Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

ML

MONDAY 19 MAY 2014, AFTERNOON

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.
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	

Examiner Only	
Marks	Remark

1 **(a)** The sentences below describe the energy change each device is **designed** to bring about. Fill in the missing answers.

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

Loudspeaker

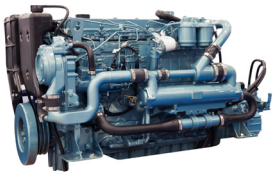
Changes _____electrical_____ energy to _____sound_____ energy.

Match

Changes _____ energy to _____ energy.

Microphone

Changes _____ energy to _____ energy.



Diesel engine

Changes _____ energy to _____ energy.

[6]

(b) Write down the principle of Conservation of Energy.

Examiner Only

Marks	Remark

_____

_____ [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 you have to think about background activity.

(i) Write down the name of a **major** source of background activity.

_____

_____ [1]

(ii) What do you have to do about background activity when measuring radioactivity?

_____

_____ [1]

(c) Radioactive emissions can cause dangerous ionisations.

Write down the name of two precautions that are taken to minimise the risk to those using ionising radiations.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

3 **(a)** Where do you find the protons, neutrons and electrons in an atom?

Protons: _____

Neutrons: _____

Electrons: _____ [3]

(b) The symbol for an isotope of carbon is

$$^{14}_{6}C$$

(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?

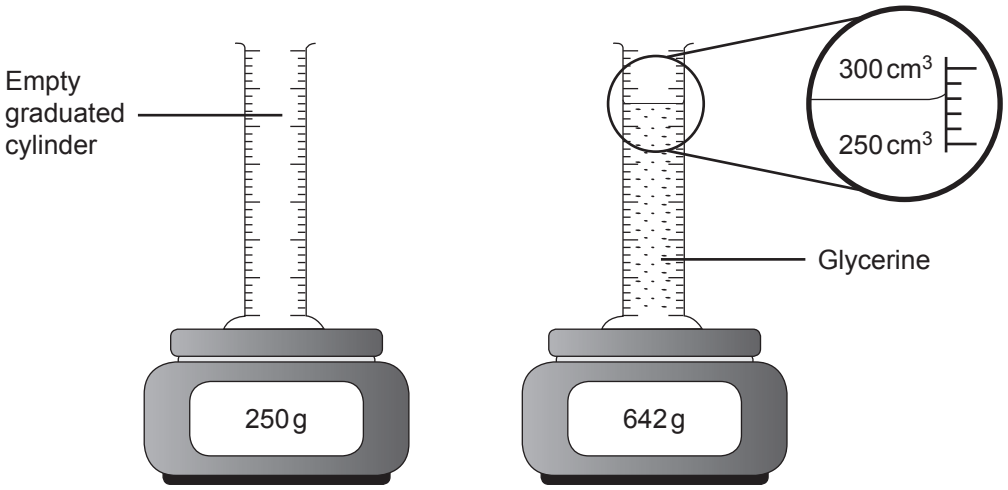
_____ [1]

(c) Explain the meaning of the word isotope. Do this in terms of **nuclear particles**.

_____

_____ [2]

4 To find the density of glycerine the readings below were recorded.



(i) Write down 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) Write down the volume of the glycerine in the graduated cylinder.

Volume of glycerine = _____ cm^3 [1]

(iv) Calculate the density of glycerine.

You should show your working out.

Density of glycerine = _____ g/cm^3 [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

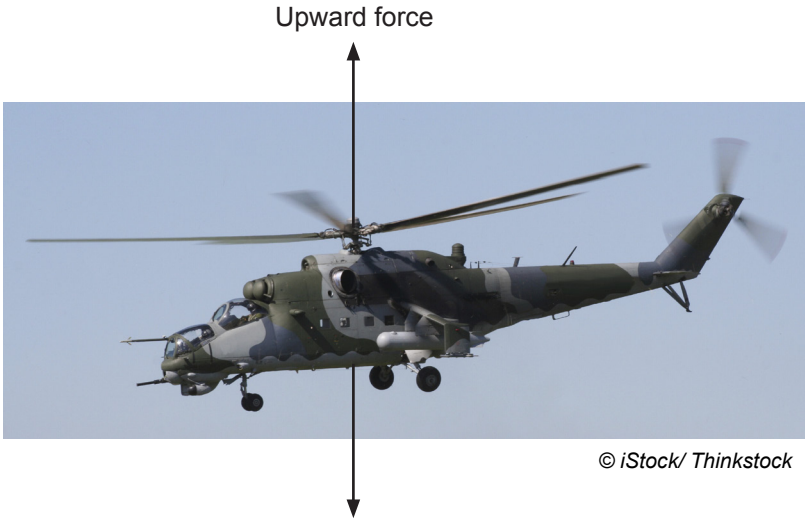
5 A remote-controlled model helicopter, of mass 2.0 kg, accelerates upwards at 1.5 m/s^2.

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

You should show your working out.

Resultant force = _____ N [3]

The diagram below shows the forces acting on the helicopter.



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

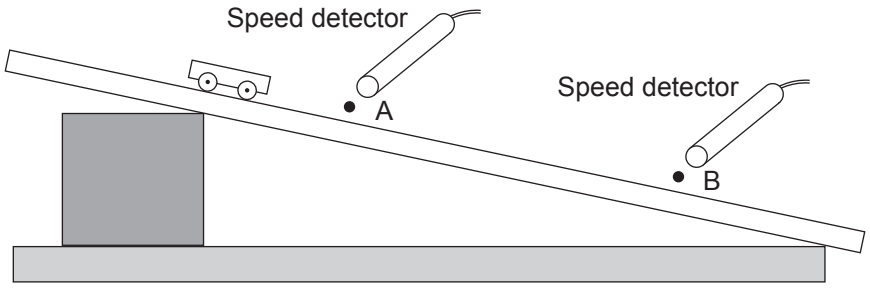
Weight = _____ N [1]

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

Upward force = Resultant force + Weight

Upward force = _____ N [1]

6 A trolley accelerates down a ramp.



The results of the experiment are shown below.

Speed at A = 0.5 m/s

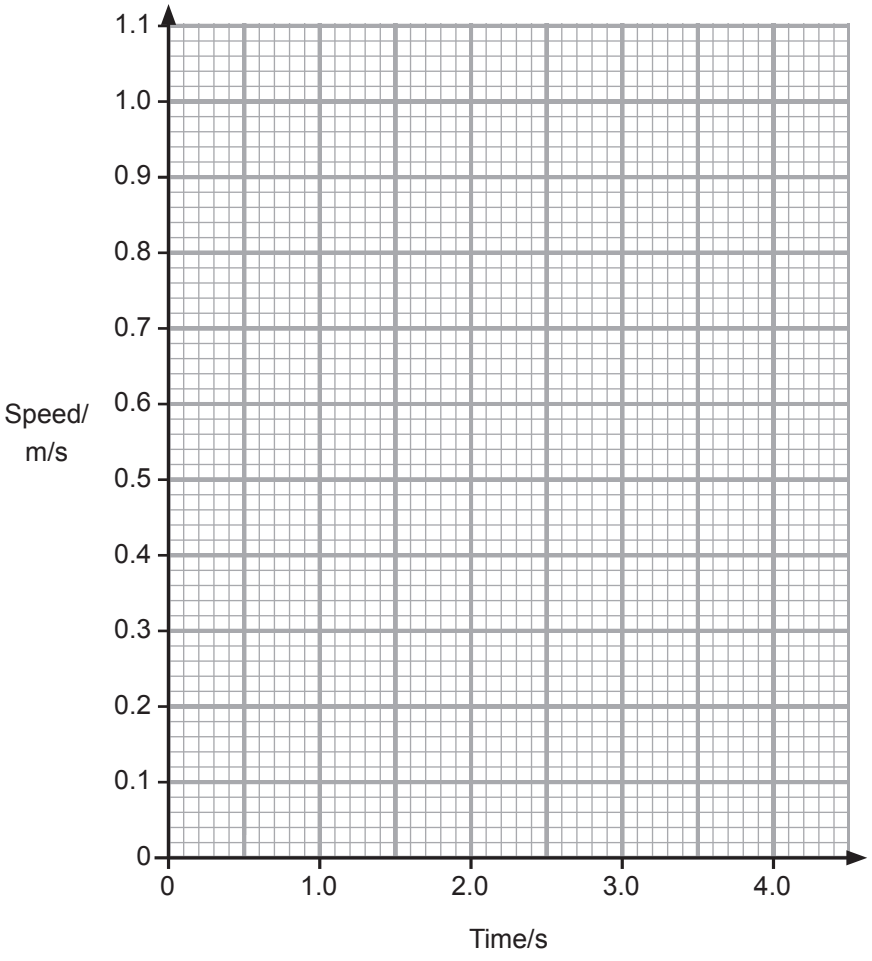
Speed at B = 1.1 m/s

Time interval from A to B = 3.0 s

(i) Write down 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.



[3]

Examiner Only
Marks | Remark

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

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

You should show your working out.

Acceleration = _____ m/s^2 [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.

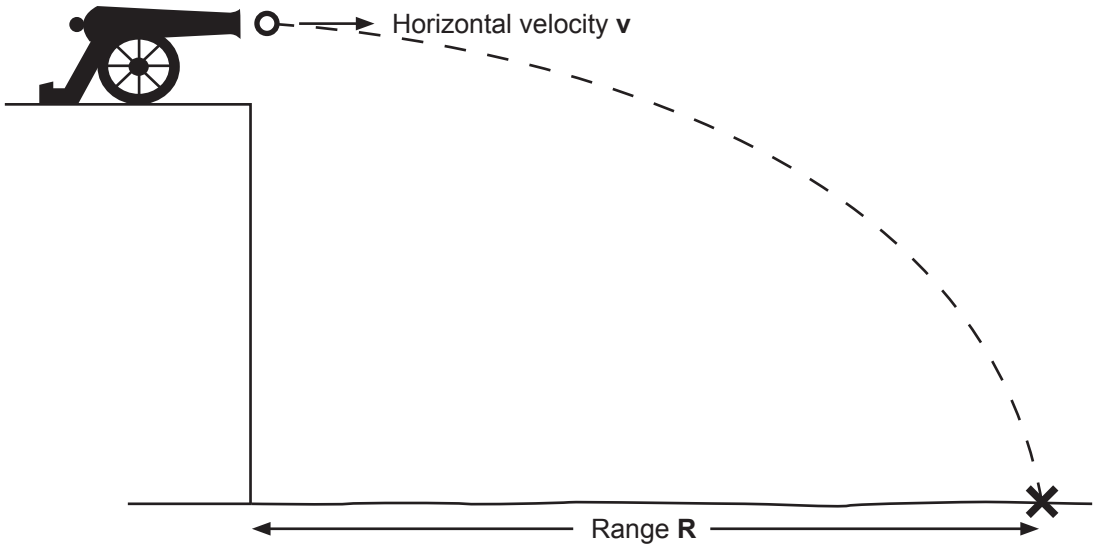
Distance = average speed × time

You should show your working out.

Distance = _____ m [3]

Examiner Only	
Marks	Remark

7 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 below.

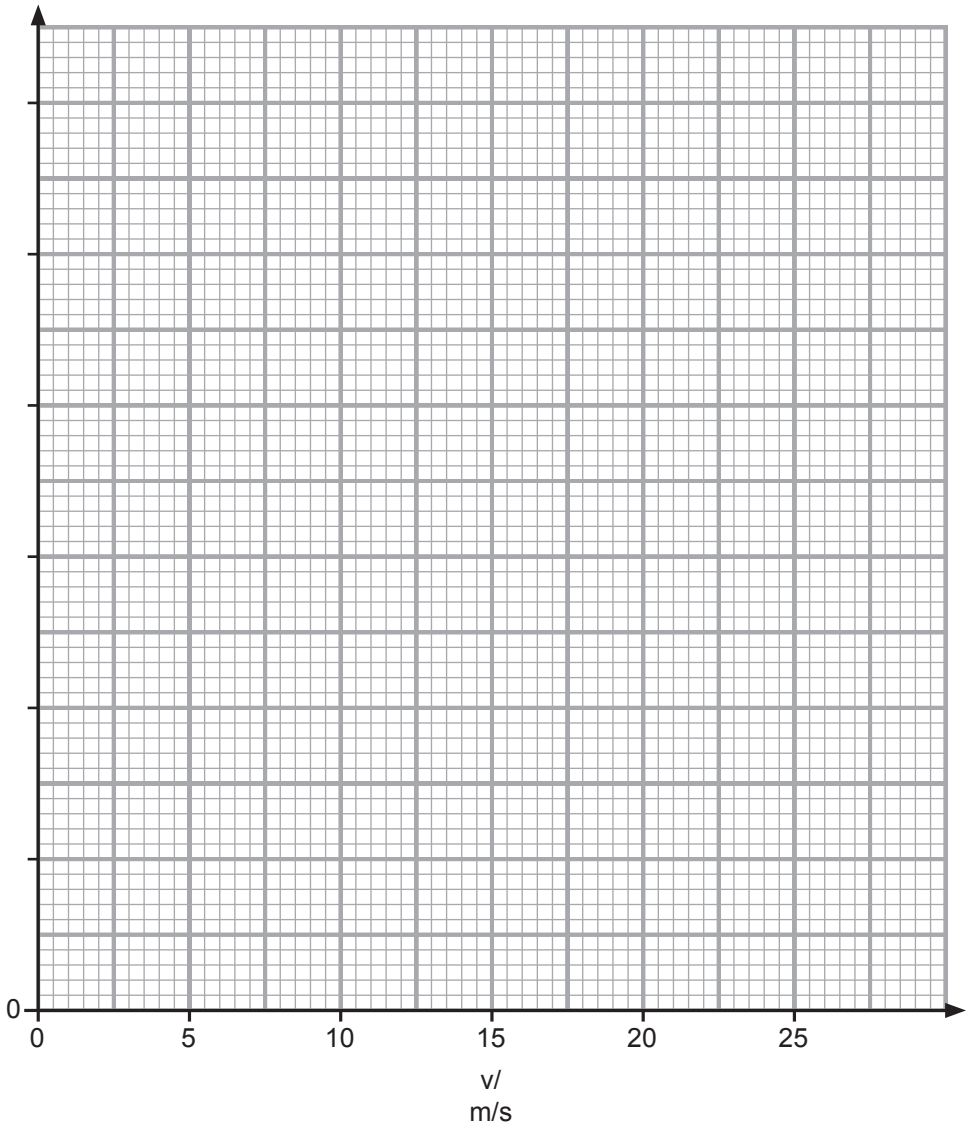
v/ m/s	0	5	10	15	20
R/m	0	30	60	90	120

(a) (i) Label and choose a suitable scale for the vertical axis. Do this on the graph. [2]

(ii) Plot the points on the graph 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 should 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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Examiner Only	
Marks	Remark

8 **(a)** Describe the process of nuclear **fusion**.

Your description should include:

- the particles involved
- what happens when nuclear fusion takes place
- where nuclear fusion occurs naturally

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

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [6]

(b) A lot of money is being invested on research into nuclear **fusion**.

(i) Write down a reason why the money is being invested.

_____ [1]

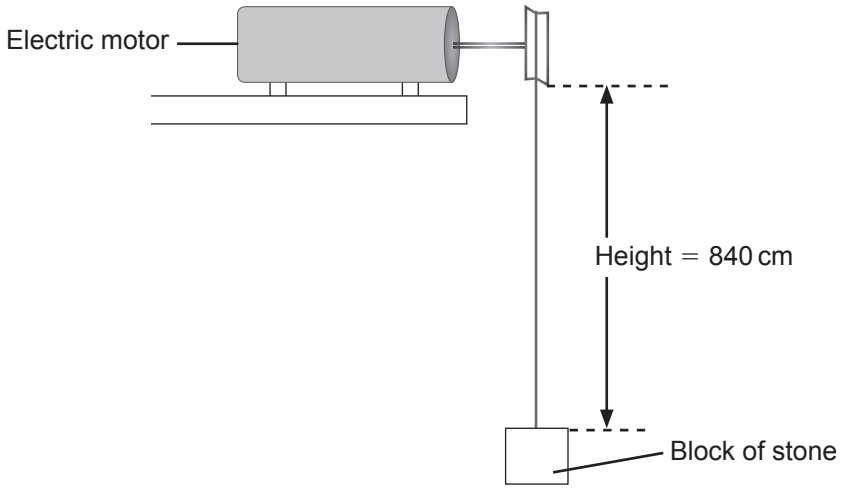
(ii) Write down two practical difficulties that must be overcome before fusion reactors become viable.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

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 should show your working out.

Work done = _____ J [4]

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

Work has become _____ [1]

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

You should show your working out.

Efficiency = _____ [3]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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