

New
Specification



Rewarding Learning

General Certificate of Secondary Education
2011–2012

Centre Number

71	
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Candidate Number

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Double Award Science: Physics

Unit P1

Foundation Tier

[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

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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]

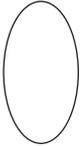
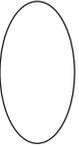
(b) State **two** uses of fossil fuels.

1. _____

2. _____ [2]

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

_____ [1]

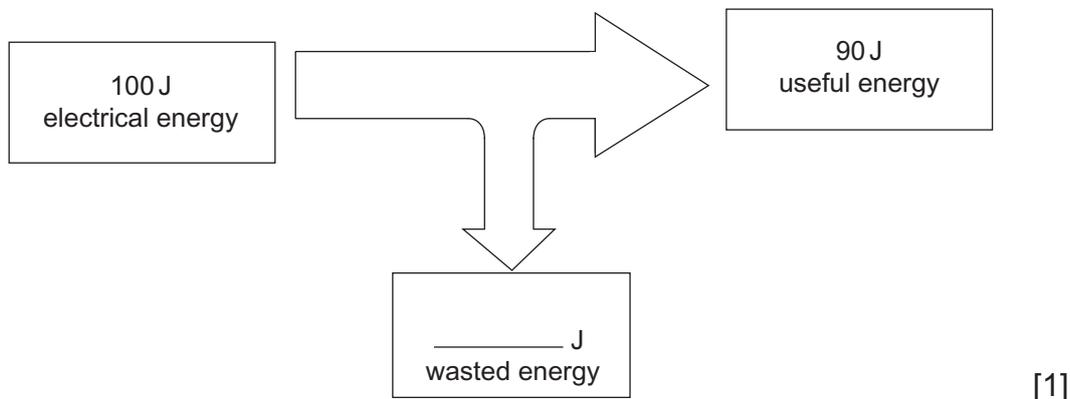
Examiner Only	
Marks	Remark
	

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



© BSH Home Appliances Ltd

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



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

_____ [1]

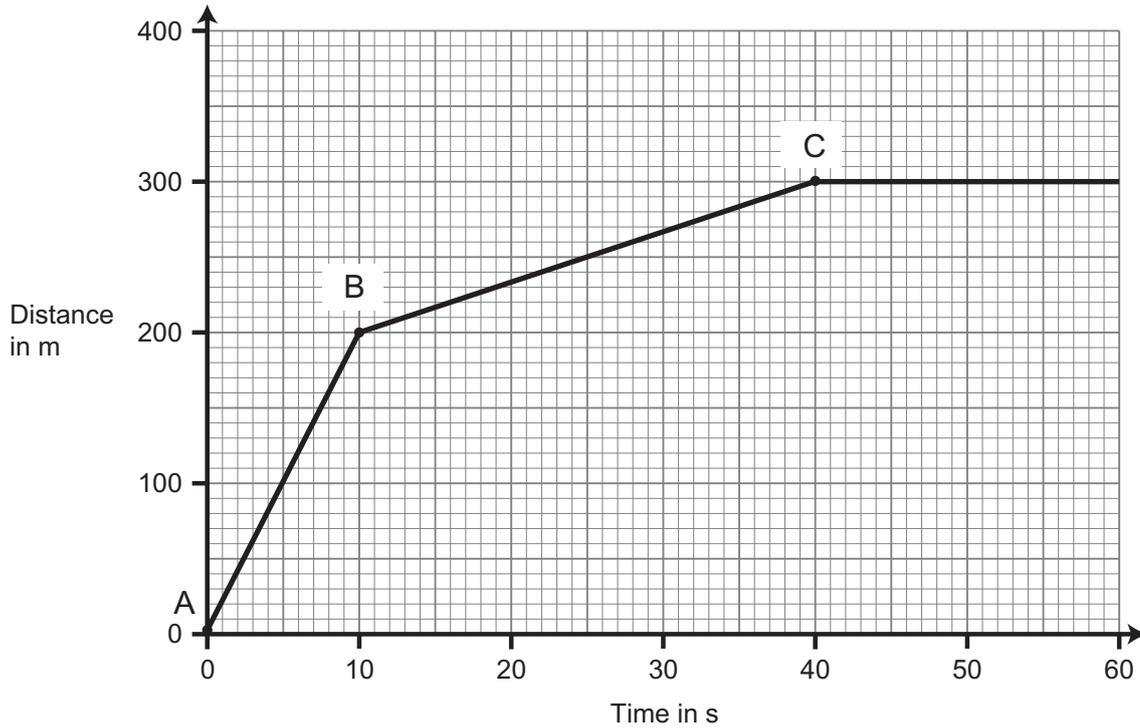
- (b) A different microwave oven takes in 800 J of electrical energy and transfers 640 J to the food. Calculate its efficiency.

You are advised to show your working out.

Efficiency = _____ [3]

Examiner Only	
Marks	Remark
○	○

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



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]

Examiner Only	
Marks	Remark
○	○

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

- 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

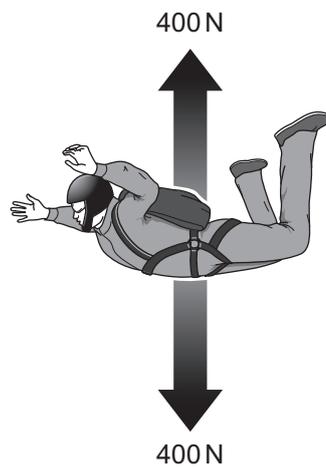


Diagram B

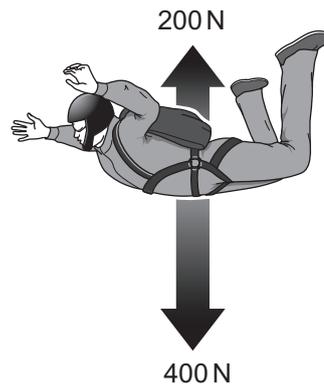


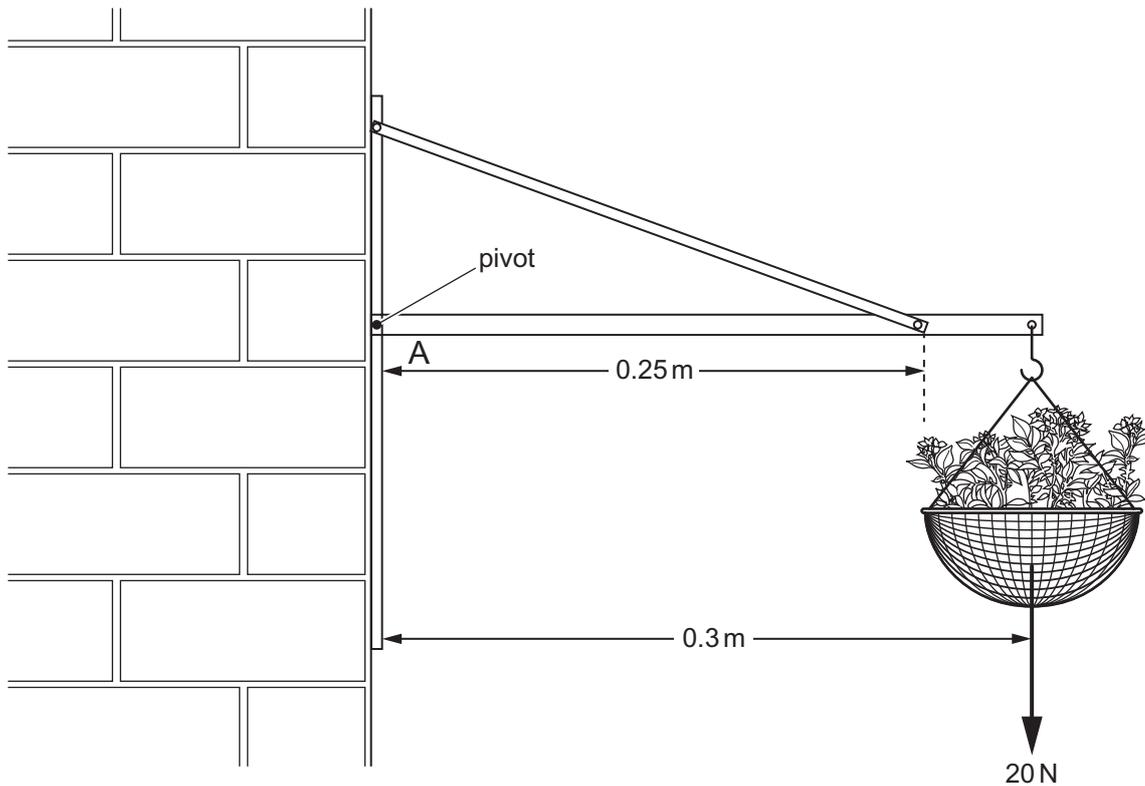
Diagram C

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]

Examiner Only	
Marks	Remark
○	○



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

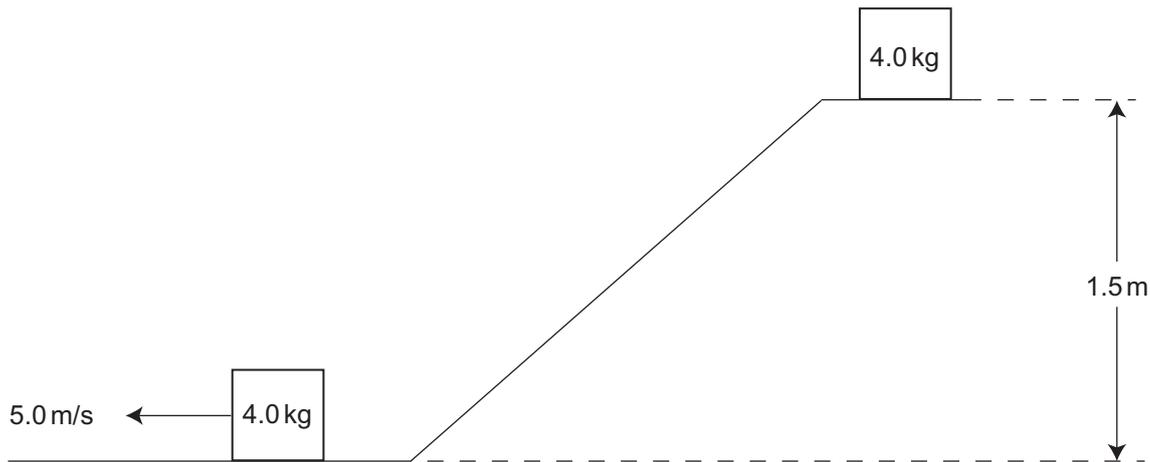
- (b) Calculate the moment caused by the weight of the hanging basket about the pivot A.

You are advised to show your working out.

Moment = _____ Nm [3]

Examiner Only	
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]

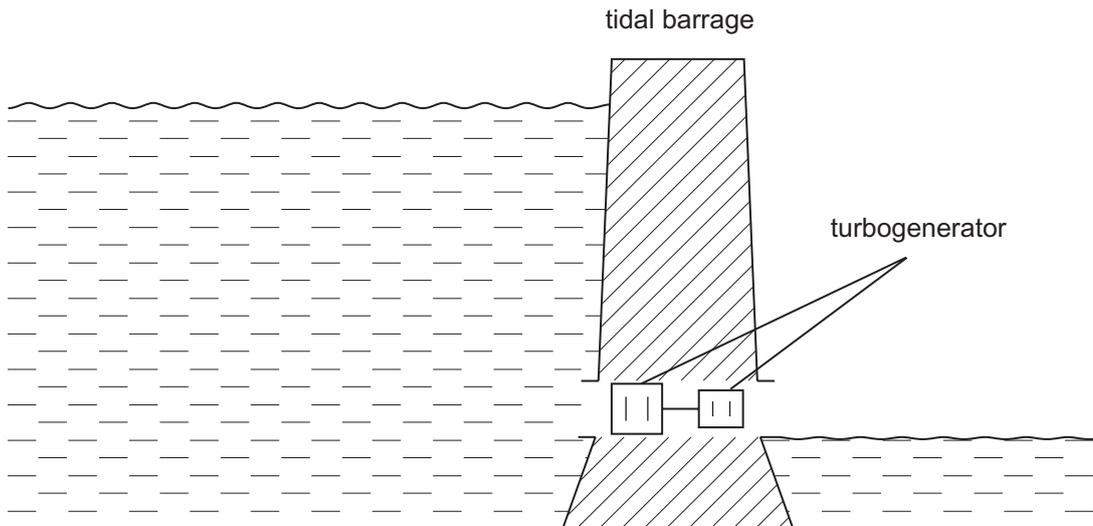
- (iii) Explain, fully, why the answers to parts (i) and (ii) are different.

_____ [2]

Examiner Only	
Marks	Remark
○	○

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(Questions continue overleaf)

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



- (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 $210\,000\text{ kg}$. 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]

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, ${}_{92}^{238}\text{U}$.

Mass number	
Number of protons	
Number of neutrons	

[3]

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

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: _____

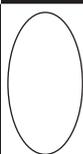
Environmental: _____

Ethical: _____

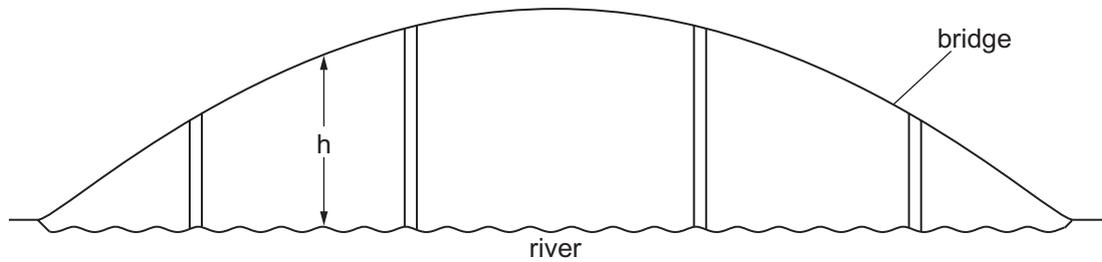
_____ [6]

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Marks Remark



10



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:

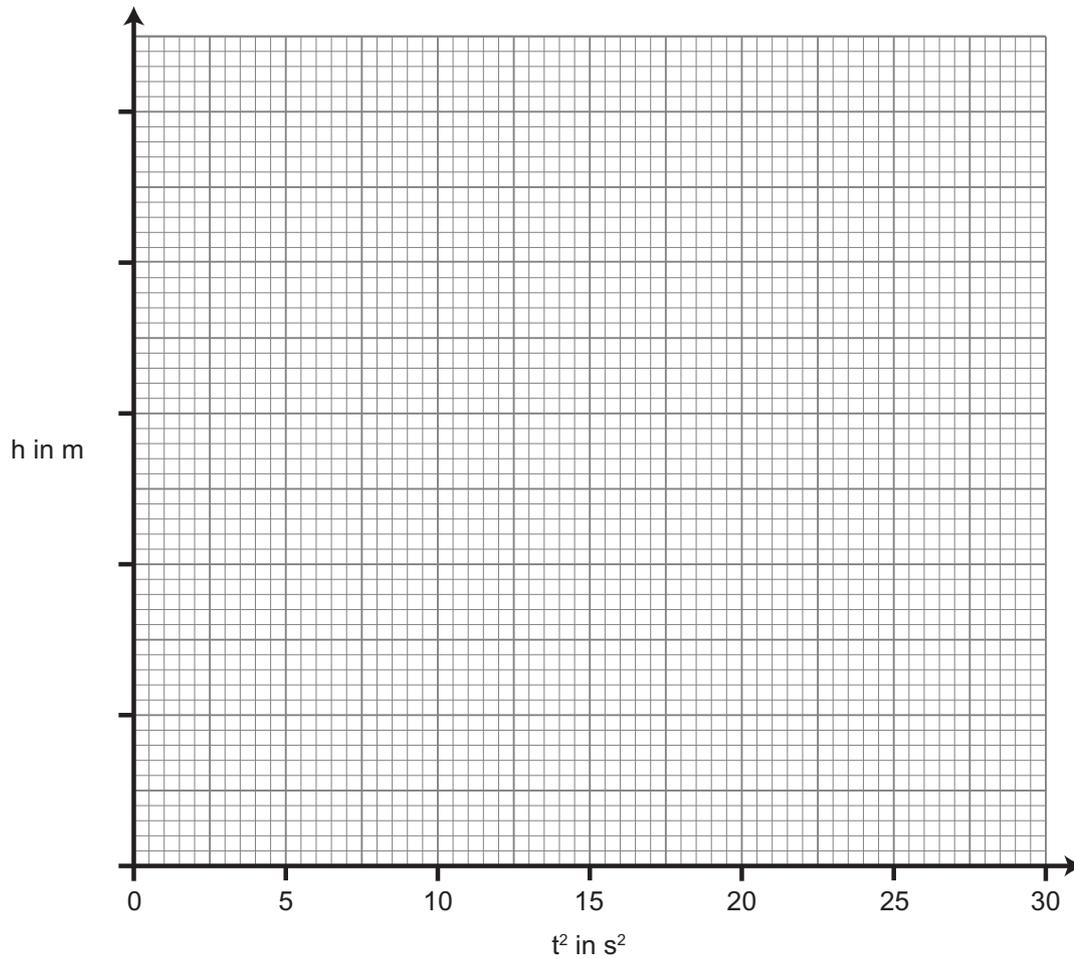
$$h = kt^2$$

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]

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Marks	Remark
○	○



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

You are advised to show your working out.

$$k = \text{_____} : \text{Unit} = \text{_____} [4]$$

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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