

New  
Specification

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--

General Certificate of Secondary Education  
2017–2018

# Double Award Science Physics

Unit P1



Higher Tier

[GDW32]

\*GDW32\*

**WEDNESDAY 23 MAY 2018, AFTERNOON**

## 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 ten** 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.

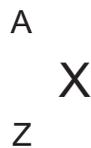
Quality of written communication will be assessed in Question 2.

11640



\*20GDW3201\*

- 1 (a) The nucleus of an element, X, may be written as shown below.



A and Z are numbers. What are the numbers called?

A is the \_\_\_\_\_ number.

Z is the \_\_\_\_\_ number.

[2]

The following incomplete sentence describes radioactive decay. Complete the sentence by filling in the blank spaces.

- (b) A nucleus decays because it is \_\_\_\_\_ and so emits

\_\_\_\_\_ or \_\_\_\_\_ particles

or \_\_\_\_\_ radiation.

[4]

A radioactive substance has 8400 **undecayed** particles and 90 minutes later 7350 particles have decayed.

- (c) By first finding the number of **undecayed** particles after 90 minutes, calculate the half-life of the substance.

**You are advised to show your working out.**

Half-life = \_\_\_\_\_ minutes [3]





3 A gardener pushes a lawnmower with an average force of 9 N.



© KatarzynBialasiewicz / iStock / Thinkstock

By the time the lawn is mowed the gardener has walked a total distance of 600 m.

(a) Calculate the work done.

**You are advised to show your working out.**

Work done = \_\_\_\_\_ J [3]



On another occasion he did 72 000 J of work and took 15 **minutes** to complete the job.

(b) Calculate the power developed.

**You are advised to show your working out.**

Power = \_\_\_\_\_ W [4]

[Turn over



4 A mountaineer wears snow shoes.



© wojciech\_gajda / iStock / Thinkstock

The snow shoes prevent her from sinking into the snow.

(i) Explain fully, in terms of pressure, why this is so.

---

---

---

[2]

The mountaineer wears snow shoes of total area  $0.5 \text{ m}^2$  and exerts a pressure on the snow of  $1800 \text{ Pa}$ .

(ii) Calculate the weight of the mountaineer.

**You are advised to show your working out.**

Weight = \_\_\_\_\_ N [3]





**BLANK PAGE**  
**DO NOT WRITE ON THIS PAGE**  
**(Questions continue overleaf)**

11640

[Turn over



- 5 A ball is rolled along a surface.



- (a) The ball travels along this surface before coming to **rest**. During this time the ball slows down at a constant rate and has an average velocity of 0.14 m/s.

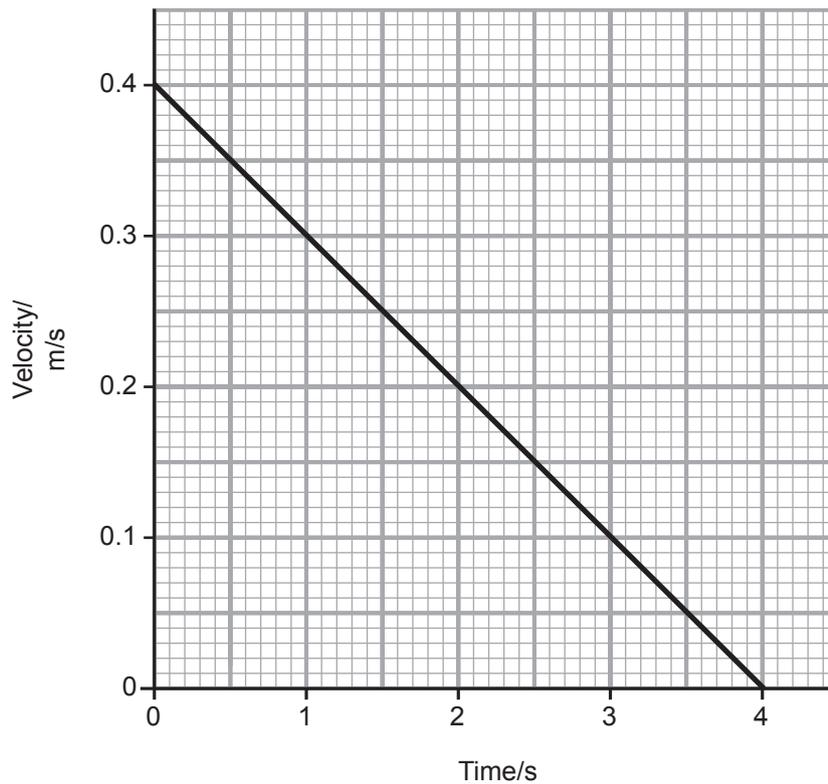
Calculate the initial velocity of the ball.

**You are advised to show your working out.**

Initial velocity = \_\_\_\_\_ m/s [3]



(b) (i) The velocity-time graph for another ball is shown below.



Calculate the acceleration of the ball.

You are advised to show your working out.

Acceleration = \_\_\_\_\_ m/s<sup>2</sup> [4]

(ii) How would you use this graph to find the displacement of the ball after four seconds?

\_\_\_\_\_ [1]

[Turn over



- 6 A student is attempting to find the density of a gas in a balloon. Some of the student's data is shown in the table below.



© Stockbyte / Thinkstock

Mass of empty balloon	12.0 g
Mass of balloon filled with gas	12.8 g
Volume of gas inside balloon	400 cm <sup>3</sup>

- (i) Use the data in the table to calculate the density of the gas inside the balloon. Include the unit with your answer.

**You are advised to show your working out.**

Density of gas = \_\_\_\_\_ [5]



- (ii) The student places the gas-filled balloon in a fridge to cool it down. As a result of the cooling the density of the gas increases.

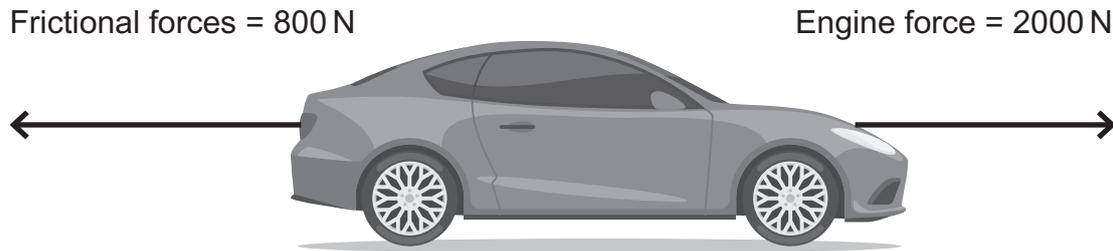
What effect does this have on the distances between the gas particles?

\_\_\_\_\_ [1]

[Turn over



7 Forces act on a car as shown below.



© EgudinKa / iStock / Thinkstock

- (i) The car accelerates uniformly at  $1.2 \text{ m/s}^2$ . Calculate the mass of the car.

**You are advised to show your working out.**

Mass = \_\_\_\_\_ kg [4]

- (ii) Describe and explain what would happen to the size of the acceleration if the frictional forces acting on the car decrease.

Effect on acceleration: \_\_\_\_\_

Explanation: \_\_\_\_\_

\_\_\_\_\_ [2]

- (iii) The brakes are applied and the car begins to slow down. In which direction will the resultant force now act?

\_\_\_\_\_ [1]



8 (a) State Hooke's Law.

---



---

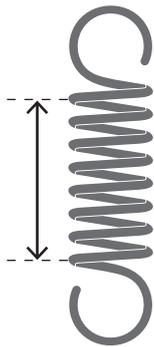


---

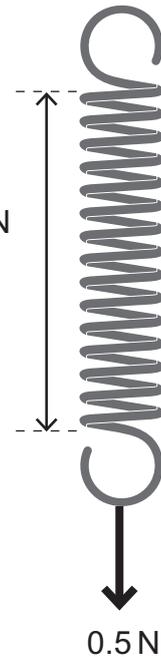
[2]

A force is applied to a spring, as shown below.

Length with no  
applied force  
= 2.2 cm



Length with 0.5 N  
applied force  
= 4.7 cm



© Aliaksei\_7799 / iStock / Thinkstock

(b) Use the information given to calculate the spring constant  $k$ .  
Remember to include the unit.

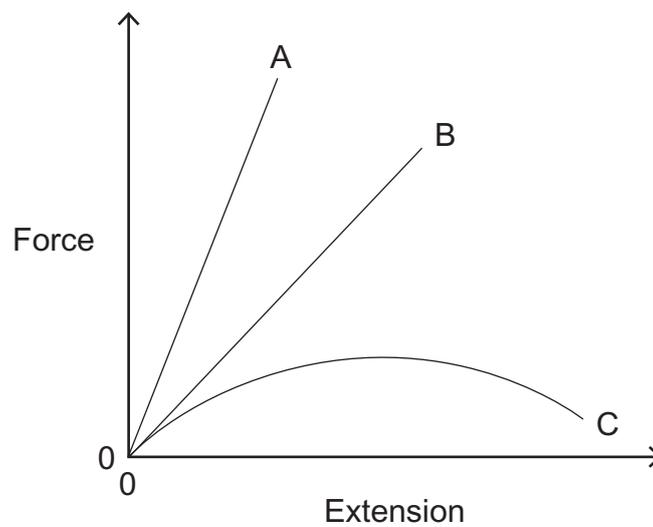
**You are advised to show your working out.**

Spring constant,  $k =$  \_\_\_\_\_ [5]

[Turn over



(c) Graphs of force against extension for three different springs are shown below.



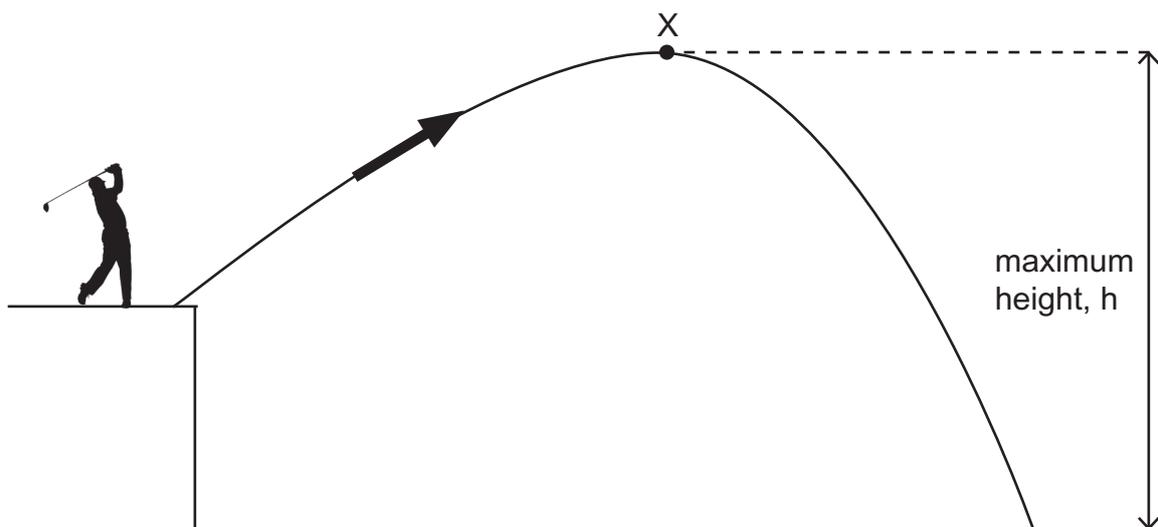
Insert the letter of the line for the spring that is best described by each of the following statements.

- (i) Has the greatest spring constant \_\_\_\_\_ [1]
- (ii) Does not obey Hooke's Law \_\_\_\_\_ [1]
- (iii) Has the smallest extension for the same applied force \_\_\_\_\_ [1]





10 A golfer strikes a golf ball as shown in the diagram below.



© Snap2Art\_RF / iStock / Thinkstock

The golf ball has a mass of 0.045 kg and hits the ground with a velocity of 20 m/s. At point X, the highest point in its motion, the kinetic energy of the golf ball is 5.5 J.

By first finding the kinetic energy of the ball when it hits the ground, use the Principle of Conservation of Energy to calculate the maximum height,  $h$ , the ball reaches.

Give your answer correct to **one decimal place**.

Assume there are no energy losses.

**You are advised to show your working out.**

Maximum height = \_\_\_\_\_ m [6]

---

**THIS IS THE END OF THE QUESTION PAPER**

---





**BLANK PAGE**  
**DO NOT WRITE ON THIS PAGE**

11640



\*20GDW3217\*

**BLANK PAGE**  
**DO NOT WRITE ON THIS PAGE**

11640



\*20GDW3218\*





**BLANK PAGE**  
**DO NOT WRITE ON THIS PAGE**

11640



\*20GDW3219\*

Sources:

Thinkstock 503400211

Thinkstock 119837460

Thinkstock skd186152sdc

Thinkstock 625457854

Thinkstock 460156865

Thinkstock 463626747

**DO NOT WRITE ON THIS PAGE**

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

<b>Total Marks</b>	
--------------------	--

Examiner Number

Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright holders may have been unsuccessful and CCEA will be happy to rectify any omissions of acknowledgement in future if notified.

11640



\*20GDW3220\*

