Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012–2013

Double Award Science: Physics

Unit P1

Foundation Tier

[GSD31]

GSD31

WEDNESDAY 27 FEBRUARY 2013, MORNING

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 Question **9**.

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 **(a)** In this question you have to distinguish the quantities **mass** and **weight**, words with precise meanings in Physics.

In each of the following sentences write the word **mass** or **weight**, in the spaces provided.

An example has been done for you.

Example: _____Mass_____ is the amount of matter in a body.

(i) The _____ of a body does not vary. [1]

(ii) The _____ of a body has size and direction. [1]

(iii) _____ is measured using a top-pan balance. [1]

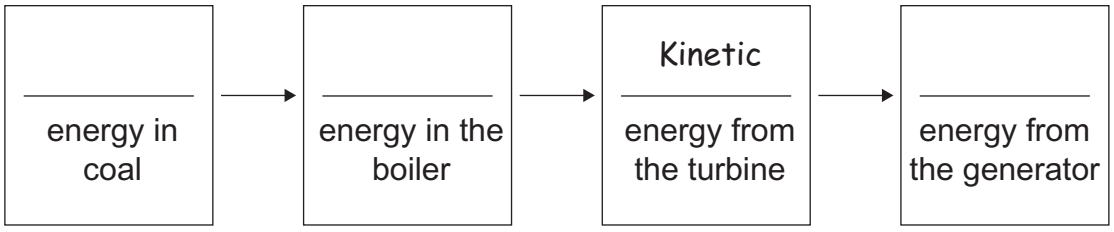
(iv) The _____ of a body is a force. [1]

(b) Boilers, turbines and generators are used in power stations.

Use the words from the box to complete the energy transfer process involved in a coal fired power station.

One has been done for you.

Heat	Potential	Chemical
Kinetic	Magnetic	Electrical



[3]

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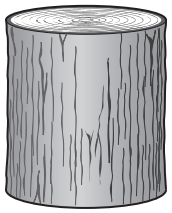
Marks	Remark

2 The block of wood shown below has a mass of 960 g and a volume of 1200 cm^3.

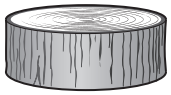


(i) Calculate the density of the wood in g/cm^3.

You are advised to show your working out.

Density = _____ g/cm^3 [3]

(ii) The block of wood is now cut into two sections A and B. Section B is twice the mass of section A.

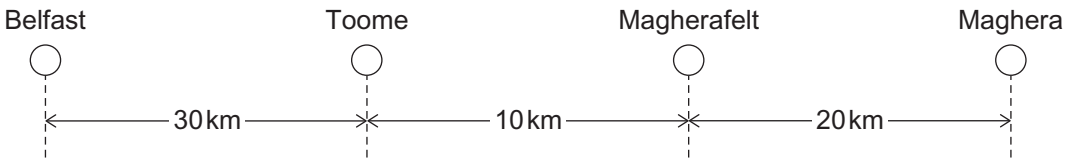
section A 

 section B

What effect, if any, will this have on the density of each section?

_____ [1]

3 The plan below shows the bus journey from Belfast to Maghera.



Plan is not to scale

The bus timetable is shown below.

		Time of day
Belfast	Departing	13.00
Toome	Arriving	13.30
Toome	Departing	13.40
Magherafelt	Arriving	14.00
Magherafelt	Departing	14.20
Maghera	Arriving	14.30

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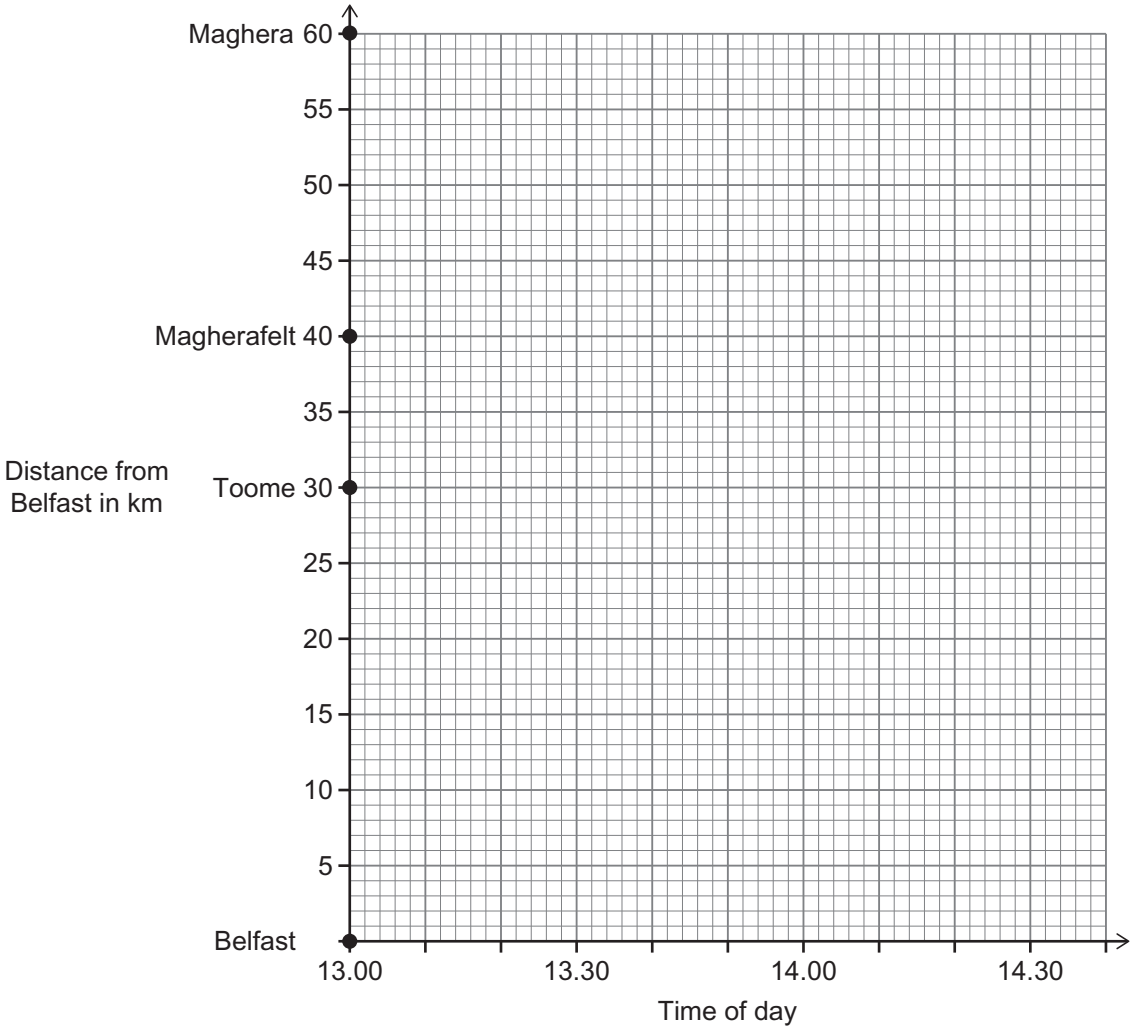
Marks	Remark

Examiner Only	
Marks	Remark

(i) Draw a distance–time graph for the 13.00 bus from Belfast to Maghera.

Assume the bus travels at constant speed between stops.



[3]

(ii) Calculate the average speed of the bus from Belfast to Maghera in km/h (kilometres per hour).

You are advised to show your working out.

Average speed = _____ km/h [4]

4 **(i)** Complete the formula for momentum, in words.

Examiner Only	
Marks	Remark

Momentum =

[1]

(ii) Calculate the momentum of a car of mass 800 kg travelling at 20 m/s.
Remember to include the units for momentum.

You are advised to show your working out.

Momentum = _____ [3]

5 **(i)** What is meant by the term centre of gravity of an object?

_____

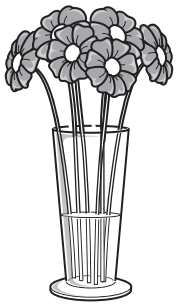
_____ [2]

(ii) A vase contains water.

Mark on the diagram, with an X, the approximate position of its centre of gravity.

[1]

(iii) A large bunch of tall flowers is put into the vase.



State and explain how the stability of the vase is affected.

_____

_____ [2]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 Wheel-braces are used to remove wheel nuts.

(i) Explain why wheel-braces are designed so that they may be extended.

Unextended wheel-brace

Extended wheel-brace

_____

_____ [1]

(ii) Calculate the moment of a force, in N m, when a force of 20 N is applied to a wheel-brace of length 40 cm.

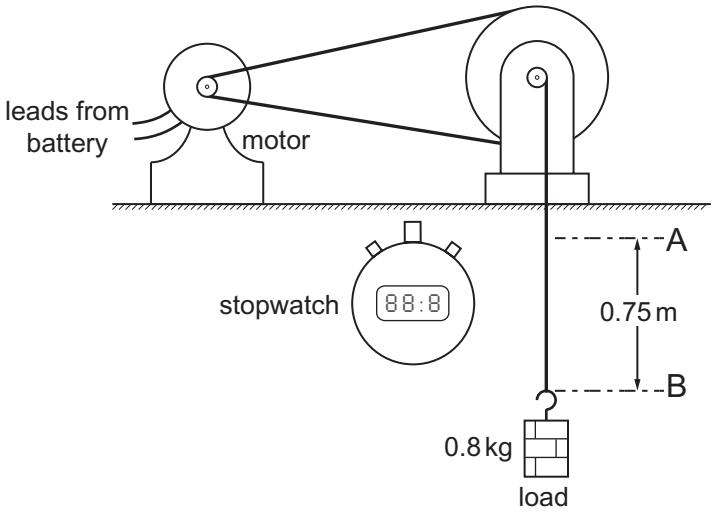
You are advised to show your working out.

Moment = _____ N m [4]

(iii) A motorist applies a force vertically upwards at the handle, in the first diagram above. State the direction of the moment.

Direction: _____ [1]

7 The power output of an electric motor was measured using the apparatus shown below.
The motor lifts a load of 0.8 kg through a height of 0.75 m.



(i) Calculate the work done in raising the load from B to A.
You are advised to show your working out.

Work done = _____ J [4]

(ii) What time interval should be measured to allow you to calculate the power of the motor?

_____ [1]

(iii) The time interval measured was 4.0 seconds.
Calculate the output power of the motor in watts.
You are advised to show your working out.

Power output = _____ W [3]

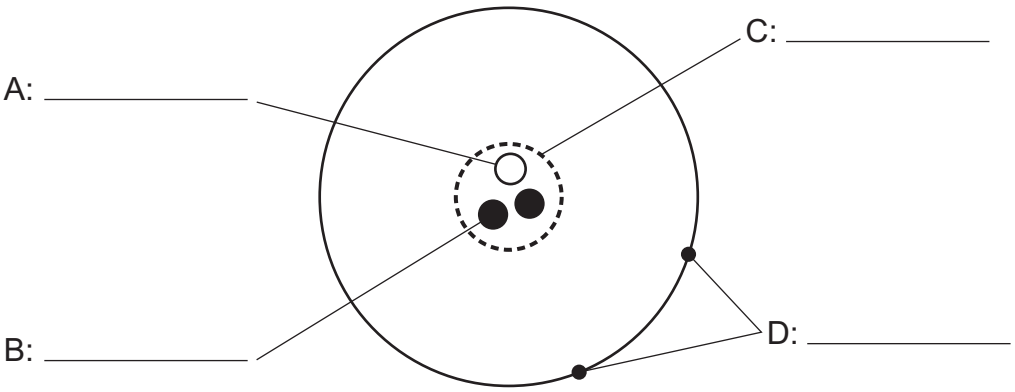
(iv) The time taken to raise the load is too short to measure accurately.
Using the apparatus shown how could you get a more accurate measurement of the power output of the motor?

_____ [1]

Examiner Only
Marks | Remark

Examiner Only	
Marks	Remark

8 **(a)** The diagram illustrates a neutral atom.



(i) Complete the diagram by writing in the spaces above, the four missing labels. [4]

(ii) Explain why atoms are neutral.

_____

_____ [1]

(iii) Give two differences between the atom drawn above and an alpha particle.

1. _____

2. _____ [2]

(b) Nuclear reactors are used in power stations to release energy through nuclear fission.

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Marks	Remark

© Dr Jeremy Burgess / Science Photo Library

(i) What is meant by nuclear fission?

_____

_____

_____ [3]

(ii) Name two fissionable substances commonly used in nuclear reactors.

1. _____

2. _____ [2]

9 Describe, in detail, an experiment to verify the Principle of Moments.

In your description you should include:

- the apparatus used;
- how the apparatus is used to test the Principle of Moments; and
- the formula you would use to test the Principle of Moments.

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

[6]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

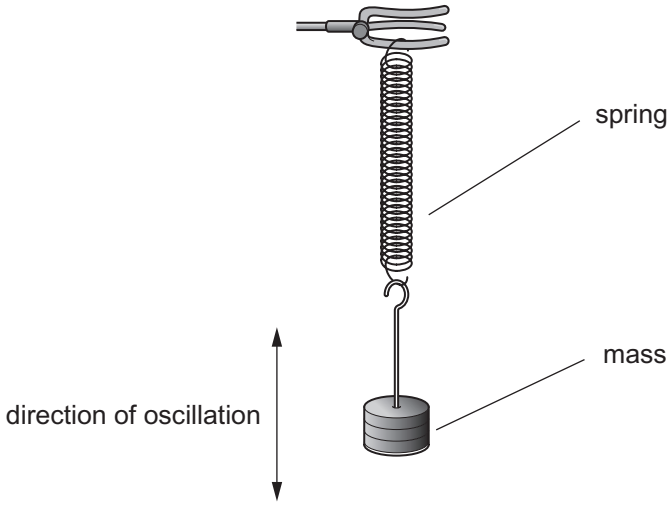
Examiner Only	
Marks	Remark

10 A mass hangs on the end of a spring. When the mass is pulled down and released then it will oscillate up and down.

When the spring carries a mass (m), the time taken (T) for one complete up and down movement is given by the relationship:

$$T^2 = K\,m \qquad \textbf{Equation 10.1}$$

where **K** is a constant.



To test the relationship, the following experimental results were recorded.

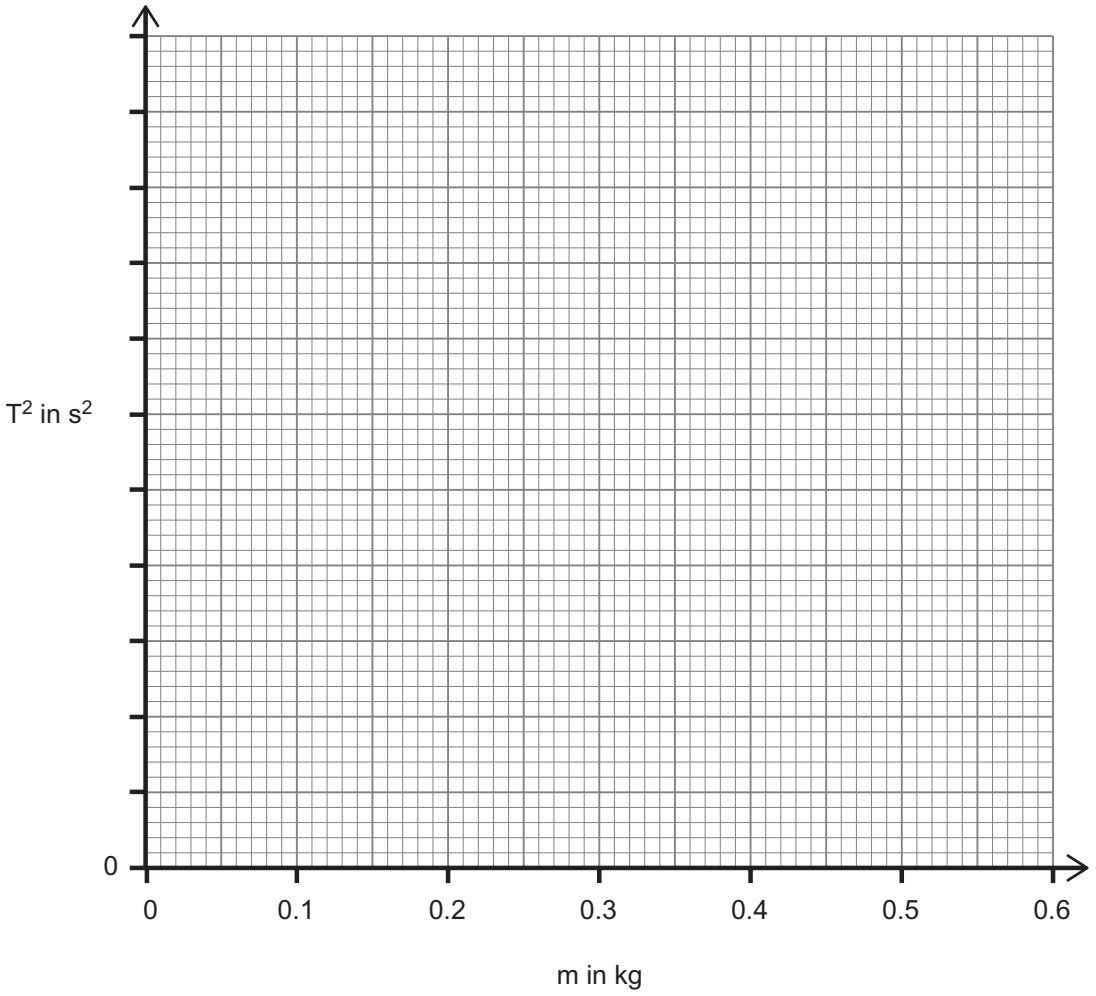
m in kg	0	0.1	0.2	0.3	0.4	0.5
T in s	0	0.63	0.90	1.10	1.26	1.41
T^2 in s^2	0			1.2		

(i) Complete the table by entering the values for T^2, to 1 decimal place.

One has been done for you. [2]

Examiner Only	
Marks	Remark

(ii) Choose a suitable scale for the vertical axis and plot a graph of T^2 on the vertical axis versus m on the horizontal axis. [3]



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

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

Explain your answer.

_____

_____

_____ [2]

(v) Find the value of K from the graph.

You are advised to show your working out.

K = _____ s^2/kg [2]