

New  
Specification

Centre Number

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Candidate Number

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General Certificate of Secondary Education  
2017–2018

# Double Award Science Physics

Unit P1



Foundation Tier

[GDW31]

\*GDW31\*

**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 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.

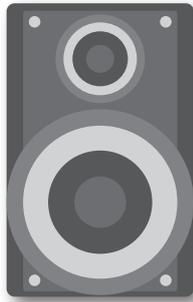
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1 (a) State the main type of energy in the following.

(i) The energy from a loudspeaker.



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

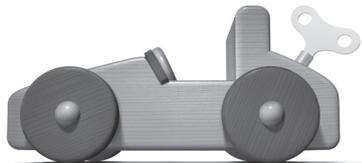
(ii) The energy in a bowl of cereal.



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

(iii) The energy in a wound up spring in a toy car.



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



(b) A ball falling through the air has two types of energy.  
State the two types.



\_\_\_\_\_ energy

and \_\_\_\_\_ energy.

[2]



- 2 (a) Explain what is meant by a renewable energy resource.

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[1]

- (b) For each energy resource in the table below place a tick (✓) to indicate whether the resource is renewable or non-renewable.

Energy resource	Renewable	Non-renewable
Sunlight		
Natural gas		
Geothermal heat		
Nuclear		

[4]

- (c) (i) Machines use energy to do work.

Which of the equations below is the **best** to calculate the efficiency of a machine? Tick (✓) your choice.

$$\text{efficiency} = \frac{\text{total output energy}}{\text{energy in}} \quad \square$$

$$\text{efficiency} = \frac{\text{energy in}}{\text{useful output energy}} \quad \square$$

$$\text{efficiency} = \frac{\text{useful output energy}}{\text{total input energy}} \quad \square$$

[1]



- (ii) An electric light bulb uses 120 J of electrical energy. It produces 24 J of light energy.  
Calculate the efficiency of the light bulb.

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

Efficiency = \_\_\_\_\_ [2]

[Turn over



- 3 (a) An object has a mass of 900 g. By first finding its mass in kg, calculate its weight.

You are advised to show your working out.

$$\text{Weight} = \text{_____} \text{ N} \quad [3]$$

- (b) An object falls from rest.  
What is the speed of the object 3 seconds later if there is no air resistance?

$$\text{Speed} = \text{_____} \text{ m/s} \quad [1]$$

- (c) An object falls from **rest** and reaches a speed of 28 m/s.  
Calculate the object's average speed.

You are advised to show your working out.

$$\text{Average speed} = \text{_____} \text{ m/s} \quad [3]$$



- (d) Sometimes it is necessary to calculate the rate of change of speed of an object as it falls.  
In the space below write, **in words**, the equation for rate of change of speed and give the unit in which it would be measured.

Rate of change of speed =

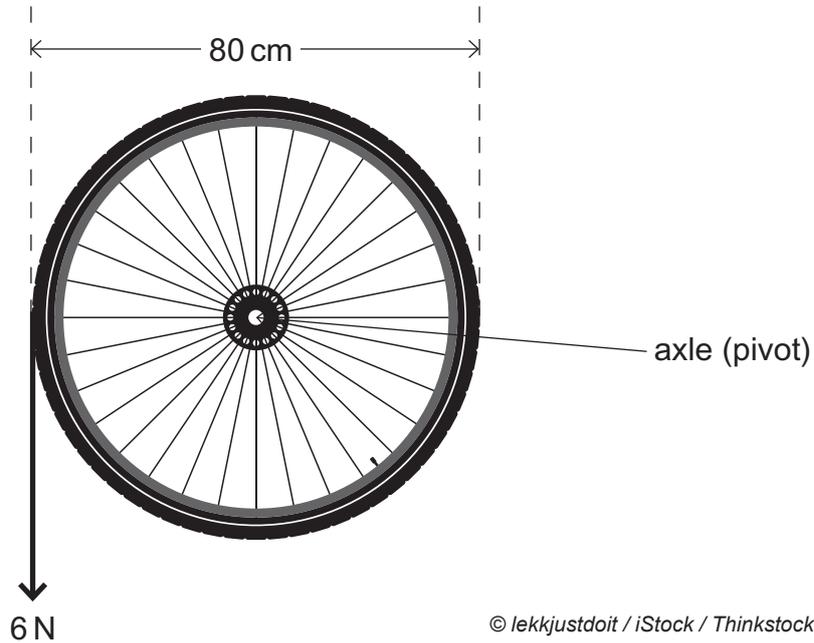
Unit =

[2]

[Turn over



- 4 A wheel has a diameter of 80 cm.  
The wheel is turned by exerting a downward force of 6 N as shown.



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- (i) Calculate the moment, in Ncm, exerted by the 6 N force about the axle (pivot).

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

Moment = \_\_\_\_\_ Ncm [3]

- (ii) Give the direction of the moment.

Direction = \_\_\_\_\_ [1]





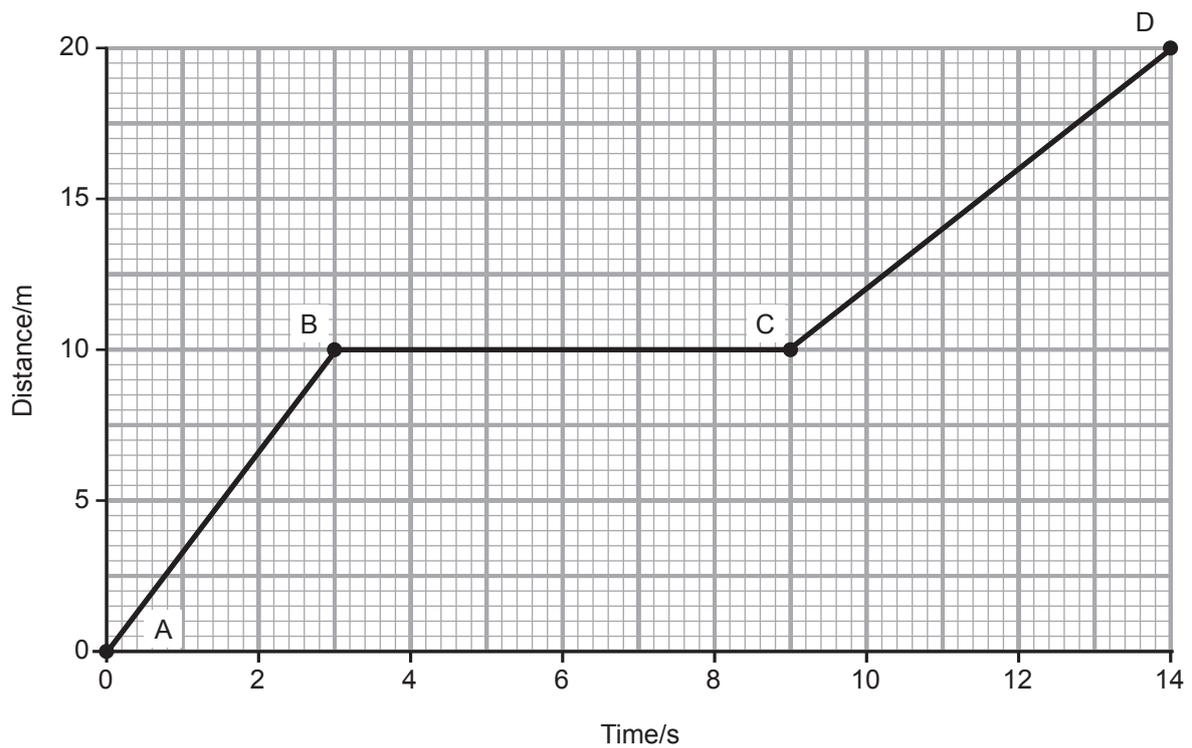
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[Turn over



5 A distance-time graph for a cyclist is shown.



(a) (i) Describe the motion of the cyclist during BC.

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

(ii) During which region is the speed of the cyclist greatest?  
Choose your answer by ticking (✓) the correct box.

Speed is greatest during

AB

BC

CD

[1]



(iii) State the distance travelled in the following time intervals.

Distance travelled in the first 3 seconds

\_\_\_\_\_ m

Distance travelled in the first 9 seconds

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

(b) Calculate the speed of the cyclist during the first 3 seconds of her journey.

Give your answer to one decimal place.

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

Speed = \_\_\_\_\_ m/s [3]

[Turn over



- 6 (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]





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



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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



9 A mountaineer wears snow shoes.



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The snow shoes prevent her from sinking into the snow.

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

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[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]





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Question Number	Marks
1	
2	
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<b>Total Marks</b>	
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Examiner Number

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