

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1
Foundation Tier

ML

[GSD31]

WEDNESDAY 23 MAY 2018, AFTERNOON

TIME

1 hour, plus your additional time allowance.

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 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.

- 1 Look at the box below. It shows the main energy resources used in the UK.

coal	solar	nuclear
gas	wind	oil

Some energy resources are renewable and some are non-renewable.

- (i) What is a **non-renewable** energy resource?

_____ [1]

- (ii) Write down the names of two **renewable** energy resources from the list.

_____ and _____ [2]

- (iii) When choosing an energy resource, it is important to think about how harmful it is to the environment.

Tick (✓) the correct box below.

Renewable energy resources cause more harm to the environment.

Non-renewable energy resources cause more harm to the environment.

Both are equally harmful.

[1]

- (iv) How do fossil energy resources pollute the environment?

_____ [1]



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(Questions continue overleaf)

2 A student uses a mobile phone.



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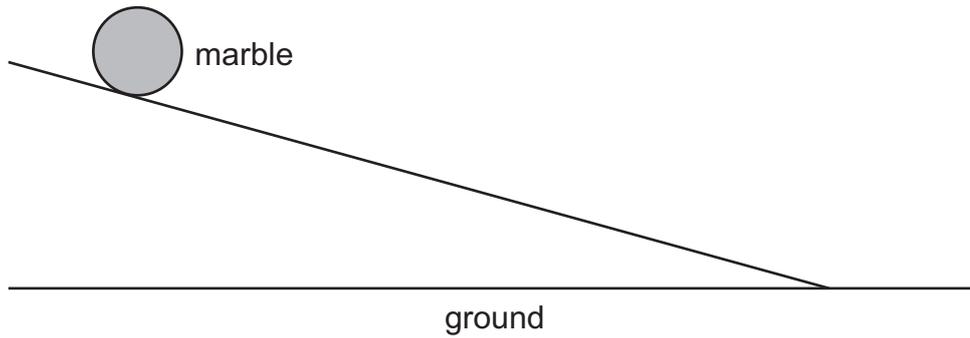
(a) (i) Write down the names of two useful energy forms produced by a mobile phone.

_____ energy **and** _____ energy. [2]

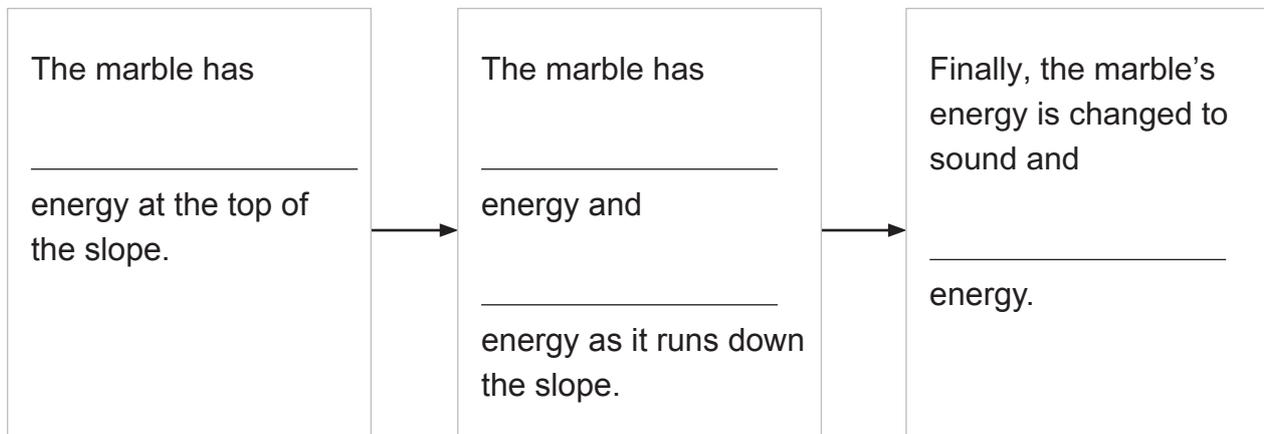
(ii) The mobile phone uses a battery.
Complete the sentence below.

The _____ energy stored in the battery provides
_____ energy to power the phone. [2]

A marble runs from rest down a slope and finally comes to a stop.

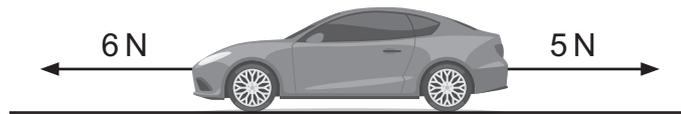


(b) Complete the energy flow diagram below to describe the energy changes which take place.

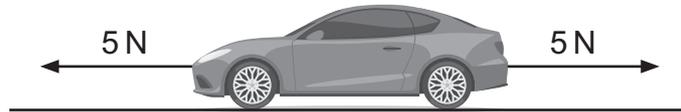


[4]

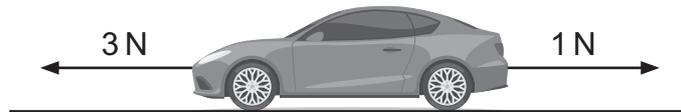
3 Three **identical** toy cars are shown.



A



B



C

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(a) (i) Which car, A, B, or C could be at rest?

Car _____ [1]

(ii) Which car, A, B, or C could be moving at constant speed?

Car _____ [1]

(b) Each car has a mass of 0.5 kg. Use the equation,

$$\text{acceleration} = \frac{\text{resultant force}}{\text{mass}}$$

to calculate the maximum acceleration above.

You should show your working out.



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4 Weight and mass are different quantities and are measured in different units.

(a) What is the weight of 300 g?

You should show your working out.

Weight = _____ N [3]

An iron nail has a mass of 3.0 g. One hundred of these nails have a volume of 37.5 cm³.



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- (b) By first finding the total mass of the nails, calculate the density of the iron. Do **not** change the units of mass and volume in your calculation. Remember to include the unit with your answer.

You should show your working out.

Density = _____ [5]

In a different set of iron nails, each nail has a mass of 5.0 g.

- (c) How will the density of these 5.0 g iron nails compare with the density of the 3.0 g iron nails? Choose by ticking (✓) the correct box below.

The 5.0 g nails will have a bigger density.

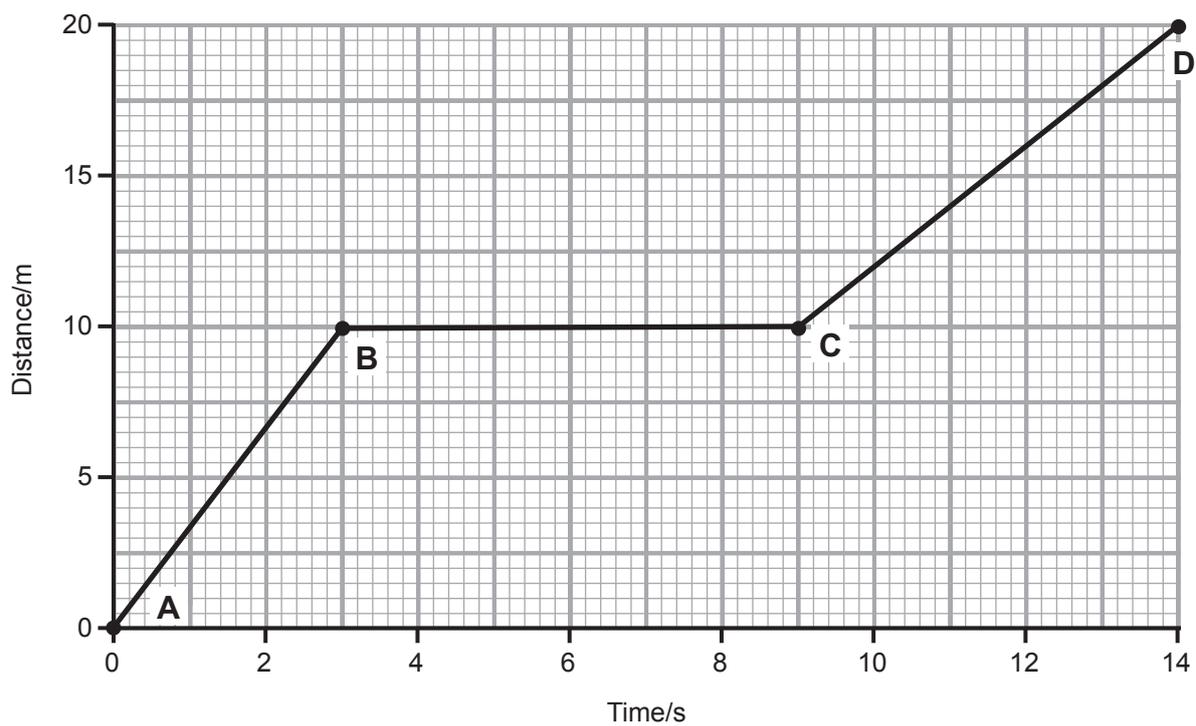
The 5.0 g nails will have a smaller density.

The 5.0 g nails will have the same density.

[1]

[Turn over

5 Look at the graph below. It shows a distance-time graph for a cyclist.



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

_____ [1]

(ii) During which region is the speed of the cyclist greatest?
Choose your answer by ticking (✓) the correct box.

Speed is greatest during

AB	<input type="checkbox"/>
BC	<input type="checkbox"/>
CD	<input type="checkbox"/>

[1]

(iii) Complete the following by ticking (✓) the correct box.

The feature of the graph which allowed you to answer part (ii) was:

The graph has the greatest gradient in this region;

The graph has the smallest gradient in this region;

The area under the graph was greatest in this region.

[1]

(iv) State the distance travelled in the following time intervals.

Distance travelled in the first 3 seconds _____ m

Distance travelled in the first 9 seconds _____ m [2]

(b) Use the graph to find the average speed of the cyclist over the whole journey.
Give your answer to one decimal place.

You should show your working out.

Average speed = _____ m/s [3]

[Turn over

6 The following incomplete sentence describes radioactive decay. Complete the sentence by filling in the blank spaces.

- (a) A nucleus decays because it is _____ and so emits _____ particles or _____ particles or _____ radiation. [4]

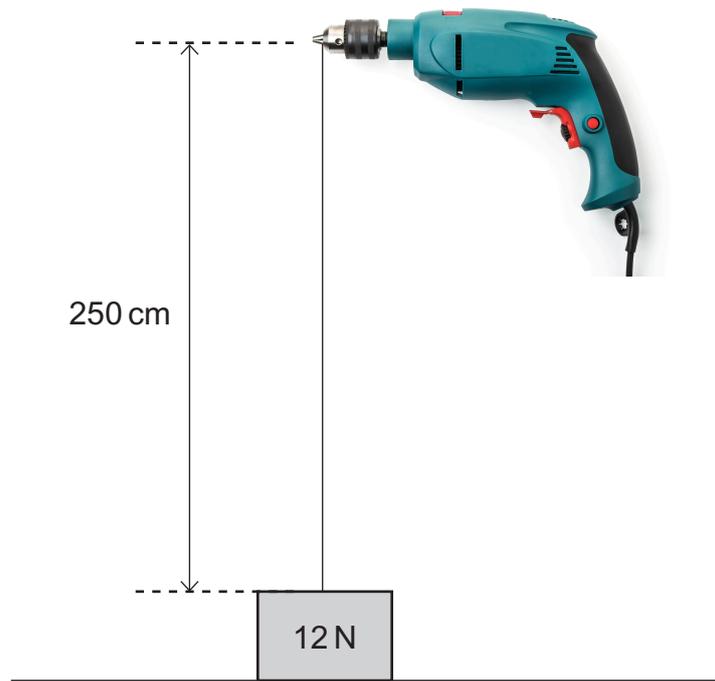
A radioactive substance has 8400 undecayed nuclei and 90 minutes later 1050 of these nuclei remain undecayed.

- (b) Calculate the half-life of the material.

You should show your working out.

Half-life = _____ minutes [3]

- 8 An electric drill is used to lift a weight of 12 N through a height of 250 cm.



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- (a) (i) Calculate the work done.

You should show your working out.

Work done = _____ J [4]

- (ii) It takes 3 seconds to raise the weight.
Calculate the power developed by the motor.
Remember to include the unit.

You should show your working out.

Power developed = _____ [4]

On another occasion the electric motor uses 3000 J of electrical energy to lift a weight. The total energy wasted is 1200 J.

- (b) Calculate the efficiency of the electric drill.

You should show your working out.

Efficiency = _____ [4]

[Turn over

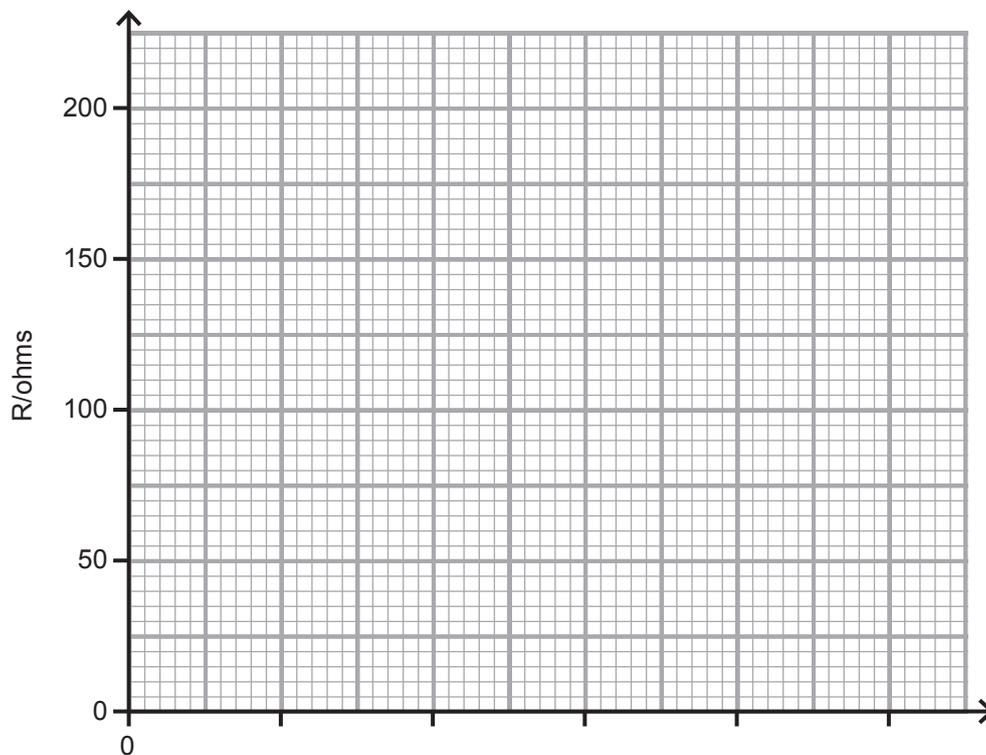
- 9 The electrical resistance of a piece of metal wire changes with temperature. It is suggested that the resistance of the wire is directly proportional to its temperature in °C. This relationship could be written in the form:

$$R = kt \quad \text{Equation 9.1}$$

where R is the resistance in ohms, t is the temperature in °C and k is a constant. To test this, the resistance of the wire is found at different temperatures.

The results are recorded below.

t/°C	100	200	300	400	500
R/ohms	100	125	150	175	200



- (i) Choose a scale for the horizontal axis and label it. [2]
- (ii) Plot the points on the grid. [2]

(iii) Draw the line of best fit and continue the line until it cuts the vertical axis. [1]

(iv) Use the graph to find the resistance of the wire at 0°C .

You should show how you get your answer.

Resistance = _____ ohms [2]

(v) Does your graph confirm the theory described by **Equation 9.1**?

Yes / No Circle your choice.

Explain your answer.

_____ [1]

(vi) Find the gradient of your graph and include the unit.

You should show your working out.

Gradient = _____

Unit = _____ [3]

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Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total Marks	

Examiner Number

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