



General Certificate of Secondary Education
2018–2019

Centre Number

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Candidate Number

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Double Award Science Physics

Unit P1

Higher Tier

ML**[GDW32]****FRIDAY 1 MARCH 2019, MORNING****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.

Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

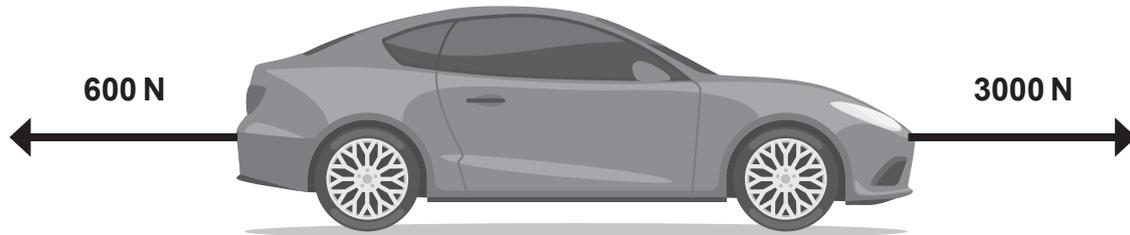
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question **3**.

- 1 (a) What does a resultant force always cause?

_____ [1]

- (b) (i) The forces acting on a car travelling in a straight line are shown below.



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The mass of the car and its driver is 1200 kg.
Calculate the car's acceleration.

You are advised to show your working out.

Acceleration = _____ m/s² [4]

- (ii) Later in the car's journey, the forces acting on it are balanced.
What is the car's acceleration at this point?

Acceleration = _____ m/s² [1]

2 Atoms are made up of protons, neutrons and electrons.

(a) Complete the table below to show the relative charge of the particles in an atom.

Particle	Relative charge
Proton	
Neutron	
Electron	

[3]

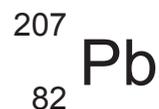
(b) The nucleus of an atom can be described using the notation



Which letter, A, X or Z, represents a value that is different for a pair of isotopes?

_____ [1]

(c) The nucleus of an atom of lead can be described using the notation



Complete the table below to show how many of each particle there is **in the nucleus** of an atom of lead.

Particle	Number of particles in the nucleus
Proton	
Neutron	
Electron	

[3]

[Turn over

3 Write about background radioactivity and the precautions taken when working with radioactive sources.

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

You should write about:

What background radioactivity is.

Two **major** sources of background radioactivity.

How background radioactivity is taken into account.

Two precautions against radioactivity.

[6]



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4 A sofa of weight 720 N exerts a pressure on the floor.



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(i) Calculate the mass of the sofa.

You are advised to show your working out.

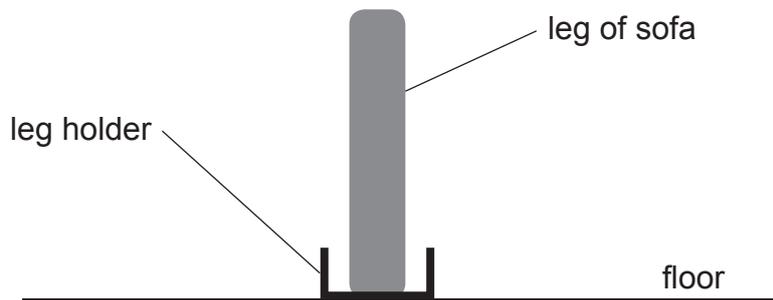
Mass = _____ kg [2]

- (ii) Each of the sofa's 4 legs has an area of 6 cm^2 . Calculate the total pressure the sofa exerts on the floor. Remember to include the unit. Do not change any units.

You are advised to show your working out.

Pressure = _____ [5]

- (iii) The diagram below shows leg holders in use. They help to stop damage to the floor.

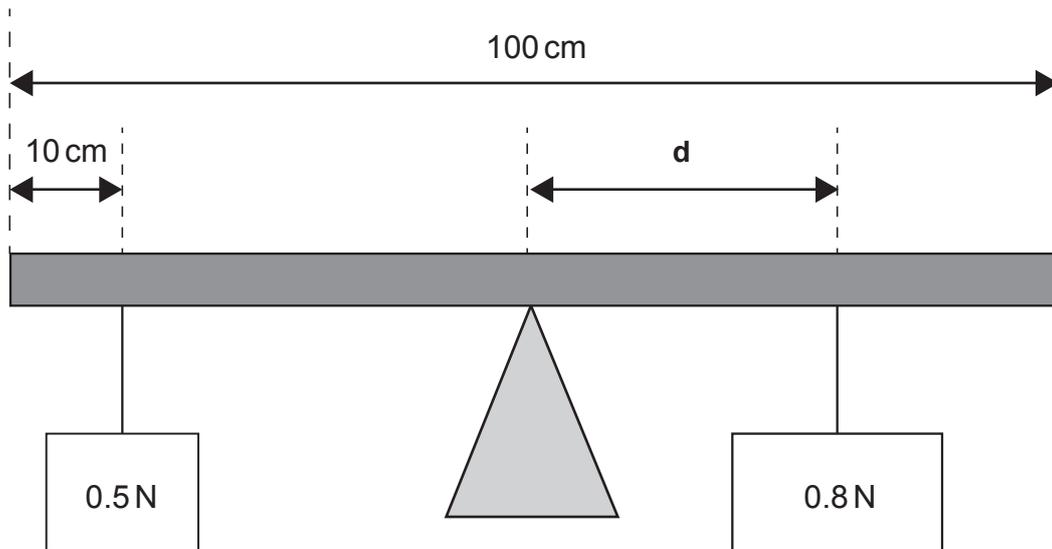


Explain how the leg holders help to stop any damage to the floor.

_____ [2]

[Turn over

- 5 A uniform metre rule is balanced at its midpoint when two forces act as shown.



Source: Chief Examiner

Calculate the distance 'd'.
Do not change any units.

You are advised to show your working out.

$d = \text{_____ cm [4]}$

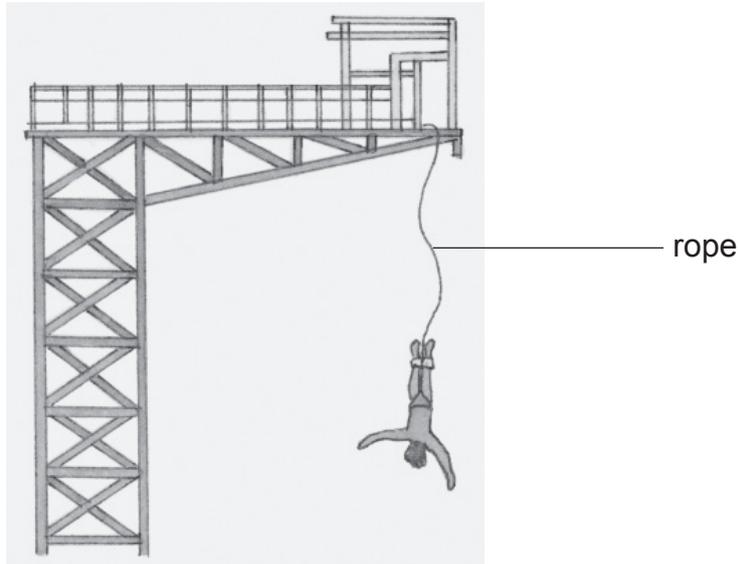


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6 (a) A spring obeys Hooke's Law. In the space below write the equation for Hooke's Law and define each term in the equation.

[4]

A man jumps from a platform. The spring-like rope attached to the man obeys Hooke's Law.



© Dorling Kindersley / Thinkstock

- (b) The weight of the man is 600 N and the unstretched length of the rope is 27 m. When the rope is fully stretched at the bottom of the jump it is 32 m long. Find the spring constant of the rope and give its unit.

Do not change any units.

You are advised to show your working out.

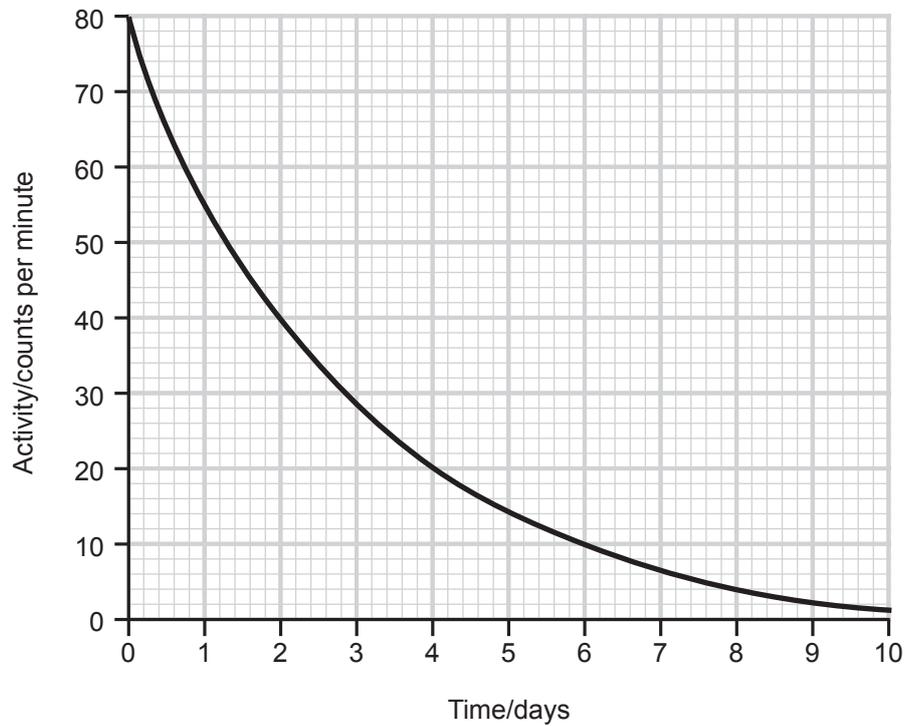
Spring constant = _____ [4]

[Turn over

7 (a) Explain the meaning of the term half-life.

[2]

The graph below shows how the activity of a radioactive substance varies with time.



(b) (i) Use the graph to find the half-life of the substance.

You are advised to show how you have used the graph.

Half-life = _____ days [2]

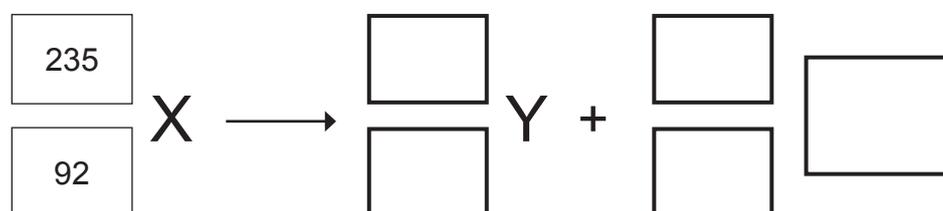
- (ii) If we want the activity of the substance to be 10 counts per minute, how many half-lives must occur before the substance may be used?

Use the graph to help you.

You are advised to show your working out.

Number of half-lives = _____ [2]

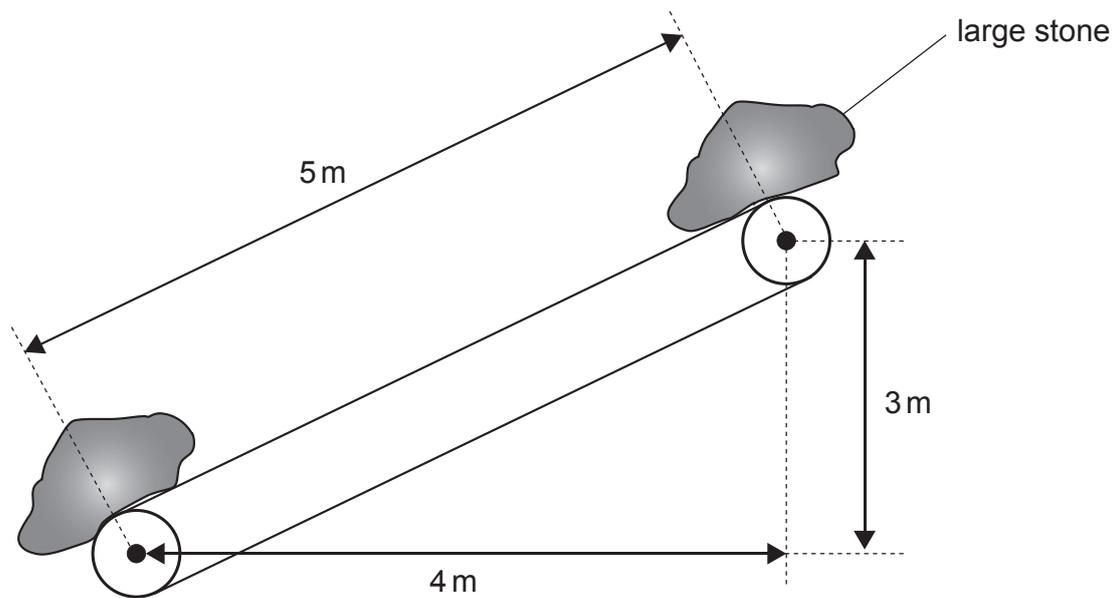
- (c) A radioactive nucleus, X, decays to a different nucleus, Y, by alpha emission. Complete the equation below for this decay. Begin by inserting the correct **symbol** for an alpha particle in the large box on the right.



[5]

[Turn over

- 8 A conveyor belt lifts a large stone so that it can be dropped into a lorry.



Source: Chief Examiner

- (a) The mass of the large stone is 250 kg. Calculate the useful work done on the large stone as it is moved from one end of the conveyor belt to the other.

You are advised to show your working out.

Useful work done = _____ J [3]

Another time the conveyor belt does 60 kJ of work in lifting a different large stone. The power output of the conveyor belt is 5000 W.

(b) How long did it take to raise this large stone?

You are advised to show your working out.

Time = _____ s [4]

[Turn over

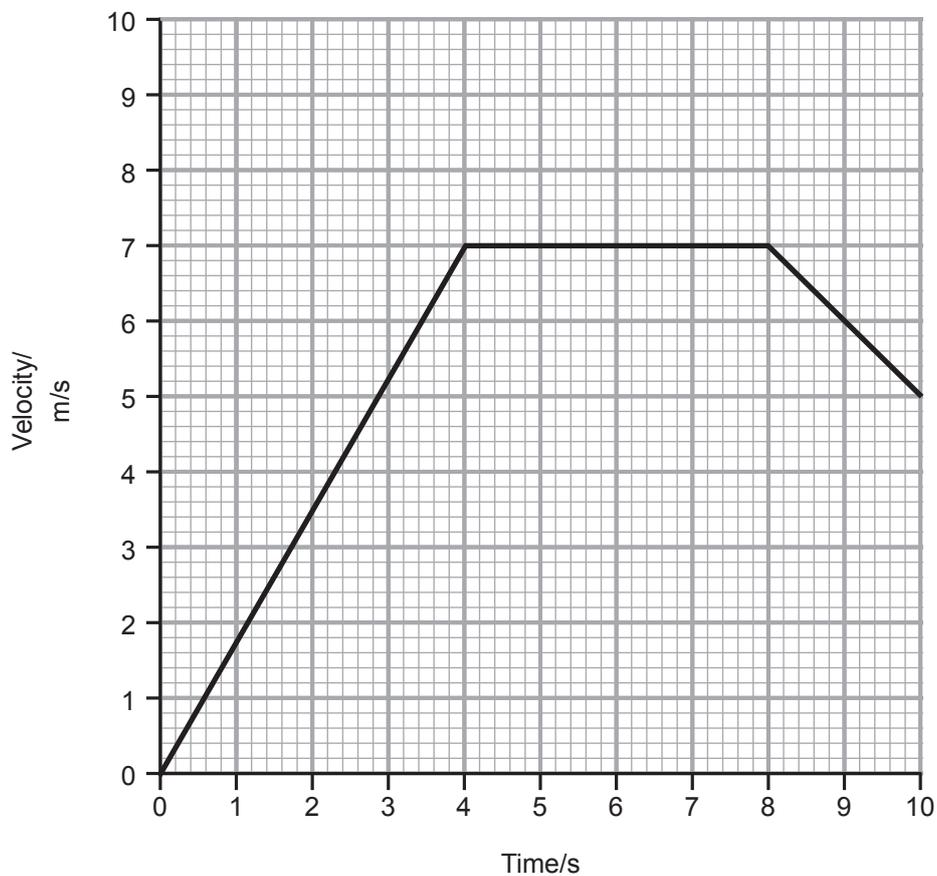
- 9 (a) Write down, **in words**, how you would calculate speed and acceleration. In each case indicate whether the quantity is a scalar or a vector quantity.

Speed _____

Acceleration _____

_____ [4]

Below is a velocity-time graph for a very short train journey from one part of a railway station to another.



- (b) The train stops once in this 10 second interval. How long did the train stop?

$t =$ _____ s [1]

(c) (i) Calculate the train's acceleration during the first 4 seconds of its journey.

Give your answer correct to one decimal place.

You are advised to show your working out.

Acceleration = _____ m/s² [2]

(ii) Calculate the displacement of the train during the last 6 seconds.

You are advised to show your working out.

Displacement = _____ m [5]

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For Examiner's use only	
Question Number	Marks
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Total Marks	

Examiner Number

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