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

THURSDAY 24 MAY 2012, 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(b)**.

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

1 The main fuels used in the UK are given in the box below.

coal	**oil**	**nuclear**	**gas**

(a) Which of the fuels shown is **not** a fossil fuel?

_____ [1]

(b) State **two** uses of fossil fuels.

1. _____

2. _____ [2]

(c) Which fuel does not contribute to the greenhouse effect?

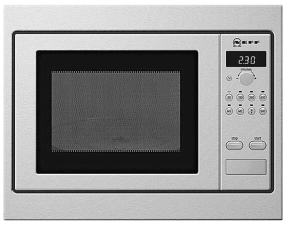
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

2 **(a)** A microwave oven converts electrical energy into useful microwave energy and other forms of energy which are wasted.



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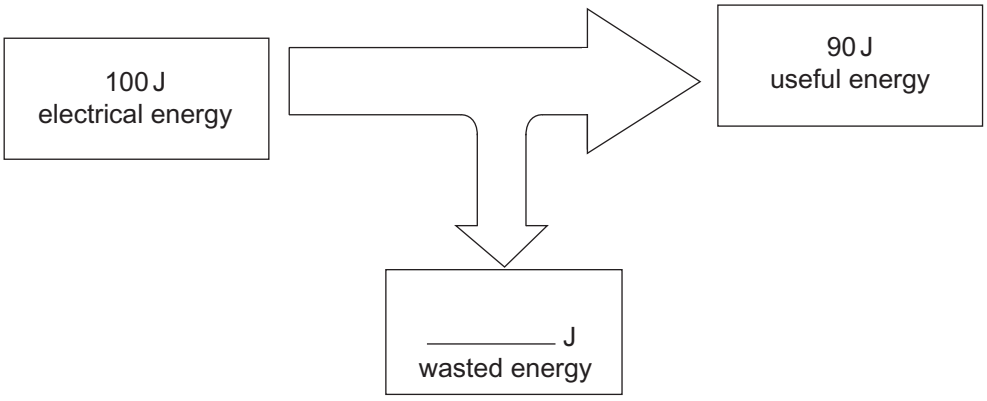
(i) Complete the box below by adding the appropriate number.



[1]

(ii) Name one other form of energy, other than microwave energy, which the oven produces.

_____ [1]

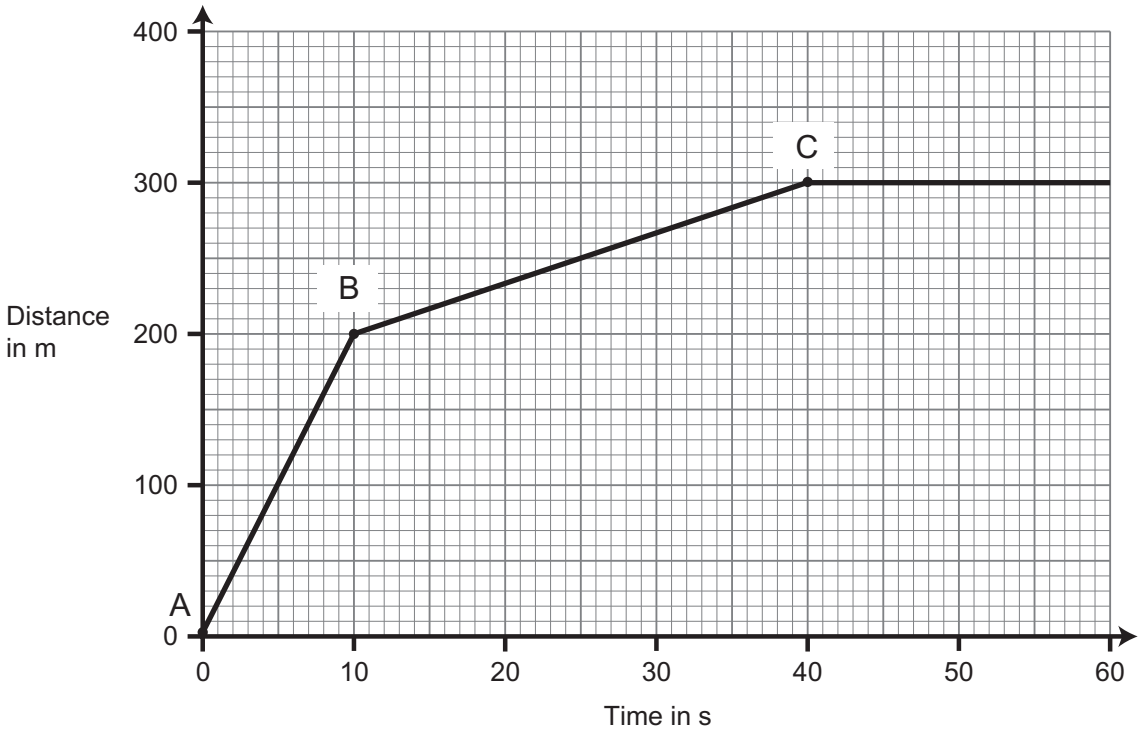
(b) A different microwave oven takes in 800 J of electrical energy and transfers 640 J to the food.
Calculate its efficiency.

You are advised to show your working out.

Efficiency = _____ [3]

3 The distance–time graph for a car approaching traffic lights is shown below.

Examiner Only	
Marks	Remark



At A the driver sees the lights.
At B the driver applies the brakes.
At C the car stops.

(a) At what speed is the car travelling before the driver applies the brakes?

You are advised to show your working out.

Speed = _____ m/s [3]

The distance the car travels while the brakes are being applied is called the braking distance.

(b) Use the graph to find the braking distance for this car.

Braking distance = _____ m [1]

(c) Will the braking distance increase, decrease or remain the same if there is ice on the road?

The braking distance will _____ . [1]

(d) What feature of the graph tells you that the car is stationary after 40 s?

_____ [1]

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Marks	Remark

Examiner Only	
Marks	Remark

4 **(a)** The diagrams show the forces acting on three skydivers falling through the air. At any instant there are two forces acting on the skydiver. The Earth pulls him down and air resistance acts upwards.

Diagram A

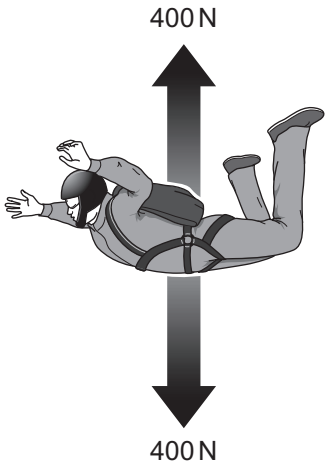


Diagram B

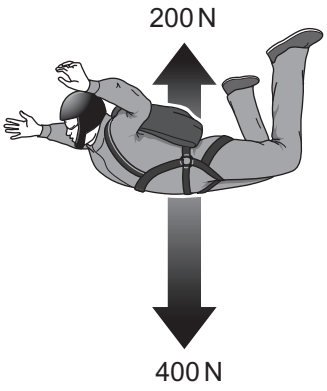
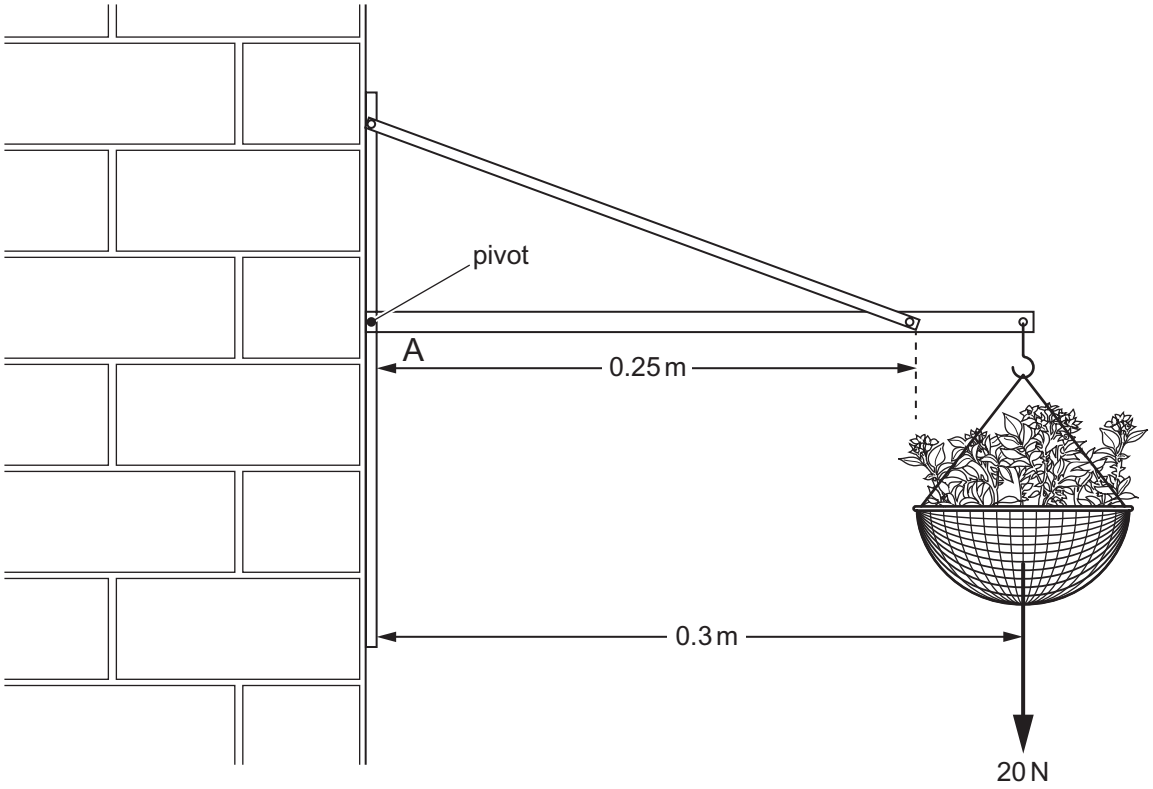


Diagram C

Complete the table below by writing the appropriate letter in each of the boxes.

Motion of Skydiver	Diagram A, B or C
The skydiver is speeding up.	
The skydiver is travelling at a constant speed.	
The skydiver is slowing down.	

[3]



A hanging basket of weight 20 N exerts a moment about the pivot A.

(b) Calculate the moment caused by the weight of the hanging basket about the pivot A.

You are advised to show your working out.

Moment = _____ Nm [3]

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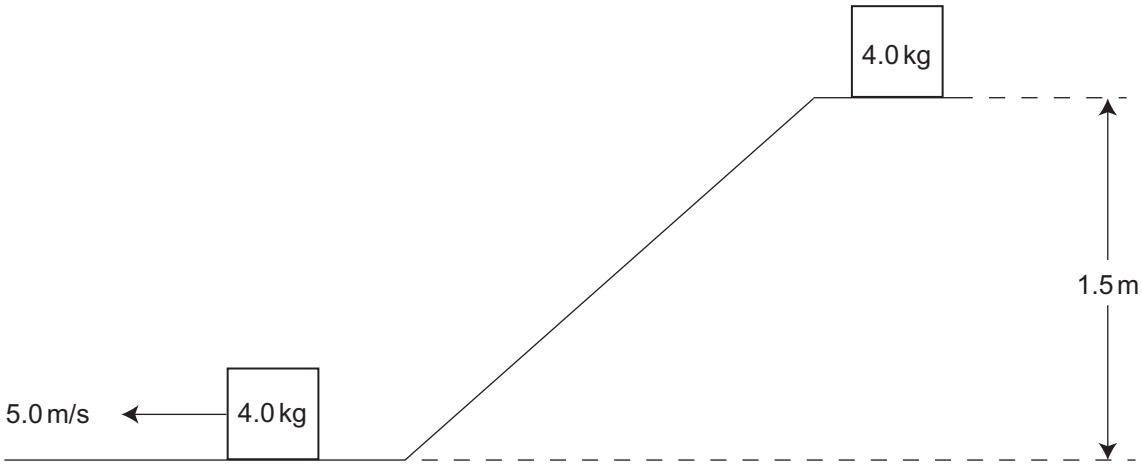
Marks	Remark

5 A mass of 4.0 kg is at rest at the top of a slope which is 1.5 m above ground level.



(i) Calculate its potential energy, at the top of the slope.

You are advised to show your working out.

Potential energy = _____ J [3]

(ii) The mass slides down a **rough** slope and its speed at the bottom is 5.0 m/s.
Calculate its kinetic energy at the bottom of the slope.

You are advised to show your working out.

Kinetic energy = _____ J [3]

(iii) Explain, fully, why the answers to parts **(i)** and **(ii)** are different.

_____

_____ [2]

Examiner Only
Marks | Remark

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(Questions continue overleaf)

6 At La Rance in France, there is a tidal power station.

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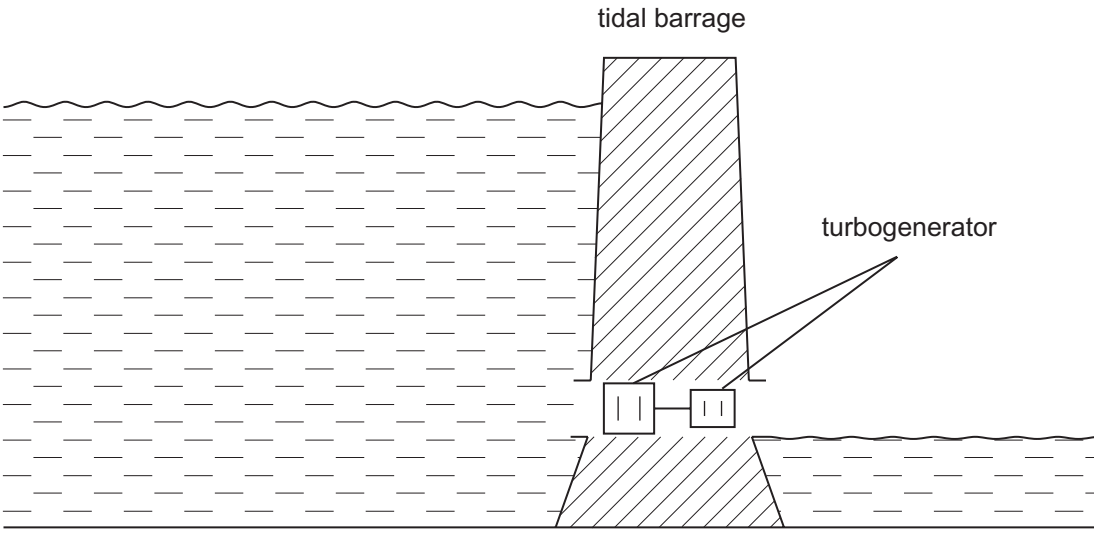
Marks	Remark



(a) (i) When the tide is in, the volume of sea water trapped behind the barrage is 200 m^3. The mass of sea water trapped is 210 000 kg. Calculate the density of the sea water trapped.

You are advised to show your working out.

Density = _____ kg/m^3 [3]

(ii) Tidal barrage is an example of a renewable energy resource. State **two** advantages of using a tidal barrage to generate electricity.

1. _____

2. _____ [2]

(b) (i) A wind turbine can produce 900 000 J of electrical energy every **minute**.
Calculate its power output.

You are advised to show your working out.

Power output = _____ W [3]

(ii) What is the power output of the wind turbine in kilowatts?

Power output = _____ kW [1]

Examiner Only	
Marks	Remark

Examiner Only

Marks	Remark

7 **(a)** When a radioactive material arrives in a hospital, its activity is 2000 counts per second.

Complete the blanks in the table below.

Activity in counts per second	Time in half-lives
2000 (arrives)	0
	1
250	
	4

[3]

(b) State **two** safety precautions which should be taken when working with radioactive sources in the laboratory.

1. _____

2. _____ [2]

8 This question is about isotopes.

(a) Explain the meaning of the term isotopes.

_____

_____ [2]

(b) Describe the structure of an atom in terms of protons, neutrons and electrons.

_____

_____ [2]

Examiner Only	
Marks	Remark

9 **(a)** **(i)** What is the symbol for the Mass Number of an atom?

_____ [1]

(ii) What is the symbol for the Atomic Number of an atom?

_____ [1]

(iii) Complete the following table for the nucleus of uranium, $^{238}_{92}U$.

Mass number	
Number of protons	
Number of neutrons	

[3]

(iv) A nucleus of uranium, $^{238}_{92}U$, decays to form a nucleus of thorium, $^{234}_{90}Th$.

1. What type of radiation, alpha, beta or gamma, is emitted by the uranium nucleus?

_____ [1]

2. Why does a nucleus that decays by emitting alpha or beta radiation become a nucleus of a different element?

_____

_____ [1]

(b) Discuss the social, environmental and ethical issues relating to the use of nuclear energy.

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

Social: _____

_____

_____

Environmental: _____

_____

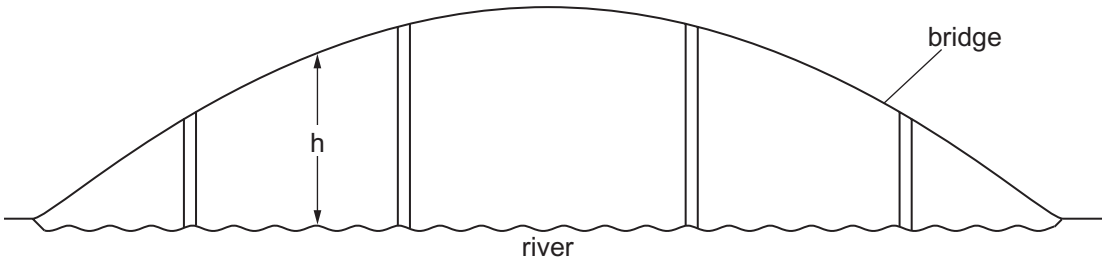
_____

Ethical: _____

_____

_____ [6]

10



Examiner Only

Marks	Remark

Jamie thinks that the height (h) fallen by a stone off a curved bridge depends on the square of the time (t) between releasing the stone and hitting the water, according to the formula:

$$h = kt^2$$

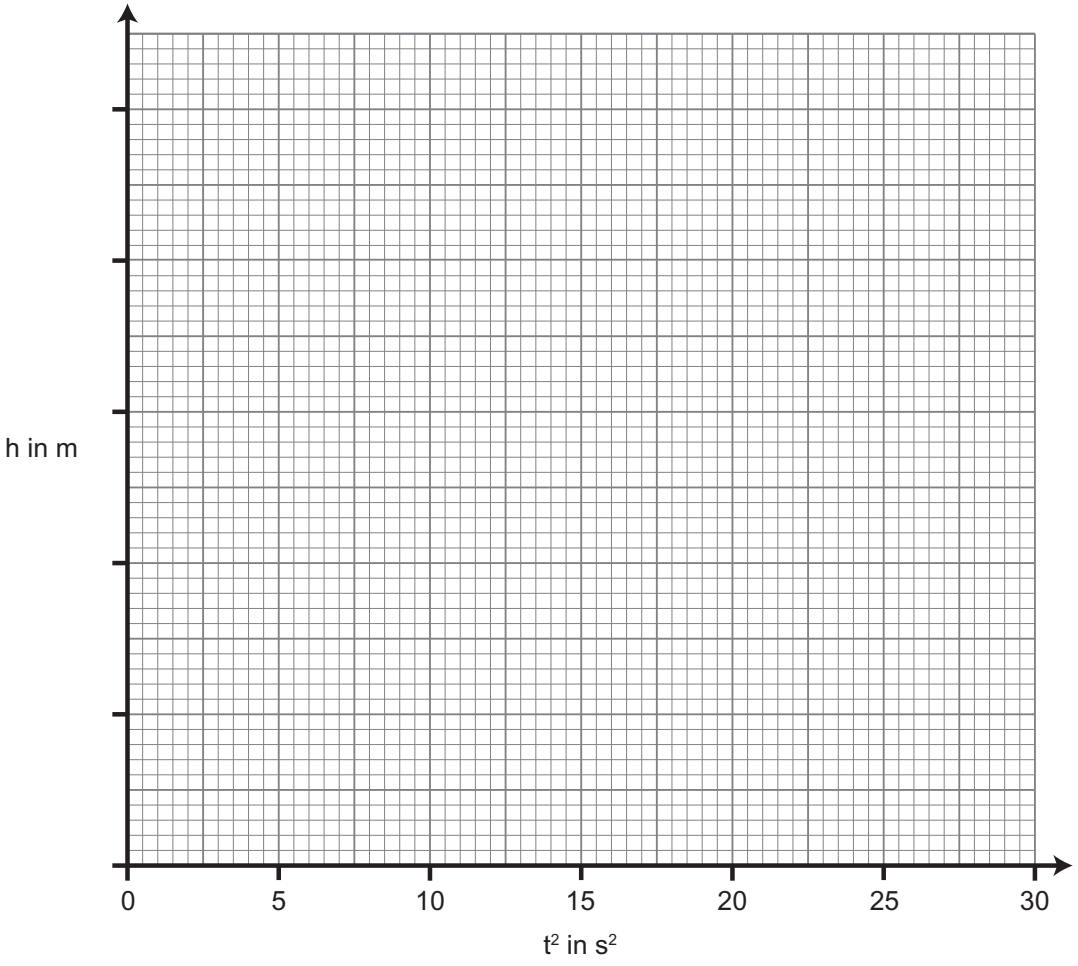
He obtains a set of results and these are shown below.

t in s	0	1	2	3	4
t^2 in s^2	0	1	4		
h in m	0	5	20	45	80

(a) Complete the table by entering the values of t^2. [2]

(b) Choose a suitable scale and plot a graph of h on the vertical axis versus t^2 on the horizontal axis on the grid opposite. [3]

(c) Draw a line of best fit. [1]



(d) Use your graph to determine the constant k.
Remember to include the units for k.

You are advised to show your working out.

k = _____ : Unit = _____ [4]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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