



Rewarding Learning

General Certificate of Secondary Education
2021–2022

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1

Foundation Tier



[GDW31]

GDW31

WEDNESDAY 24 NOVEMBER, MORNING

TIME

1 hour.

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 60.

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 A student uses a portable computer to access the internet.



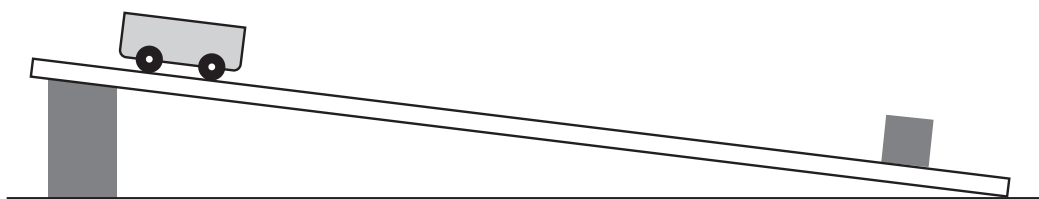
Source: © Getty Images

- (i) Where is the energy stored in the portable computer?

Name two useful forms of energy the portable computer produces.

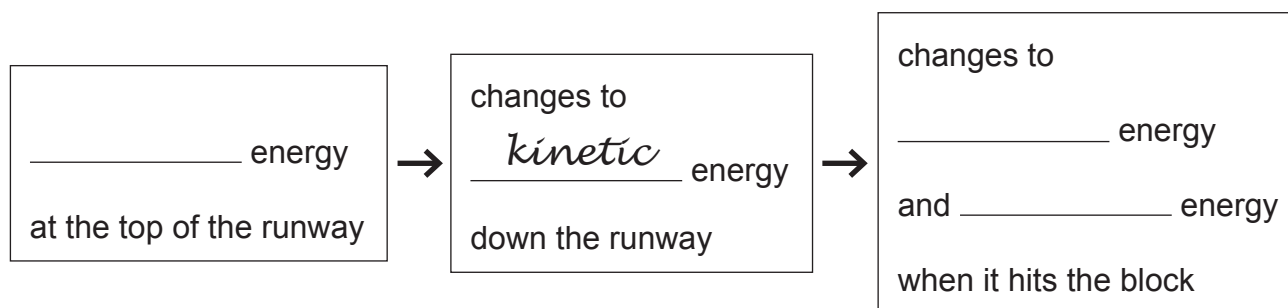
_____ energy and _____ energy. [3]

- (ii) A trolley is held at rest at the top of a runway and then released. At the bottom it hits a block of wood that is fixed to the runway.



Source: Chief Examiner

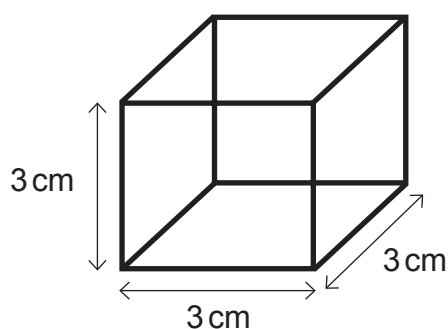
Complete the energy transfer diagram below to show the energy **changes** that take place when the trolley is released. One box has been completed for you.



[3]



- 2 (i) A brass cube has the dimensions shown.



The cube has a mass of 235 g.

By first finding the volume of the cube, calculate its density, in g/cm^3 , to the nearest whole number.

You are advised to show your working out.

Volume = _____ cm^3

Density = _____ g/cm^3 [6]

- (ii) A hole is now drilled through the cube thereby reducing its mass.

How will this affect its density? Circle your answer below.

density increases

density decreases

density remains the same

[1]

[Turn over]



- 3 An electric oven produces 2000 J of heat every second.



Source: © Getty Images

Each second 200 J of energy escapes as waste heat from the oven.

Calculate the efficiency of the oven.

You are advised to show your working out.

Efficiency = _____

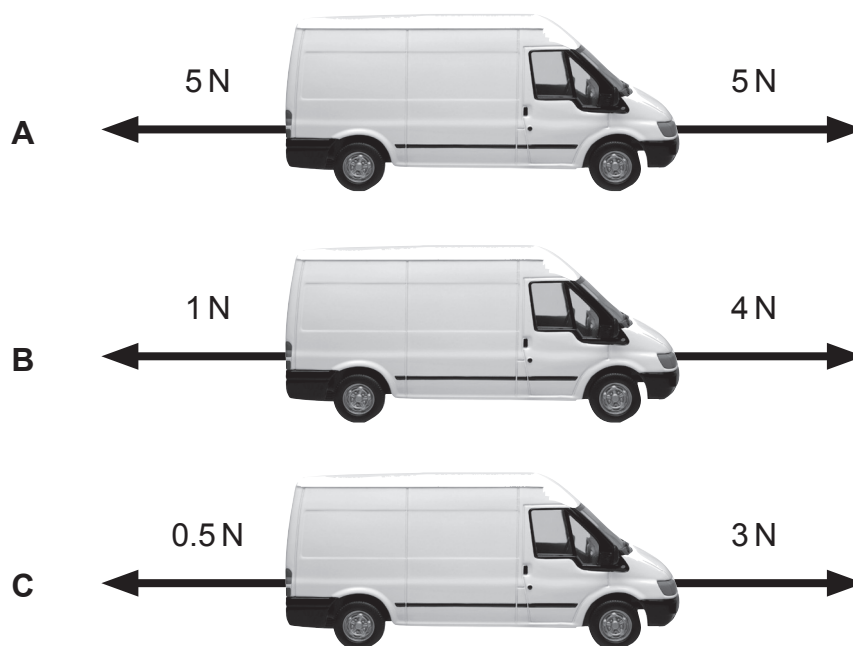
Tick (✓) the box which gives the correct unit for efficiency, if any.

joules ☐ watts ☐ no unit ☐

[5]



- 4 Three identical toy vans, A, B and C are shown below with different forces acting on them.



Source: © Getty Images

- (i) Which van, A, B or C, will have the greatest acceleration?

Van _____

Which van, A, B or C, could be travelling at constant speed?

Van _____ [2]

- (ii) Another van of mass 1.25 kg accelerates at 2 m/s^2 .

Calculate the resultant force acting on it.

You are advised to show your working out.

Force = _____ N [3]

[Turn over]



- 5 (a) An atom has an atomic number of 1 and a mass number of 3.

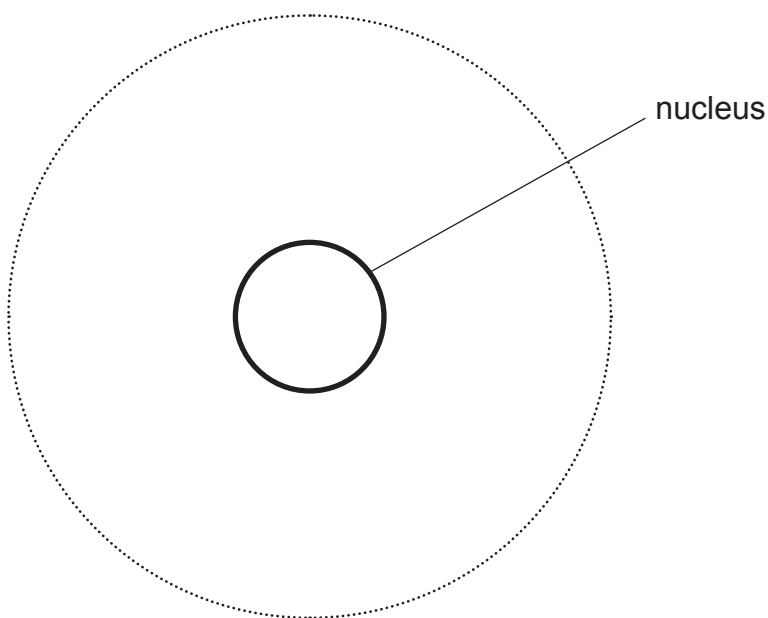
Use the following symbols to complete the diagram of the atom below.

Make sure your symbols are drawn clearly.

Neutron ☐

Electron ●

Proton ○



Source: Chief Examiner

[6]

- (b) (i) What is a beta (β) particle?

From which part of the atom does it come?

[2]

- (ii) A scientist accidentally touches a source of alpha radioactivity.

Why is alpha radiation less dangerous than the other types of radiation in this situation?

[1]



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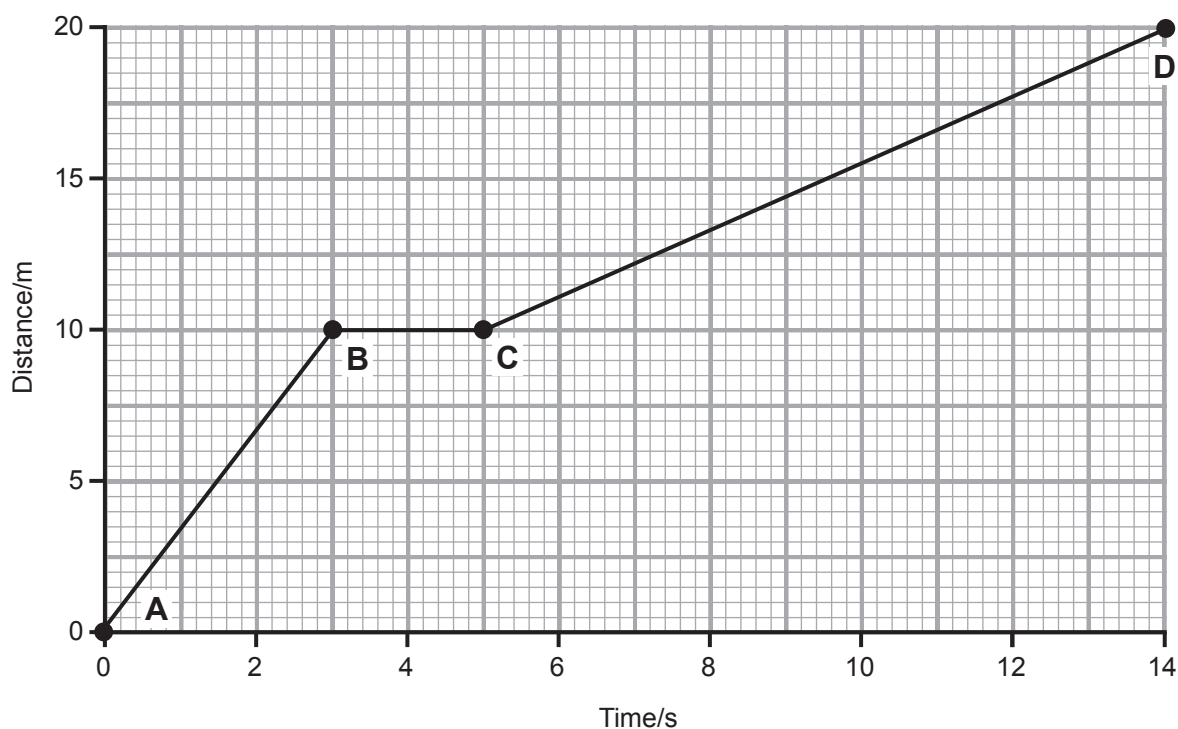
13287

[Turn over



16GDW3107

6 Below is the distance-time graph for a cycle journey.



(a) Describe the motion of the cyclist during AB.

Choose your answer from the following by placing a tick (✓) in the correct box.

Travelling at constant speed

☐

At rest

☐

Travelling with a constant rate of change of speed

☐

Without doing a calculation, how can you tell that the cyclist is travelling slower in CD than in AB?

_____ [2]



- (b) (i) State the distance travelled in the first 4 seconds.

Distance = _____ m [1]

- (ii) Use the graph to calculate the average speed of the cyclist over the first 5 seconds of the journey.

You are advised to show your working out.

Average speed = _____ m/s [3]

[Turn over]



- 7 This question is about renewable and non-renewable energy resources.

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

State what is meant by a renewable energy resource and give an example.

Renewable energy _____

Example _____

Give **two** examples of **non-renewable** energy resources.

To which group, renewable or non-renewable, do fossil fuels belong?

Give an environmental disadvantage of using non-renewable energy resources.

_____ [6]





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(Questions continue overleaf)



- 8 A gardener pushes a lawnmower over his lawn.



Source: © Getty Images

He exerts an average force of 24 N.

By the time he has finished mowing he has done 2160 J of work.

- (a) (i) How far has the gardener pushed the mower in doing this work?

You are advised to show your working out.

Distance = _____ m [3]

- (ii) Express your answer to (a) (i) in km.

Distance = _____ km [1]



(b) On another occasion the gardener does 72 000 J of work in 15 minutes.

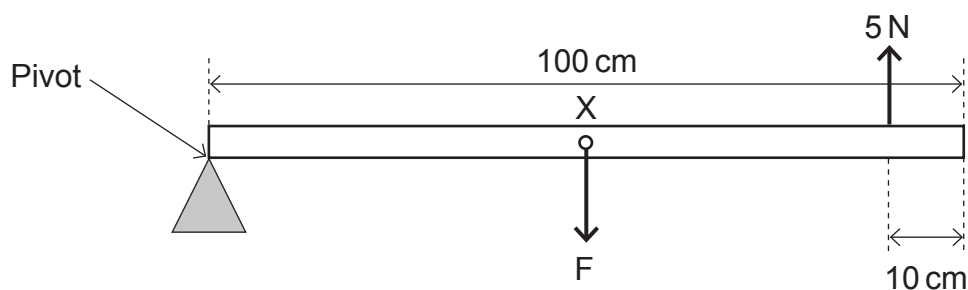
Calculate his power.

You are advised to show your working out.

Power = _____ W [4]



- 9 A uniform piece of wood 100 cm long is held in a horizontal position by exerting an upwards vertical force of 5 N as shown.



Source: Chief Examiner

- (i) Another vertical downwards force, F , acts at the midpoint, X , of the piece of wood.

What is the name of the force F ?

What name is given to the point X ?

_____ [2]



(ii) Record the following distances:

Pivot to the point X = _____

Pivot to the 5 N force = _____

Use the Principle of Moments and the values recorded above to calculate the force F acting at X.

You are advised to show your working out.

Force F = _____ N [6]

THIS IS THE END OF THE QUESTION PAPER



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

Total Marks	
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Examiner Number

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