New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

GSD31

MONDAY 14 NOVEMBER 2011
1.30 pm–2.30 pm

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 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 **questions requiring extended answers**.

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

Examiner Only	
Marks	Remark

1 Maureen uses her mobile phone.

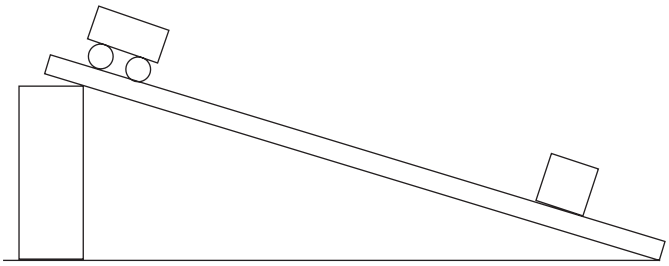
(a) (i) Where is the energy stored in the mobile phone?

Answer _____ [1]

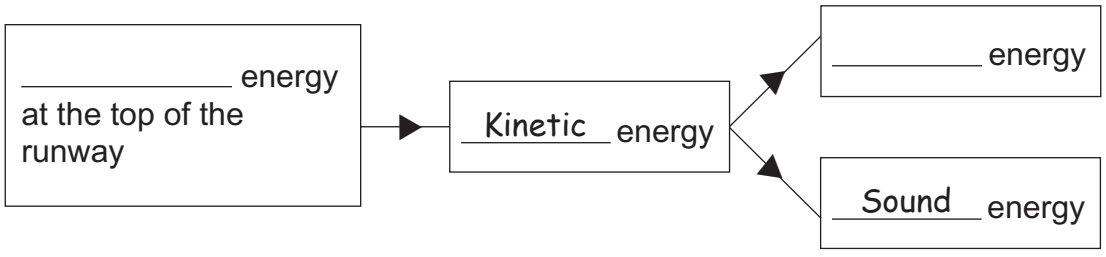
(ii) Name **two** useful forms of energy the mobile phone produces when it is in use.

_____ energy and _____ energy. [2]

A trolley is held at rest and then allowed to run down a runway. It hits a block of wood at the bottom and stops.



(b) Complete the energy transfer diagram below to show the energy changes that take place when the trolley is released.



[2]

Examiner Only	
Marks	Remark

2 Joan wants to find the average speed of her friend Siobhan as she cycles past.

(i) What two measurements would Joan have to make to allow her to calculate Siobhan's average speed? In each case give the name of the measuring instrument Joan would use.

1. _____ measured with _____

2. _____ measured with _____ [4]

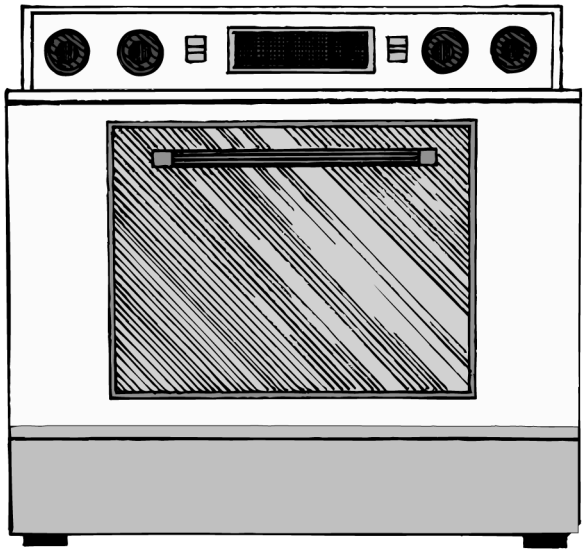
(ii) In the box below, give the equation, **in words**, that Joan would use to carry out the calculation to find the average speed.

[1]

Examiner Only	
Marks	Remark

3 An electric oven produces 2000 J of heat energy every second.

However 400 J of heat energy are lost every second.



(a) (i) Calculate the efficiency of the oven.

You are advised to show your working out.

Efficiency = _____ [3]

(ii) What unit, if any, is efficiency measured in? Choose from:

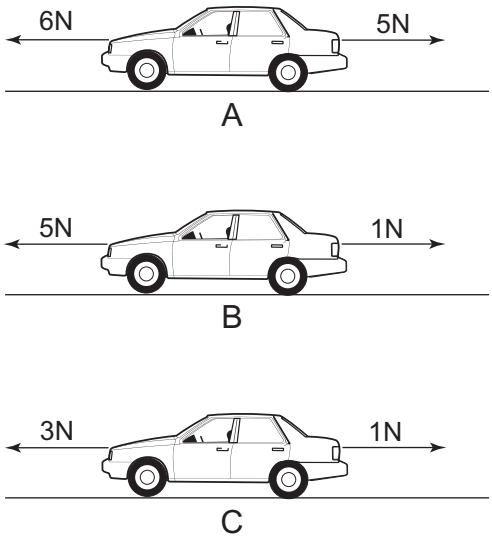
joule, newton, no unit, watt.

Answer _____ [1]

(b) In what practical way could the manufacturer make the oven more efficient?

_____ [1]

4 Three toy cars are shown and each one has the same mass.



(a) **(i)** Which car, A, B or C, will have the greatest acceleration?

Car _____ [1]

(ii) Give a reason for your answer.

_____ [1]

(b) Car C has a mass of 0.5 kg. Use the equation:

$$\text{acceleration} = \frac{\text{resultant force}}{\text{mass}}$$

to find the acceleration of car C.

Remember to include the correct unit.

You are advised to show your working out.

Acceleration = _____ [3]

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Marks	Remark

5 When an object moves in a circle then a force, called a centripetal force, must act towards the centre of the circle. Give the name of the force which provides the centripetal force in the two examples below.

(a) (i) a car moving round a circular track

Force = _____ [1]

(ii) a ball moves in a circle at the end of a string

Force = _____ [1]

A ball of mass 0.5 kg moves in a circle at the end of a string, as shown below.

(b) At a particular instant its velocity is 3 m/s. Calculate the ball's momentum at this instant.

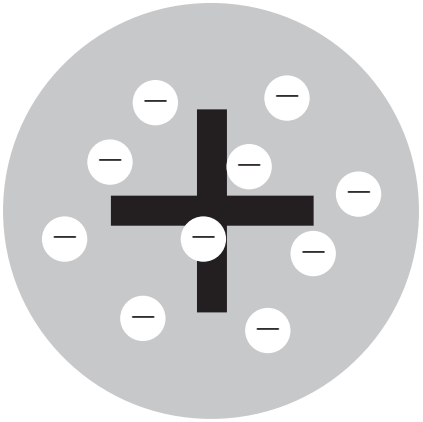
You are advised to show your working out.

Momentum = _____ kgm/s [3]

Examiner Only

Marks	Remark

6 In 1904 a scientist called J.J. Thomson put forward a model about the structure of the atom as shown in the diagram below.



(a) (i) What is the name of this model of the atom?

_____ [1]

Later this model was replaced by a better model. This model is named after two of the scientists who proposed it.

(ii) Give the name of **one** of the scientists.

_____ [1]

(b) Information about the model in **(ii)** above can be given in a table. Complete the table below.

Particle	Location	Charge
proton		positive
	nucleus	neutral
electron	in orbit	

[3]

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Marks	Remark

7 Mass and weight are two different quantities with different units.

(a) What is the weight of 400 g?

You are advised to show your working out.

Weight = _____ N [3]

Jim wants to find the density of steel. He has 100 steel nails and he finds that their volume is 20 cm^3.

(b) **(i)** Describe a method that Jim could have used to find the volume of the nails.

_____

_____

_____

_____

_____ [3]

(ii) The total mass of the nails is 150 g and their volume is 20 cm^3. Calculate the density of steel. Remember to include the units.

You are advised to show your working out.

Density = _____ [4]

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Marks	Remark

8 Nuclear fission reactors make use of a fuel called uranium. Uranium may be written in the following way:

$$^{235}_{92}U$$

(a) (i) What is the number 92 called?

_____ [1]

(ii) What information about the uranium nucleus is given by the number 92?

_____ [1]

(iii) What is the number 235 called?

_____ [1]

(iv) What information about the uranium nucleus is given by the number 235?

_____ [1]

(b) Some scientists believe that we should make greater use of nuclear fission.

Describe what happens in the fission of $^{235}_{92}U$ in a nuclear reactor.

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

_____

_____

_____

_____

_____

_____

_____

_____ [6]

9 Certain substances such as uranium are said to be radioactive.

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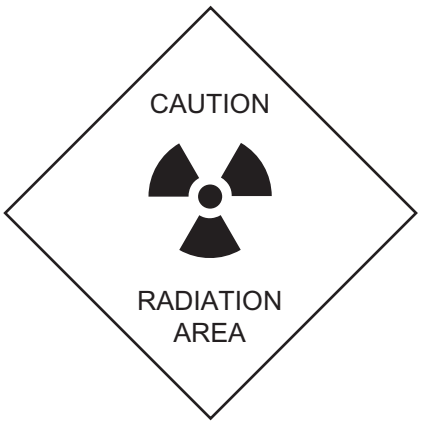
Marks	Remark



(a) (i) What does the word "radioactive" mean?

_____

_____ [2]

In the study of radioactivity we learn of three different types of radiation.

(ii) Identify these radiations from the information given below.

This type of radiation is an electromagnetic wave.

Type of radiation _____ [1]

This type of radiation is a particle made up from four smaller particles.

Type of radiation _____ [1]

This type of radiation is a single particle.

Type of radiation _____ [1]

We are all exposed to a certain minimum amount of radiation called "background radiation".

(b) Give two sources of background radiation.

1. _____

2. _____ [2]

People who work in nuclear power stations must take certain precautions to minimise the amount of radiation they receive.

Examiner Only	
Marks	Remark

(c) (i) Why must they keep the radiation they receive to a minimum?

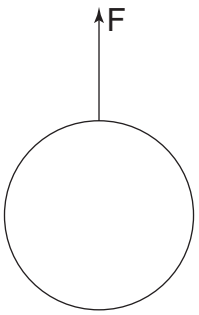
_____ [1]

(ii) Give two methods that they can use to keep the radiation to a minimum.

1. _____

2. _____ [2]

10 When an object falls through the air a drag force, F, acts on the object.



The size of the drag force, F, depends on the speed, v, of the falling object.

A scientist suggests a theory that the drag force is proportional to the square of the velocity. Another way of writing this relationship is:

$$F = kv^2 \qquad \textbf{Equation 10.1}$$

where k is a constant.

He obtains a set of results and these are shown.

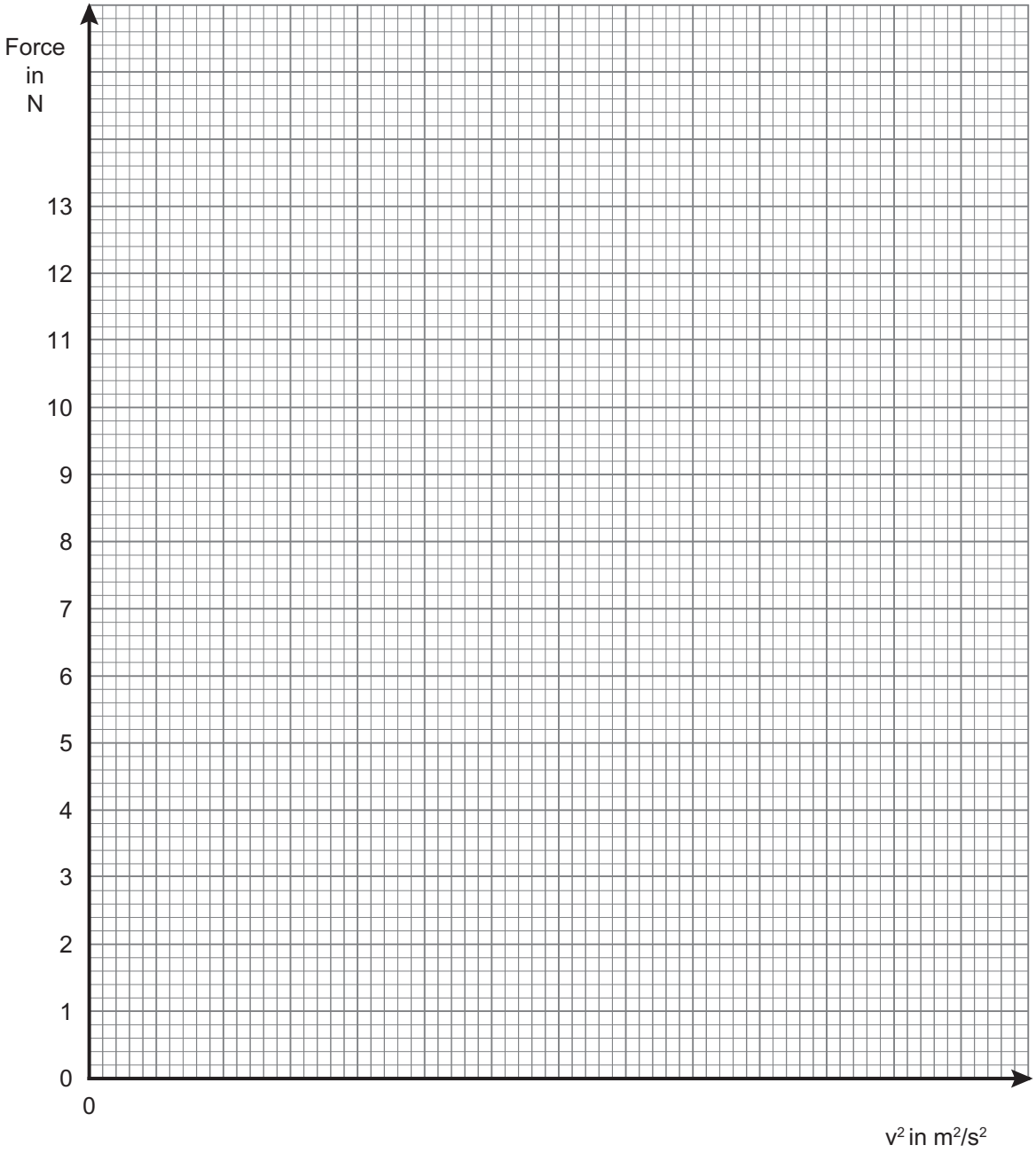
F in N	0.5	2.0	4.5	8.0	12.5
v in m/s	1	2	3	4	5
v^2 in m^2/s^2			9		

(i) Complete the table by entering the values of v^2. One has been done for you. [2]

(ii) Choose a suitable scale for the horizontal axis and plot a graph of F against v^2. [3]

Examiner Only

Marks	Remark



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Marks	Remark

(iii) Draw the best fit line. [1]

(iv) Does your graph support the theory described by **Equation 10.1**? Explain your answer.

_____

_____ [3]

(v) How would you find the value of k from the graph?

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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