



General Certificate of Secondary Education
2024–2025

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1

Higher Tier



[GDW32]

GDW32

THURSDAY 22 MAY 2025, 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 questions in black ink and use a dark HB pencil for drawings and graphs.

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.

You may use a scientific calculator.

Quality of written communication will be assessed in Question 3.

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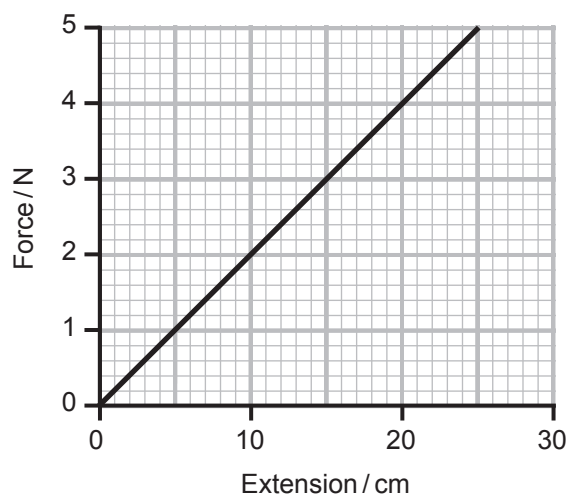


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1 (a) State Hooke's law.

[2]

(b) A student plots a graph of force against extension of a spring as shown below.



(i) The spring has an unstretched length of 2 cm.

Use the graph to find the **total length** of the spring when a force of 4 N is applied to it.

Show your working out.

Total length = _____ cm [2]



(ii) Use values from the graph to calculate the spring constant.

Include the unit in your answer.

Do not change any units.

Show your working out.

Spring constant = _____ [4]



2 This question is about radioactivity.

(a) Complete the table below by stating the type of radiation that would be best suited to each of the uses described.

Use	Type of radiation
Smoke alarms	
Sterilising medical equipment	
Controlling the thickness of aluminium as it is rolled into thin sheets	
Locating pipes deep underground	

[4]

(b) Give two **different** steps taken to reduce the risk when using radioactive sources.

1. _____

2. _____

[2]



3 Write an account of nuclear fusion using the headings below.

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

Explain what happens when nuclear fusion occurs:

State where nuclear fusion occurs naturally:

Name the two isotopes of hydrogen that could be used for nuclear fusion:

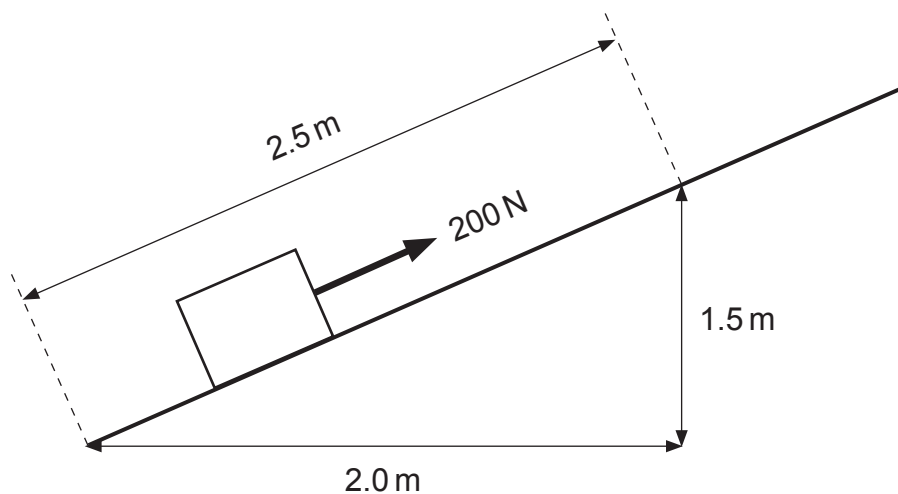
State the major by-product of nuclear fusion:

[6]

[Turn over



- 4 (a) A box is pulled up a slope as shown below.



A force of 200 N is used to pull the box 2.5 m up the slope.

Calculate the work done.

Show your working out.

Work done = _____ J [4]

- (b) In words, define power.

_____ [2]



(c) On another occasion, 640 J of work is done in pulling a different box up a slope.

This generates 160 W of power.

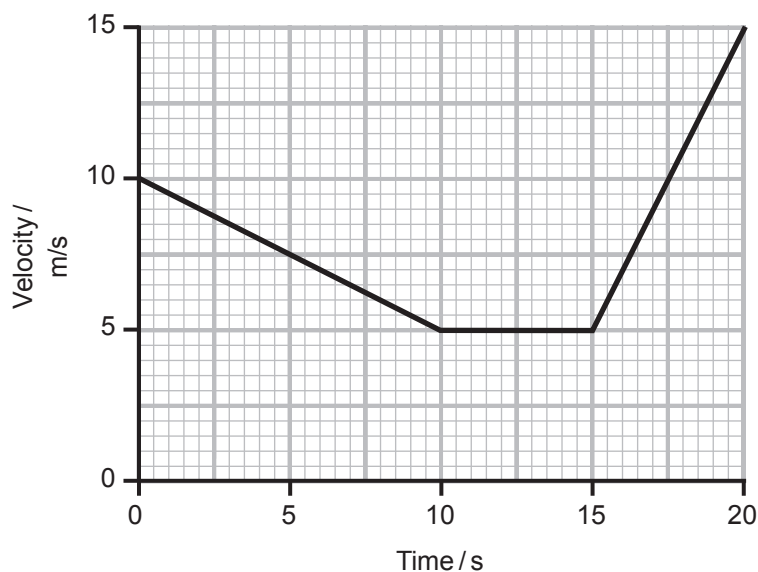
Calculate the time taken to pull this box up the slope.

Show your working out.

Time taken = _____ s [4]



- 5 The velocity-time graph for part of a car journey is shown below.



- (i) Describe the motion of the car during the time period 10 to 15 seconds.

_____ [1]

- (ii) During which time period are the forces acting on the car balanced?

_____ to _____ seconds [1]

- (iii) Calculate the acceleration of the car during the time period 15 to 20 seconds.

Show your working out.

Acceleration = _____ m/s^2 [4]



- (iv) Calculate the total displacement of the car during the time period 0 to 10 seconds.

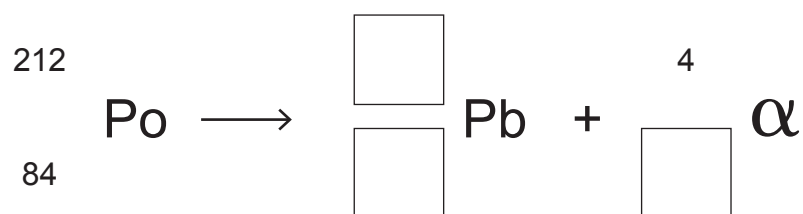
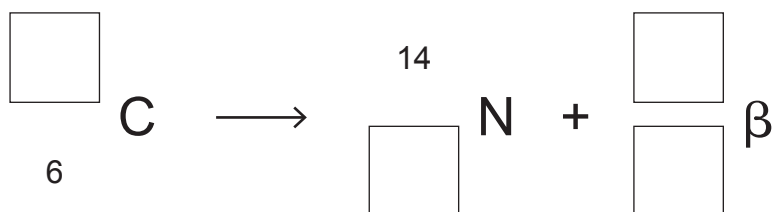
Show your working out.

Displacement = _____ m [4]



6 Some nuclei are radioactive and decay.

Complete the following decay equations.



[7]



7 (a) Define the term half-life.

[2]

(b) (i) A radioactive source has a half-life of 2 hours.

At 8 am it has an activity of 1600 Bq.

Calculate the activity of the source at 4 pm on the same day.

Show your working out.

Activity at 4 pm = _____ Bq [4]

(ii) What was the activity of the source at **6 am** on the same day?

Activity at 6 am = _____ Bq [1]

[Turn over



8 A ball is thrown vertically into the air.

(i) How much kinetic energy does the ball have when it is at its **maximum** height?

Kinetic energy = _____ J [1]

(ii) The ball falls and has 80 J of kinetic energy as it hits the ground.

The ball has a mass of 400 g.

Calculate the speed of the ball as it hits the ground.

Show your working out.

Speed = _____ m/s [4]

(iii) Another ball of mass 0.2 kg was dropped from rest.

The ball has 45 J of kinetic energy as it hits the ground.

The ball lost 5 J of its total energy during its fall.

Calculate the height from which the ball was dropped.

Show your working out.

Height = _____ m [4]



9 A person bounces on a trampoline.



The person has a mass of 57 kg and accelerates upwards at 20 m/s^2 .

Calculate the resultant force on the person.

Use your answer to find the **upward** force required to cause the person to accelerate at 20 m/s^2 .

Show your working out.

Upward force = _____ N [7]

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For Examiner's use only	
Question Number	Marks
1	
2	
3	
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Total Marks	
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Examiner Number

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