



Rewarding Learning

General Certificate of Secondary Education
2019–2020

Centre Number

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Candidate Number

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Double Award Science: Physics

Unit P1

Higher Tier



[GDW32]

GDW32

FRIDAY 28 FEBRUARY 2020, 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 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 3.

12903



16GDW3201

1 This question is about radioactivity.

(i) Why are some nuclei radioactive?

[1]

(ii) Three types of radiation are emitted by radioactive sources.

Use lines to match each of the statements to the correct type of radiation.

Radiation

Statement

alpha

electromagnetic wave of high energy

beta

fast electron

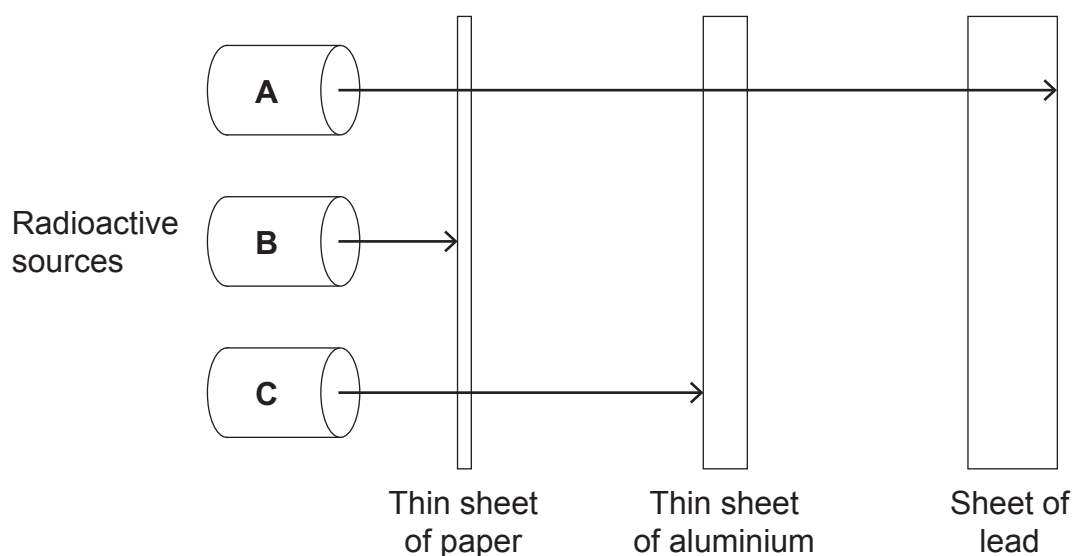
gamma

consists of two protons and two neutrons

[3]



- (iii) The diagram below shows different types of radiation emitted by three radioactive sources. In each case the radiation passes through, or is absorbed by, different materials.



Source: Principal Examiner

State the type of radiation, (alpha, beta or gamma) being emitted by the source in each case.

Source A: _____

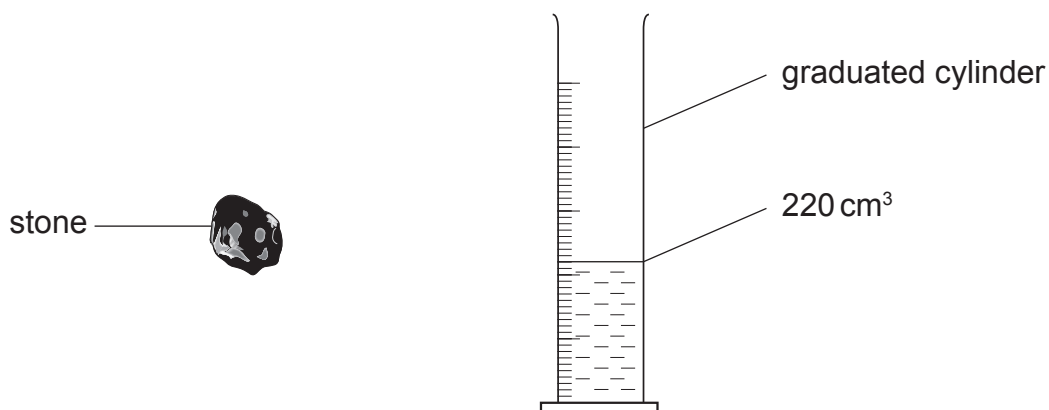
Source B: _____

Source C: _____ [3]

[Turn over



- 2 A stone has a density of 8 g/cm^3 and a mass of 640 g .



Source: Principal Examiner

It is placed in a large measuring cylinder which contains 220 cm^3 of water.

Calculate the final reading of the measuring cylinder.

You are advised to show your working out.

Final reading = _____ cm^3 [4]



- 3 In this question you are asked to state the Principle of Conservation of Energy and then describe two energy changes which occur when an archer shoots an arrow horizontally into a target.



© Getty Images

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

The Principle of Conservation of Energy.

The energy stored in the bow after the arrow is pulled back.

The energy gained by the arrow as it leaves the bow.

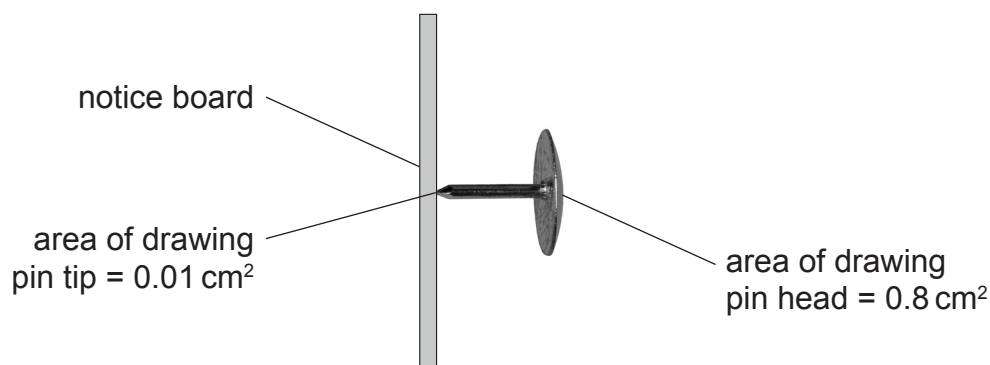
The energy change which takes place when the arrow strikes the target.

[6]

[Turn over



- 4 A drawing pin is pushed into a notice board.



© Getty Images

- (a) Calculate the pressure the drawing pin exerts on the notice board when it is pushed with a force of 2 N.

Include the unit with your answer.

Do not change any of the units given in the question when doing your calculation.

You are advised to show your working out.

Pressure = _____ [4]

Unit = _____ [1]

- (b) Explain fully, in terms of pressure, why the design of the drawing pin tip makes it easy to push it into the notice board.

[2]



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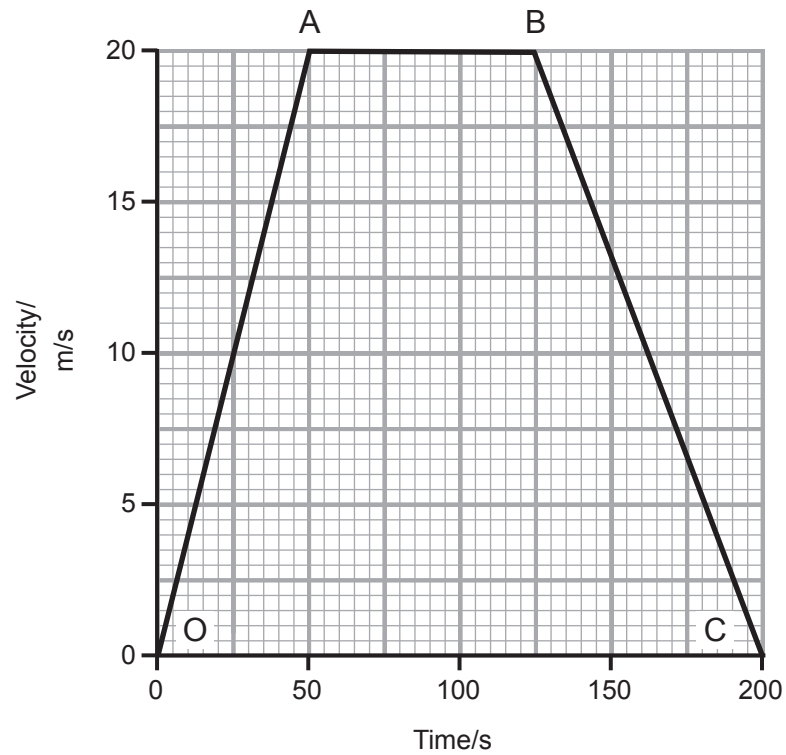
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[Turn over



16GDW3207

5 The graph below shows the motion of a bus.



(a) Describe the motion of the bus in the intervals OA, AB and BC.
Calculations are not required.

OA _____

AB _____

BC _____

[4]



(b) Calculate the total displacement of the bus during the first 125 seconds.

You are advised to show your working out.

Displacement = _____ m [4]

(c) During which time interval of the journey are the horizontal forces on the bus balanced?

From _____ s to _____ s [1]

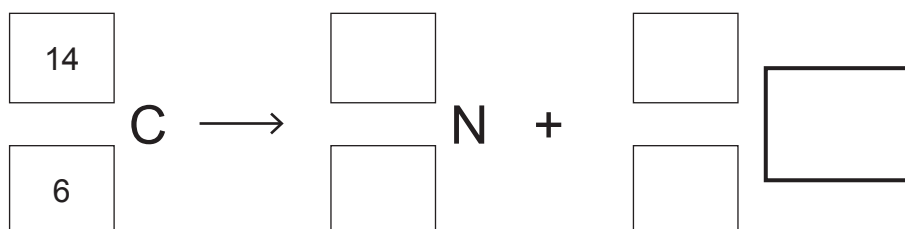
[Turn over]



- 6 (a) An isotope of carbon, **C**, emits a beta particle to become nitrogen, **N**.

Complete the equation below for this decay.

Begin by inserting the correct symbol for a beta particle in the large box on the right.



[5]

- (b) An isotope has 18 000 radioactive nuclei. After 12 days 16 875 of the nuclei have decayed.
Calculate the half-life of the isotope.

You are advised to show your working out.

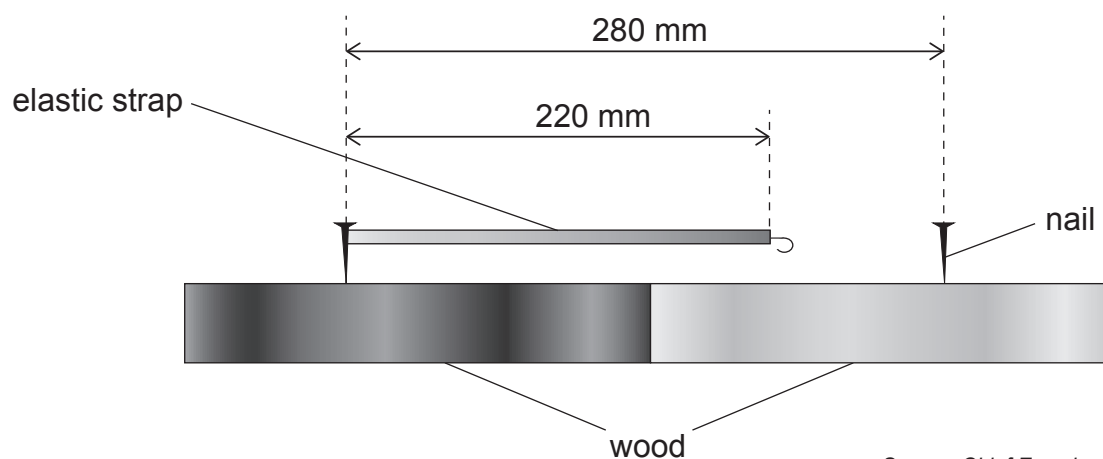
Half-life = _____ days [4]



7 (a) State Hooke's Law.

[2]

(b) An elastic strap, which obeys Hooke's law, is used to keep two pieces of wood together.



The original length of the strap is 220 mm and a force of 3 N has to be applied to hook the strap over the nail.

Calculate the spring constant of the elastic strap.

Give your answer to **2 decimal places**.

Remember to include the unit.

Do not change any of the units given in the question.

You are advised to show your working out.

Spring constant = _____

Unit = _____ [4]

[Turn over]

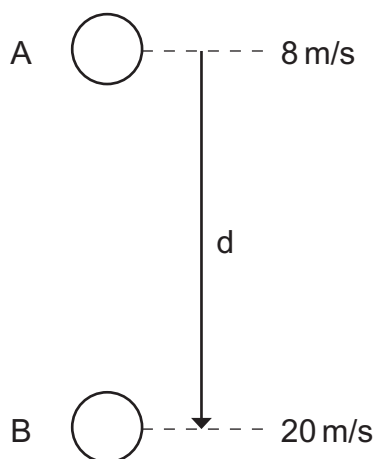


8 (a) Complete the sentence below.

When an object falls in the absence of friction it does so with an acceleration of _____ m/s^2 and this acceleration is known as the acceleration of _____ and has the symbol _____.

[3]

(b) On another occasion a ball falls through the air.



At position A its velocity is 8 m/s and 1.5 seconds later its velocity at B is 20 m/s.

Calculate the displacement d.

You are advised to show your working out.

Displacement d = _____ m [6]





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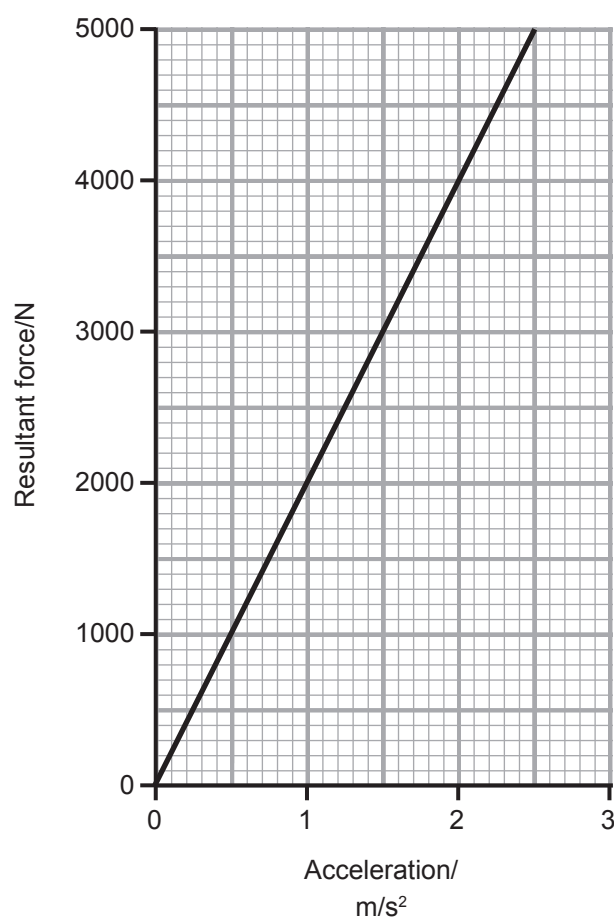
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[Turn over



16GDW3213

- 9 (a) The graph shows how the acceleration of a car depends on the resultant accelerating force.



Calculate the weight of the car.

You are advised to show your working out.

Weight = _____ N [4]



- (b) A different car of mass 1600 kg is uniformly accelerated from rest until its velocity is 30 m/s. The resultant accelerating force is 2000 N.

By first finding the kinetic energy of the car, calculate the distance for which the car was accelerated. Assume no energy losses.

You are advised to show your working out.

Kinetic energy = _____ J

Distance = _____ m [6]

- (c) Some quantities in physics are vectors and some are scalars.

Indicate with a tick (✓) in the table below whether the quantity is a scalar or vector.

Quantity	Scalar	Vector
Acceleration		
Mass		
Weight		

[3]



THIS IS THE END OF THE QUESTION PAPER

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

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