



Rewarding Learning

General Certificate of Secondary Education
2022–2023

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1

Foundation Tier



[GDW31]

GDW31

FRIDAY 24 FEBRUARY 2023, 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.

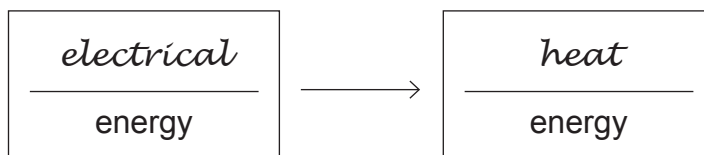
Quality of written communication will be assessed in Question **7(a)**.



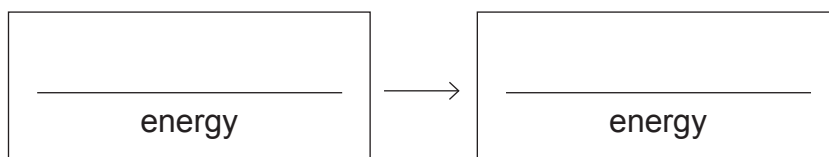
1 Many devices change energy from one form to another.

- (a) Complete the boxes below to show the main energy change the device is designed to bring about.
One example has been completed for you.

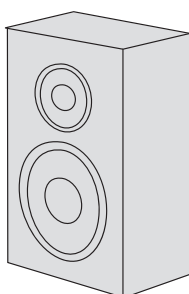
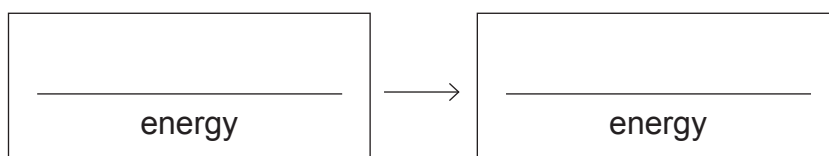
A heater.



A candle.



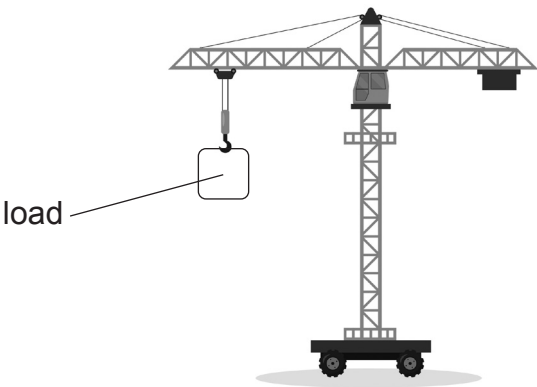
A loudspeaker.



[4]



(b) A load is raised by a crane as shown.



The load rises at a **constant speed**.
Complete the table below for the load being raised by placing ticks (✓) in the correct boxes.
Use only one tick (✓) per row.

	Increases	Decreases	Stays the same
Potential energy			
Kinetic energy			

[2]

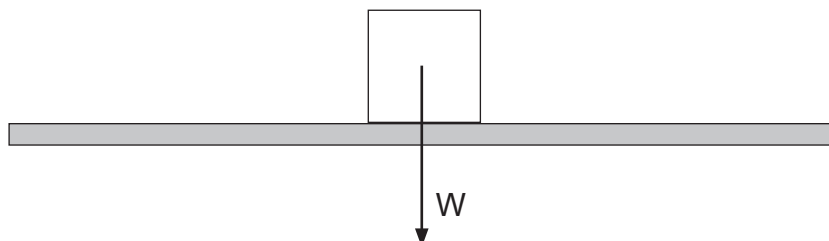
[Turn over



- 2 (i) It is important to understand the difference between mass and weight.
Complete the sentence below.

Mass is the amount of _____ in an object.

When the object sits on a table, a downward force, W , acts on it.



What name is given to this force, W , and what causes it?

Name of force, W _____

caused by _____ [3]

- (ii) The force shown in the diagram above is 2 N.
What is the size of the force the table exerts on the object?

Force = _____ N

State the direction of this force.

Direction _____ [2]





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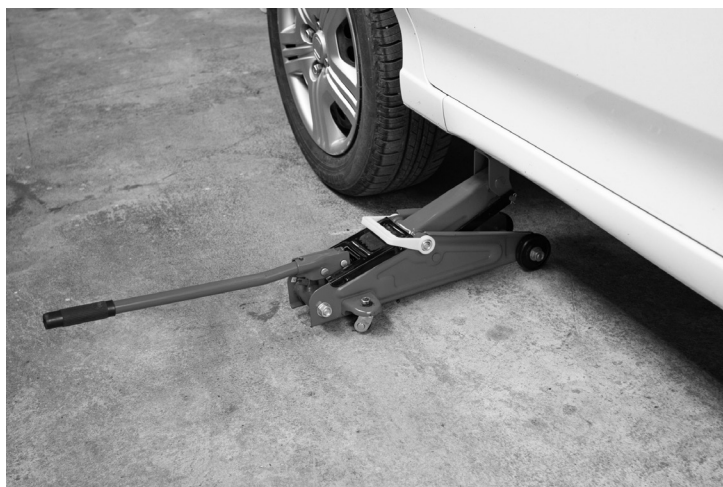
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20GDW3105

- 3 (i) A car jack raises a car so that the wheel can be changed.



The useful energy output in lifting the car is 1680 J.

The mechanic puts 5600 J of energy into the car jack.

Calculate the efficiency of the car jack.

You are advised to show clearly your working out.

Efficiency = _____ [3]



(ii) 1680 J of work are done by the car jack.

The force exerted by the car jack is 4200 N.

Calculate the height the car is raised.

You are advised to show clearly your working out.

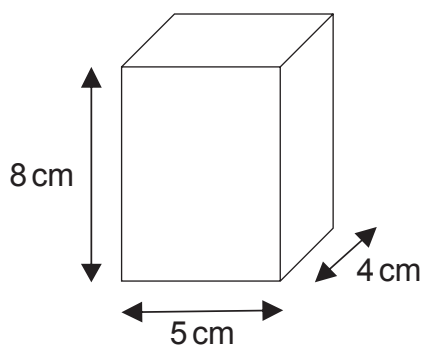
Height = _____ m [3]

(iii) Express your answer to part (ii) in cm.

Height = _____ cm [1]



- 4 (a) A block of wood with its dimensions is shown below.



Its mass is 96 g.

By first finding the volume of the block, calculate its density.

You are advised to show clearly your working out.

Density = _____ g/cm³ [5]

- (b) Nitrogen can exist in three different forms, solid, liquid and gas.
Place them in order of increasing density by writing the words solid, liquid and gas, in the boxes below.

Increasing density

[2]





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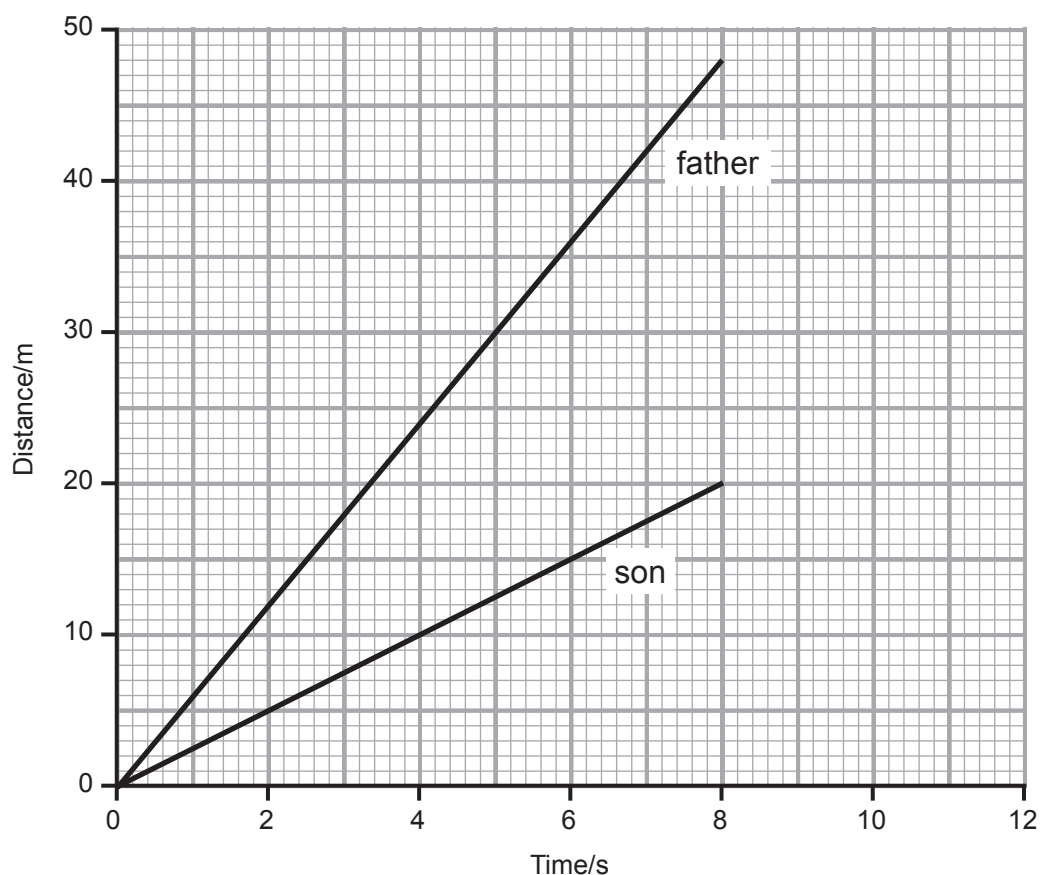
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20GDW3109

5 Shown below are distance-time graphs for father and son cyclists.



- (a) (i) Without doing a calculation, how can you tell **from the graph** that the father is cycling faster than the son?

_____ [1]

- (ii) How far has the father cycled after 8 seconds?

Distance = _____ m [1]

- (iii) How far apart are father and son after 8 seconds?

Distance apart = _____ m [1]



(b) Use the graph to find the son's speed.

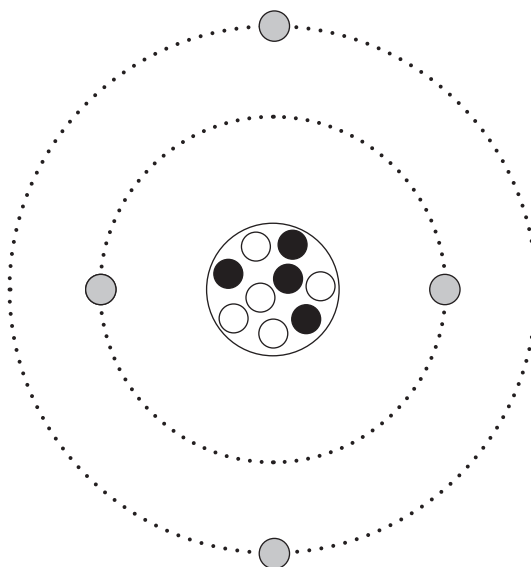
Give your answer to one decimal place.

You are advised to show clearly your working out.

Speed = _____ m/s [3]



- 6 The diagram shows a **neutral** atom of an element X.



- (a) (i) State the mass number.

Mass number = _____

State the number of neutral particles.

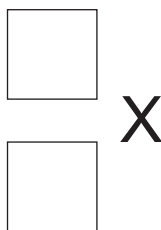
Number = _____

State the atomic number.

Atomic number = _____

[3]

- (ii) The nucleus of element X can be described using the notation below.
Insert the correct numbers in the two boxes.



[1]



(iii) If the neutral atom, X, is to become a positive ion what must happen to it?

_____ [2]

(b) What are isotopes? Give your answer in terms of **atomic number** and **mass number**.

_____ [2]

[Turn over]



7 (a) Radiation may be used in industry, medicine and agriculture.

Sources with different half-lives are used in each case below.

You are asked to consider the type of radiation emitted (alpha, beta or gamma) and in each case give a suitable half-life (long or short).

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

Radiation can be used to trace a leak in an underground pipe.
The detector is above ground.

Radiation emitted _____

Half-life _____

Smoke alarms are installed in many households.

Radiation emitted _____

Half-life _____

An isotope is injected into the bloodstream so that the flow of blood through the body can be monitored.

Radiation emitted _____

Half-life _____

_____ [6]

(b) Why do some nuclei disintegrate?

_____ [1]





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[Turn over



20GDW3115

- 8 A speedboat moves with a **constant acceleration** of 3 m/s^2 .
The mass of the speedboat is 750 kg .



- (i) Calculate the resultant force acting on the speedboat.

You are advised to show your working out.

Resultant force = _____ N [3]

- (ii) Calculate the weight of the speedboat.

You are advised to show your working out.

Weight of speedboat = _____ N [2]



(iii) State what will happen to the speed of the boat when the size of the engine force is equal to the size of the resistive forces combined.

Tick (✓) the correct box below.

The speed will increase.

☐

The speed will be constant.

☐

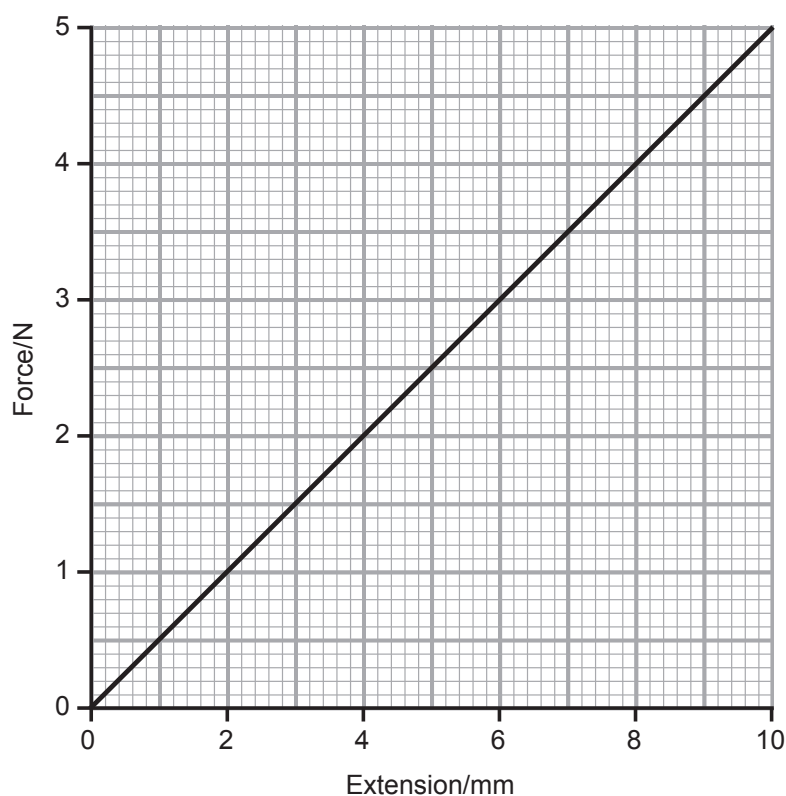
The speed will decrease.

☐

[1]



- 9 (i) A student carries out an experiment with a spiral spring to obtain readings of force and extension.
The graph of her results is shown.



Find the gradient of the graph and give its unit.

Do not change any units.

You are advised to show clearly your working out.

Gradient = _____

What property of the spring does the gradient represent?

[5]



- (ii) The student wants to find the extension of the **same** spring when the force is 16 N.

The spring has not reached the limit of proportionality when the force is 16 N.

Use your answer to part (i) to find the extension of the spring when the force is 16 N.

You are advised to show clearly your working out.

Extension = _____ mm [3]

THIS IS THE END OF THE QUESTION PAPER



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Question Number	Marks
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Examiner Number

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