



General Certificate of Secondary Education
2013–2014

Centre Number

71

Candidate Number

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

MONDAY 19 MAY 2014, AFTERNOON

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.
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 **8(a)**.

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

Total Marks	
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- 1 (a) Complete the statements below to describe the energy change each device is **designed** to bring about.

The first one has been done for you as an example.



Loudspeaker

© Dorling Kindersley/ Thinkstock

Changes electrical energy to sound energy.



Match

© iStock/ Thinkstock

Changes _____ energy to _____ energy.



Microphone

© iStock/ Thinkstock

Changes _____ energy to _____ energy.



Diesel engine

© iStock/ Thinkstock

Changes _____ energy to _____ energy.

[6]

Examiner Only	
Marks	Remark
○	○

(b) State the principle of Conservation of Energy.

[1]

(c) The table below shows the energy input and useful output values for 3 electric toasters. However, one value has been recorded incorrectly.

Toaster	Energy Input /J	Useful Output Energy/J
A	450	200
B	350	500
C	550	450

Which set of figures A, B or C is **incorrect**?

Answer _____

Explain your answer.

[2]

Examiner Only

Marks

Remark

2 (a) Some nuclei are said to be radioactive.

What does radioactive mean?

_____ [2]

(b) When measuring radioactivity, background activity is taken into account.

(i) Name a **major** source of background activity.

_____ [1]

(ii) How is it taken into account when measuring radioactivity?

_____ [1]

(c) Radioactive emissions can cause dangerous ionisations.

Name two precautions which are taken to minimise the risk to those using ionising radiations.

1. _____
2. _____ [2]

Examiner Only	
Marks	Remark
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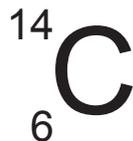
- 3 (a) Where are the protons, neutrons and electrons to be found in an atom?

Protons: _____

Neutrons: _____

Electrons: _____ [3]

- (b) The symbol for an isotope of carbon is



- (i) How many protons are there in this isotope of carbon-14?

_____ [1]

- (ii) How many neutrons are there in this isotope of carbon-14?

_____ [1]

- (iii) How many electrons are there in a neutral atom of carbon-14?

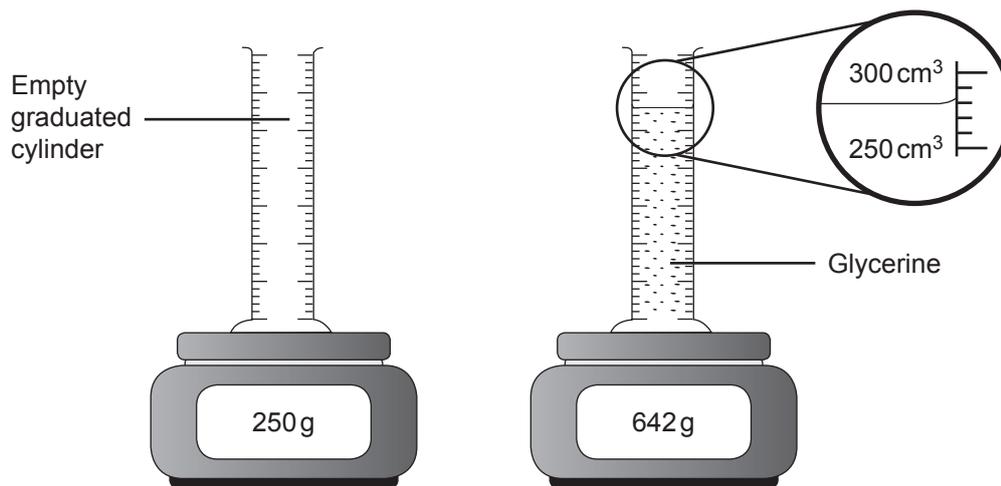
_____ [1]

- (c) In terms of **nuclear particles**, explain the meaning of the word isotope.

_____ [2]

Examiner Only	
Marks	Remark
○	○

- 4 To find the density of glycerine the following readings were recorded.



- (i) State the mass of the empty graduated cylinder.

Mass of cylinder = _____ g [1]

- (ii) Calculate the mass of the glycerine in the graduated cylinder.

Mass of glycerine = _____ g [1]

- (iii) State the volume of the glycerine in the graduated cylinder.

Volume of glycerine = _____ cm³ [1]

- (iv) Calculate the density of glycerine.

You are advised to show your working out.

Density of glycerine = _____ g/cm³ [3]

Examiner Only	
Marks	Remark
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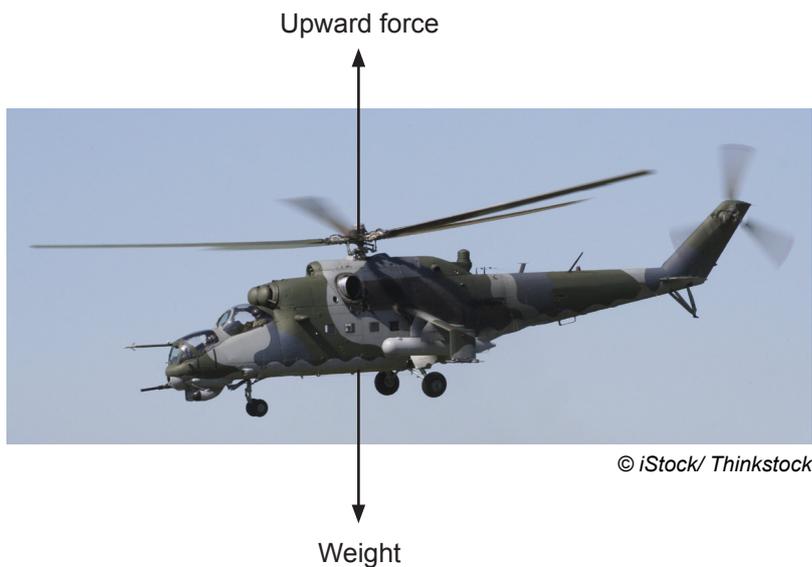
- 5 A remote-controlled model helicopter, of mass 2.0 kg, accelerates upwards at 1.5 m/s^2 .

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

You are advised to show your working out.

Resultant force = _____ N [3]

The diagram shows the forces acting on the helicopter.



(ii) State the weight of the helicopter. Remember its mass is 2.0 kg.

Weight = _____ N [1]

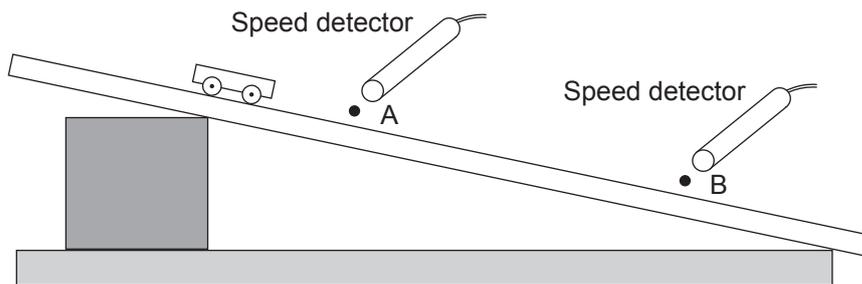
(iii) Calculate the upward force on the helicopter by using

Upward force = Resultant force + Weight

Upward force = _____ N [1]

Examiner Only	
Marks	Remark
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6 A trolley accelerates down a ramp.



In a particular experiment the results are shown below.

Speed at A = 0.5 m/s

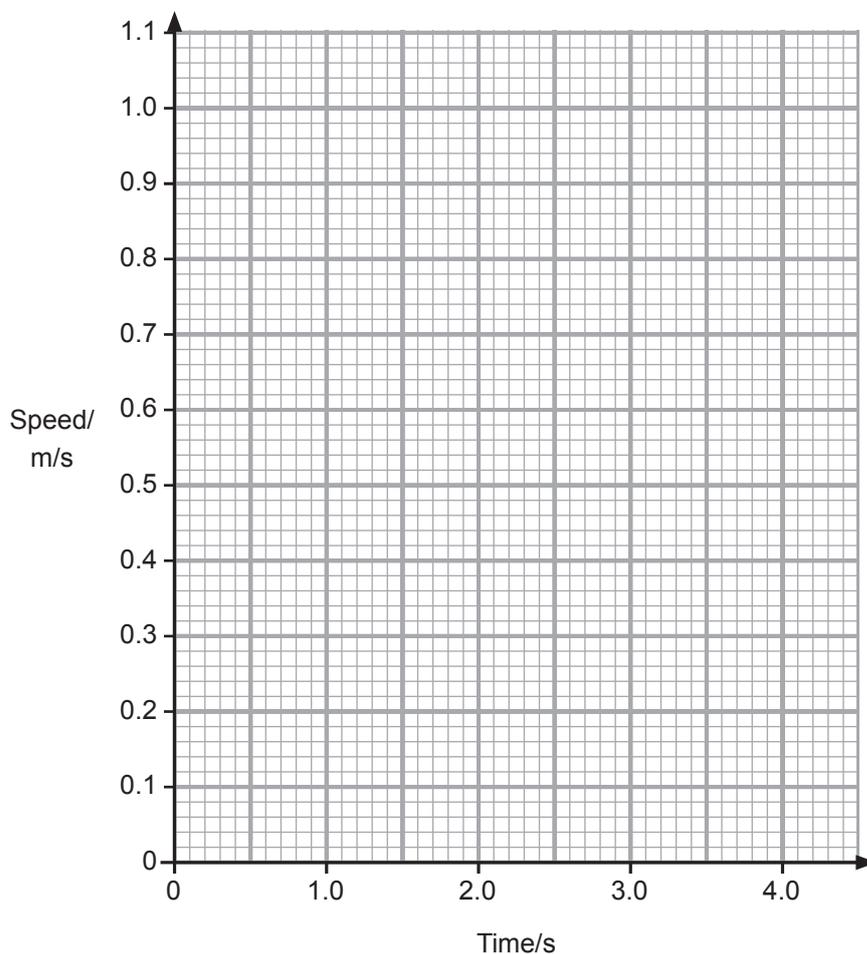
Speed at B = 1.1 m/s

Time interval from A to B = 3.0 s

(i) State the increase in speed of the trolley.

Increase in speed = _____ m/s [1]

(ii) Remember at time $t = 0$ s, the speed of the trolley is 0.5 m/s.
Draw a graph of the trolley's motion.



Examiner Only	
Marks	Remark
○	○

(iii) Calculate the acceleration of the trolley using the formula:

$$\text{Acceleration} = \frac{\text{Increase in speed}}{\text{Time}}$$

You are advised to show your working out.

$$\text{Acceleration} = \text{_____} \text{ m/s}^2 \text{ [2]}$$

(iv) The average speed of the trolley as it rolls down the ramp is the average of its speeds at A and B.

Use the formula below to find the distance between points A and B.

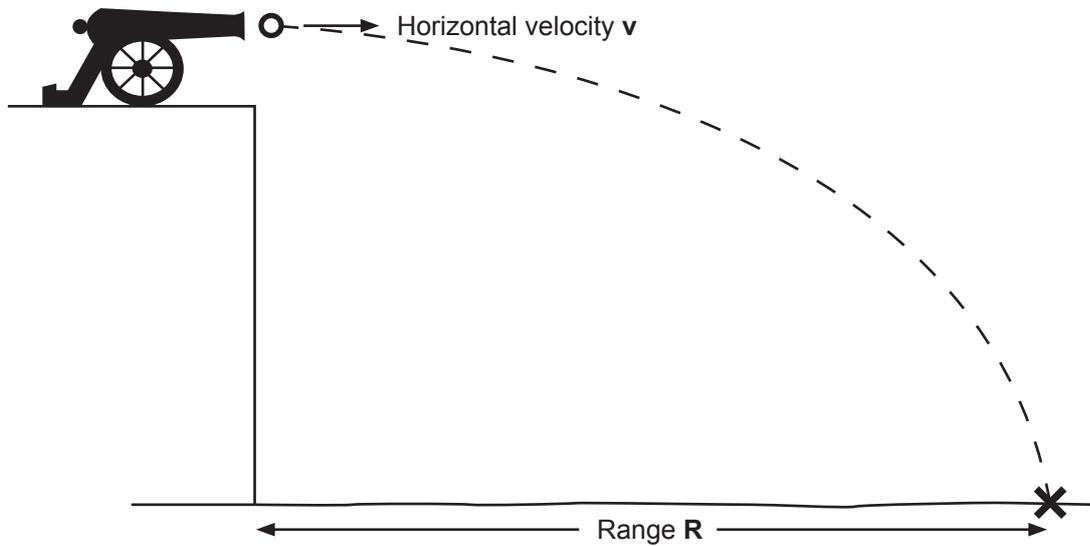
$$\text{Distance} = \text{average speed} \times \text{time}$$

You are advised to show your working out.

$$\text{Distance} = \text{_____} \text{ m [3]}$$

Examiner Only	
Marks	Remark

- 7 According to theory, the range R of a cannonball depends on the horizontal velocity v when fired from the top of a cliff.

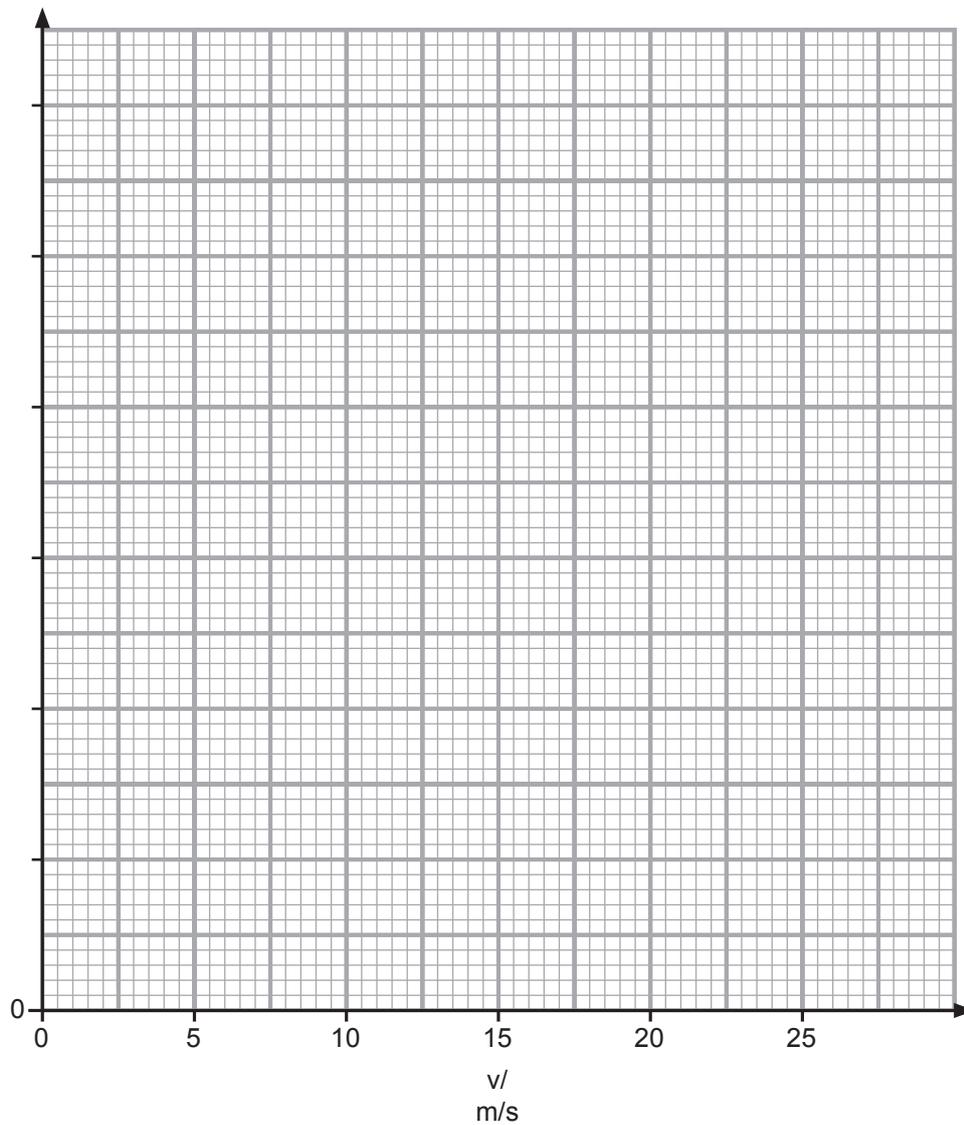


A series of readings is shown in the table.

$v/$ m/s	0	5	10	15	20
R/m	0	30	60	90	120

- (a) (i) Label and choose a suitable scale for the vertical axis. [2]
- (ii) Plot the points on the grid and draw the straight line of best fit. [3]

Examiner Only	
Marks	Remark
○	○



Examiner Only	
Marks	Remark

(b) Find the gradient of the graph.

Remember to include the unit for the gradient.

You are advised to show your working out.

Gradient = _____

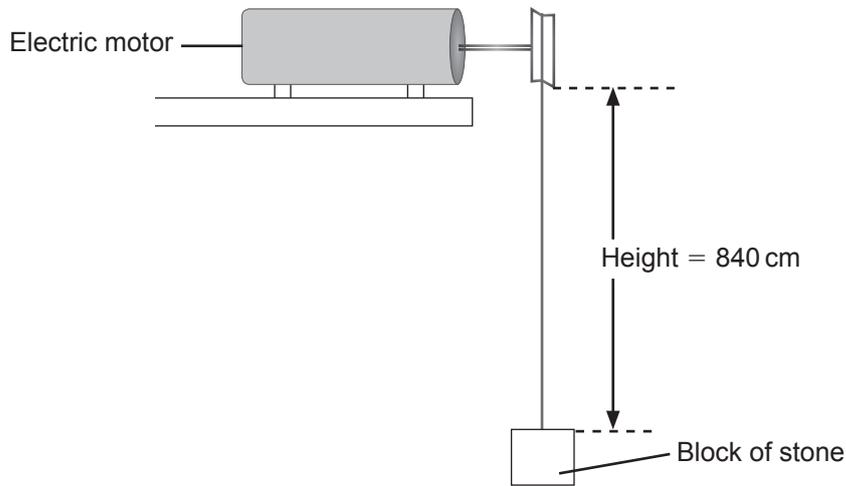
Unit = _____ [4]

(c) Use the graph to find the range, **R**, of the cannonball when its horizontal velocity is 12 m/s.

Range = _____ m [1]

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- 9 An electric motor lifts a block of stone, of weight 150 N, through a vertical distance of 840 cm.



- (i) Calculate the work done.

You are advised to show your working out.

Work done = _____ J [4]

- (ii) Into what energy form has this work been changed?

Work has become _____ [1]

Examiner Only	
Marks	Remark
○	○

(iii) If the motor uses 2100 J of electrical energy, calculate the efficiency of the motor.

You are advised to show your working out.

Efficiency = _____ [3]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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