



Rewarding Learning

General Certificate of Secondary Education  
2011–2012

**Double Award Science: Physics**

Unit P1

Foundation Tier

[GSD31]

MONDAY 14 NOVEMBER 2011

1.30 pm–2.30 pm



Centre Number

71	
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Candidate Number

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**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	

<b>Total Marks</b>	
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1 Maureen uses her mobile phone.



Examiner Only	
Marks	Remark
○	○

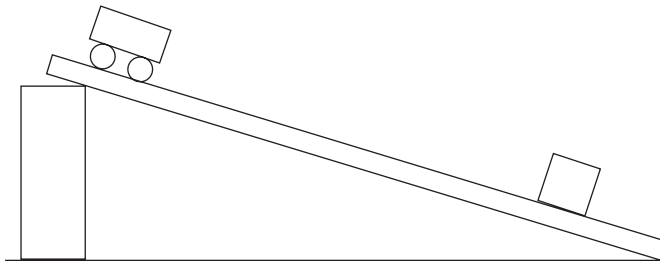
(a) (i) Where is the energy stored in the mobile phone?

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

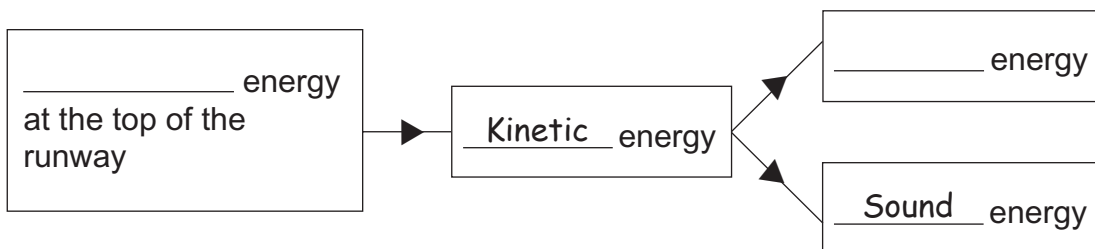
(ii) Name **two** useful forms of energy the mobile phone produces when it is in use.

\_\_\_\_\_ 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.

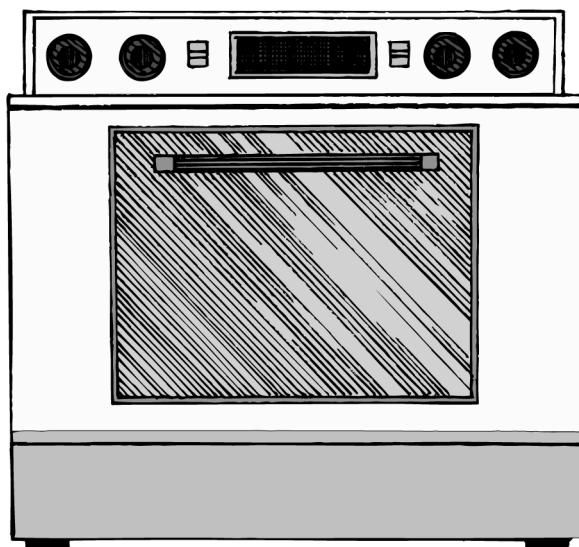


[2]



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.**

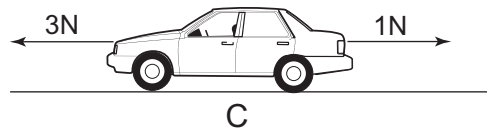
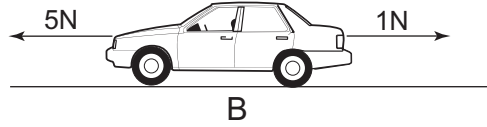
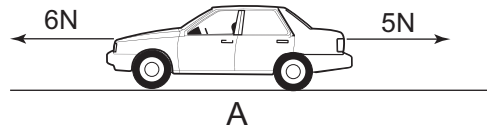
Answer \_\_\_\_\_ [1]

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

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

Examiner Only	
Marks	Remark
○	○

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



Examiner Only	
Marks	Remark
○	○

(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]

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



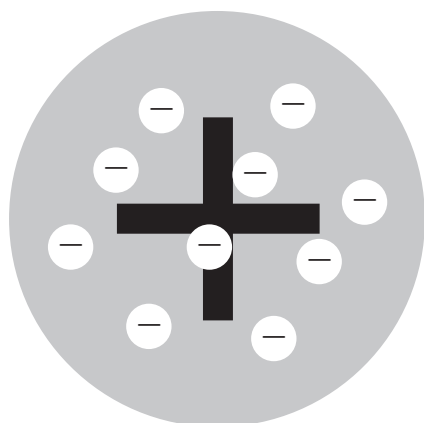
(b) At a particular instant its velocity is 3m/s. Calculate the ball's momentum at this instant.

**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.

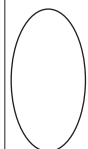
Particle	Location	Charge
proton		positive
	nucleus	neutral
electron	in orbit	

[3]

Examiner Only

Marks

Remark







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



(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.

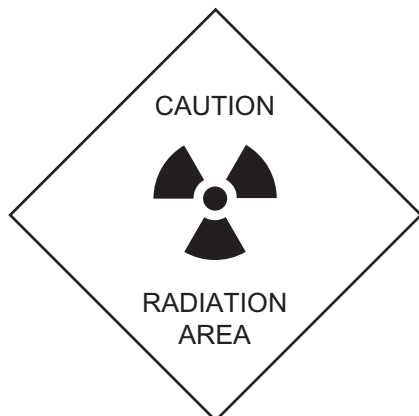
Describe what happens in the fission of  ${}_{92}^{235}\text{U}$  in a nuclear reactor.

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [6]

Examiner Only	
Marks	Remark
○	○

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



(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]

Examiner Only	
Marks	Remark
○	○

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

**(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.

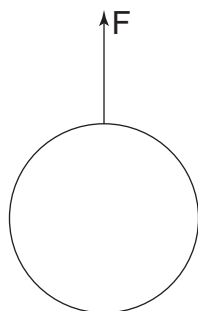
1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

Examiner Only

Marks Remark

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:

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

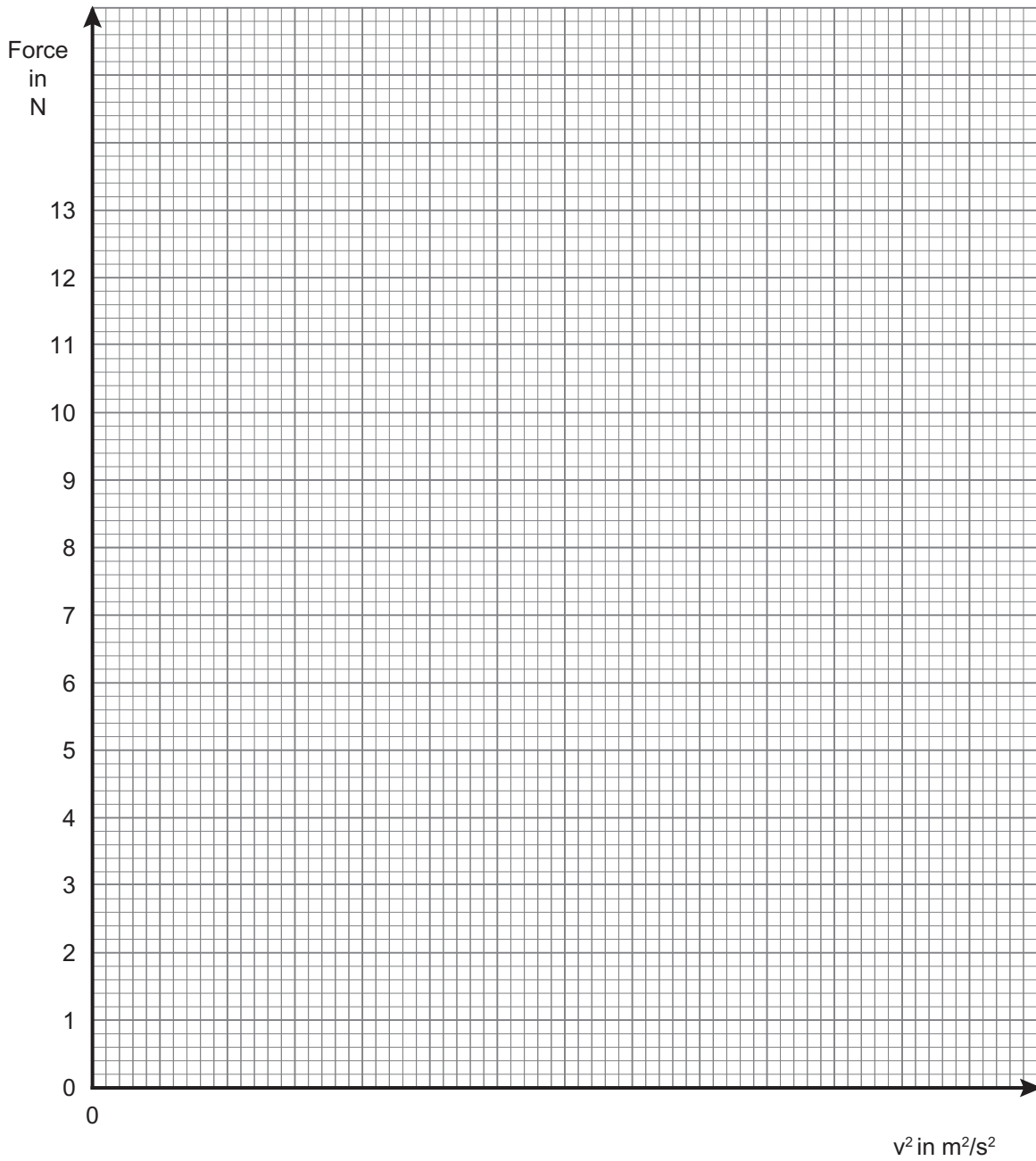
where  $k$  is a constant.

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 $\text{m}^2/\text{s}^2$			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
○	○



Examiner Only

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]

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**THIS IS THE END OF THE QUESTION PAPER**

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