Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2021–2022

Double Award Science: Physics

Unit P1

Foundation Tier

[GDW31]

GDW31

TUESDAY 7 JUNE, 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 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 **8**.

13388

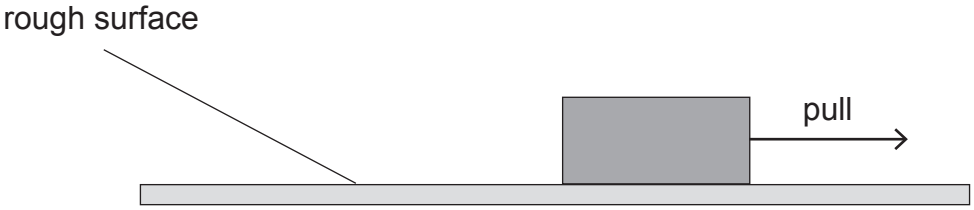
1 **(a)** This question is about different types of energy.

What type of energy is contained in petrol?

© Getty Images

_____ energy

Other than sound, what is the energy produced when an object is pulled over a rough surface?



Source: Chief Examiner

_____ energy

In the example of the microphone below, state the input and the output energy.

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Input energy _____

Output energy _____ [4]

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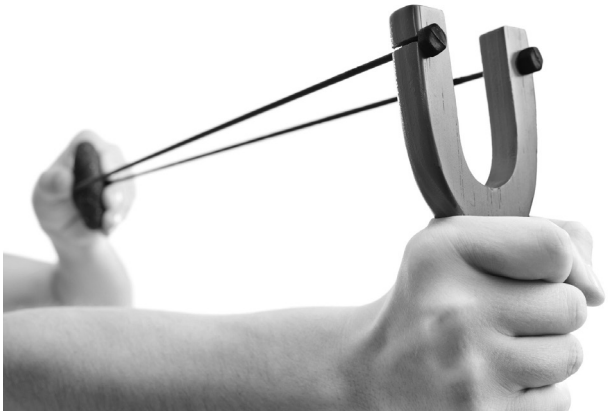
(b) Complete the sentences below for a catapult.



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The stretched catapult stores _____ energy.

This energy is changed to _____ energy

and _____ energy of the stone as it travels

upwards. [3]

2 Energy resources may be renewable or non-renewable.

(a) In the table below indicate whether the resource is renewable or non-renewable.

Write R beside the resource which is renewable.
Write N beside the resource which is non-renewable.

Resource	**Renewable (R) or non-renewable (N)**
wood	
geothermal heat	
natural gas	
nuclear	

[4]

(b) Which **two** statements below could be applied to a **non-renewable** energy resource?
Tick (✓) two boxes.

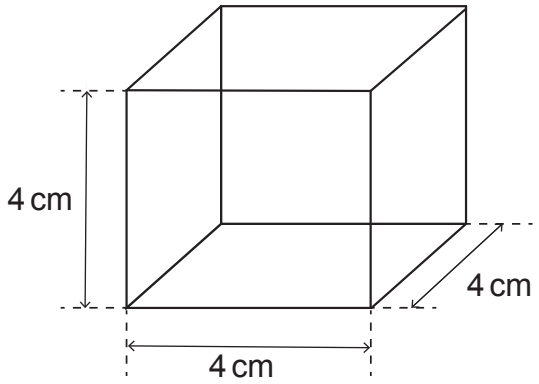
The resource can be replaced within a lifetime. ☐

The resource can cause acid rain. ☐

The resource will run out some day. ☐

The resource will never run out. ☐ [2]

3 A student carries out an experiment to find the density of a cube.



(i) Calculate the volume of the cube.

You are advised to show your working out.

Volume = _____ cm^3 [2]

The cube has a mass of 192 g.

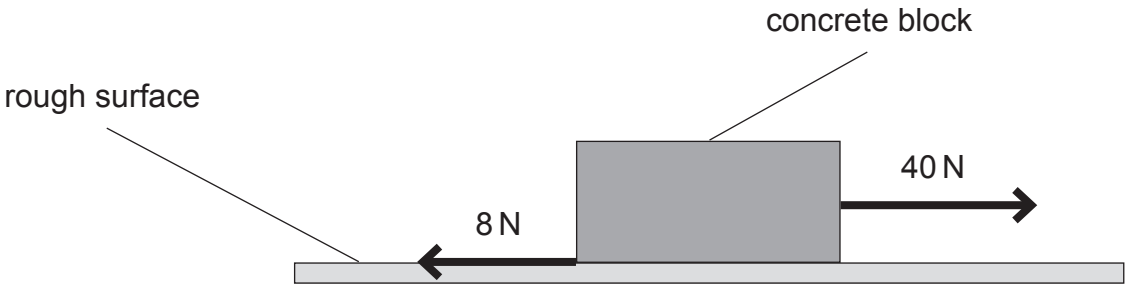
(ii) Calculate its density.

You are advised to show your working out.

Density = _____ g/cm^3 [3]

[Turn over

4 **(a)** A block of concrete is pulled over a rough surface by a force of 40 N.



The frictional force exerted by the rough surface is 8 N.

(i) Calculate the resultant force acting on the block.

Resultant force = _____ N [1]

The block moves a distance of 5 m.

(ii) Use your answer to part (i) to calculate the useful work done on the block.

You are advised to show your working out.

Work done = _____ J [3]

(b) A machine does 520 J of work in 13 seconds. Calculate the power of the machine.

You are advised to show your working out.

Power = _____ W [3]

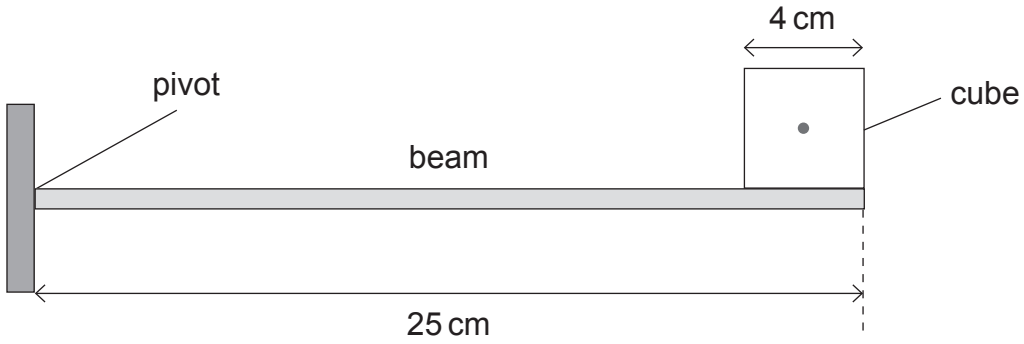
[Turn over

5 **(i)** What do you understand by the centre of gravity of an object?

_____

_____ [2]

A cube has sides of 4 cm and is placed on a beam of length 25 cm as shown.
The left hand end of the beam is fixed.



(ii) Starting at the correct point, draw an arrow on the cube to represent its weight. [2]

(iii) Calculate the distance from the centre of the cube to the pivot.

Distance = _____ cm [1]

(iv) The cube has a weight of 20 N.
Use your answer to (iii) to calculate the moment exerted by the cube about the pivot.
Give your answer in Ncm.

You are advised to show your working out.

Moment = _____ Ncm [3]

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6 A footballer kicks a ball of mass 0.5 kg into the air.

© Getty Images

(a) At one point the ball has a speed of 8 m/s.

Calculate the kinetic energy of the ball at this point.

You are advised to show your working out.

Kinetic energy = _____ J [3]

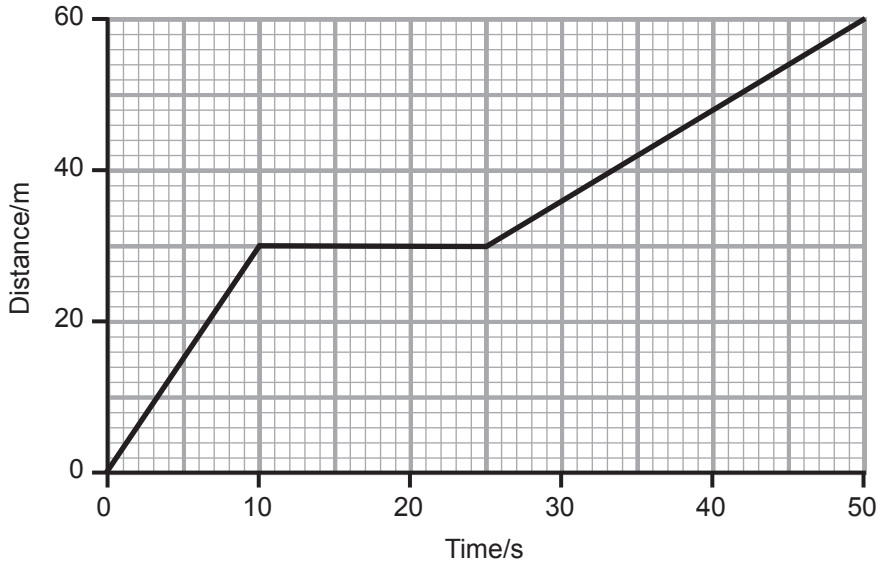
(b) On another occasion the footballer kicks the ball to a height of 5 m.
Calculate the potential energy of the ball.
Remember the mass of the ball is 0.5 kg.

You are advised to show your working out.

Potential energy = _____ J [3]

[Turn over

7 The distance–time graph for a cycle journey is shown below.



(i) During what time interval is the cyclist travelling fastest?

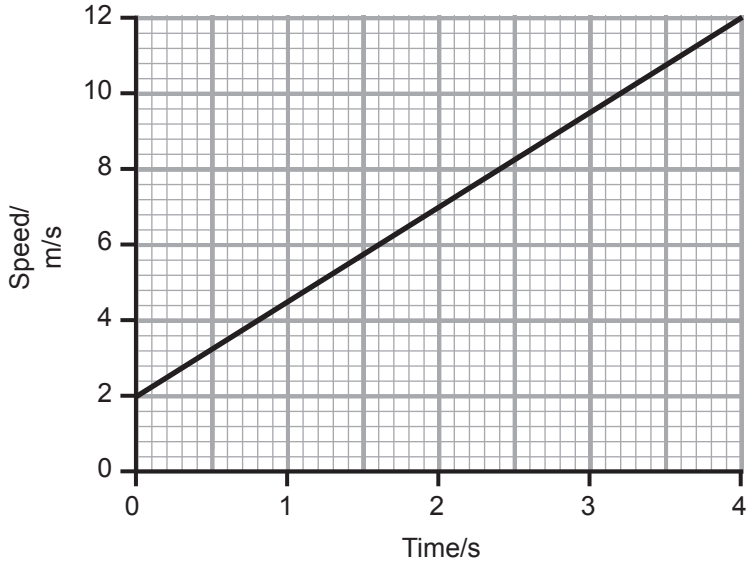
_____ s to _____ s [1]

(ii) Calculate his speed during the last 25 seconds of his journey.

You are advised to show your working out.

Speed = _____ m/s [4]

(iii) A speed–time graph for a different journey is shown.



Calculate the rate of change of speed and give its unit.

You are advised to show your working out.

Rate of change of speed = _____ [5]

[Turn over

8 In the following question you are asked to name, **in words**, the three types of radiation that may be emitted by radioactive nuclei.

For each type of radiation state its relative charge, if any.

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

Radiation 1

Radiation 2

Radiation 3

[6]

9 **(i)** Explain the meaning of the term half-life.

_____

_____ [2]

(ii) A radioactive substance has a half-life of 3 days.

Initially the substance has 14 000 undecayed nuclei.

By first finding the number of undecayed nuclei after 9 days, calculate the number of nuclei which have decayed in this time.

You are advised to show your working out.

Number of decayed nuclei = _____ [3]

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Question Number	Marks
1	
2	
3	
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8	
9	
Total Marks	

Examiner Number

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