Candidate Name	Centre Number	Candidate Number
		0

GCSE

237/01

SCIENCE
FOUNDATION TIER
PHYSICS 1

A.M. WEDNESDAY, 19 January 2011

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark awarded**
1.	**4**	
2.	**4**	
3.	**3**	
4.	**3**	
5.	**4**	
6.	**6**	
7.	**7**	
8.	**4**	
9.	**5**	
10.	**5**	
11.	**5**	
Total	**50**	

0237
010001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

A list of equations is printed on page 2. In calculations you should show all your working.

EQUATIONS

power = voltage × current

energy transfer = power × time

units used (kWh) = power (kW) × time (h)

cost = units used (kWh) × cost per unit

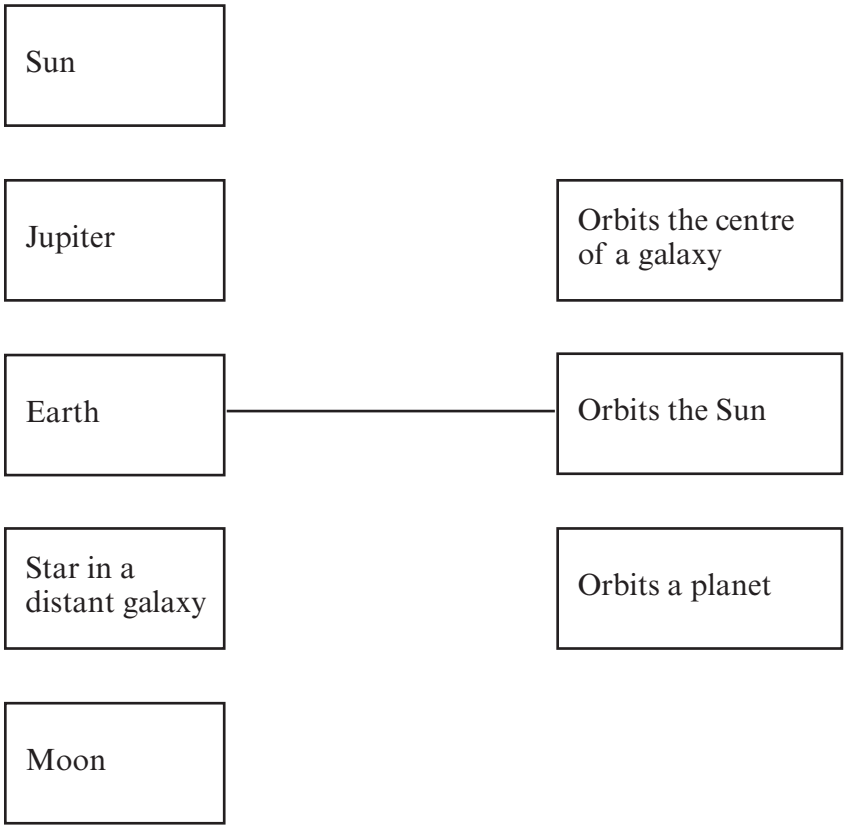
$$\%\ \text{efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100$$

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

wave speed = wavelength × frequency

Answer **all** *questions.*

1. The boxes on the left name objects found in space.
The boxes on the right say something about orbits.
Draw lines from **each object** to its orbit (some orbits will be used more than once).
One has been done for you. [4]



4

Examiner only

2. The Sun has been around for billions of years and is now in its stable state. It will eventually change into a red giant and later into a white dwarf.

(a) State which gas will be used up when the Sun comes to the end of its stable state.

..... [1]

(b) Complete the following sentences by choosing phrases from the box below.

smaller than	equal to	bigger than

(i) In its stable state, the outward force on the Sun is ..... the inward force due to the Sun's gravity.

(ii) As the Sun expands to become a red giant, the outward force will be ..... the inward force due to the Sun's gravity.

(iii) As the Sun shrinks to become a white dwarf, the outward force will be ..... the inward force due to the Sun's gravity. [3]

4

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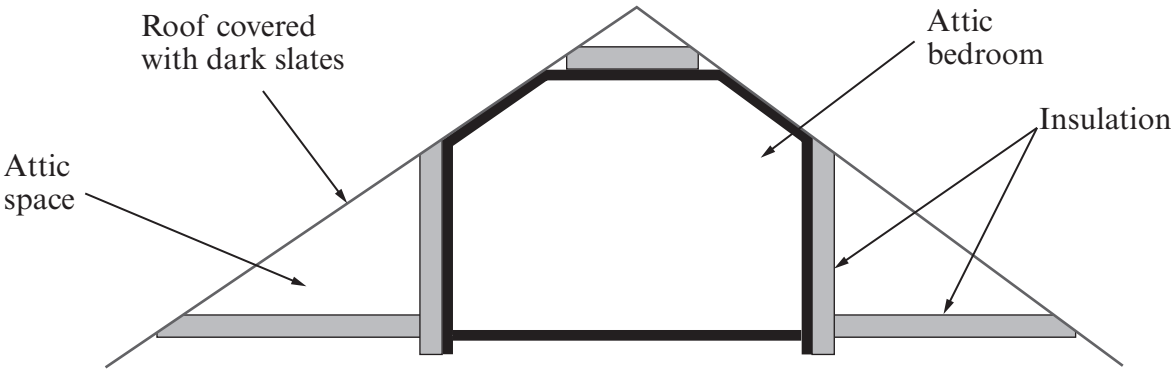
3. In a sunny summer, the attic space of a house gets hot. The diagram shows an attic with a room built into it.



(a) Underline the correct word in each bracket.

The attic space gets hot because the heat (conducted, convected, radiated) from the Sun is (absorbed, attracted, reflected) by the dark roof slates. [2]

(b) The attic bedroom is well insulated with fibre glass to stop it getting too warm. Explain why fibre glass is a good insulator. [1]

.....

.....

.....

3

4. A power station produces 1200 kJ of electricity from 3500 kJ of chemical energy in coal.

(i) How much energy is wasted? ..... kJ [1]

(ii) Use the equation

$$\% \text{ Efficiency} = \frac{\text{Useful energy transfer}}{\text{Total energy input}} \times 100$$

to calculate the efficiency of the power station. [2]

Efficiency = ... %

3

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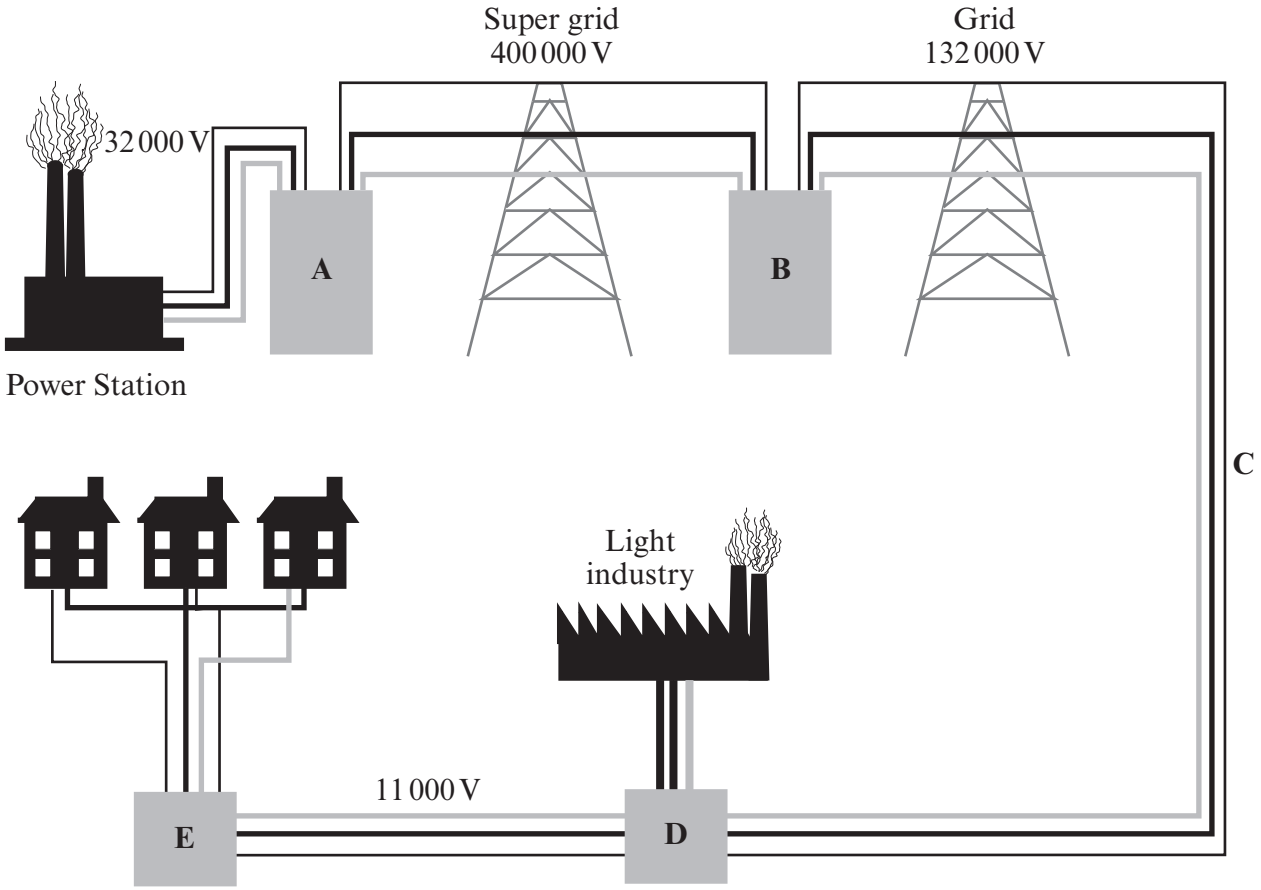
5. The diagram shows part of the national grid.



(a) At which point A, B, C, D or E would you find a step up transformer? ..... [1]

(b) Underline the correct answer in each bracket below.

(i) The voltage at point C is (11 000, 32 000, 132 000, 400 000) volts?

(ii) The voltage is stepped down to 230 V at (A, B, C, D, E).

(iii) A high voltage is used in the National Grid so that the current in the cables is (zero, small, big). [3]

4

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6. *(a)* Using the words below fill in the missing parts of the electromagnetic spectrum. [2]

Ultra violet waves
Radio waves
Sound waves
Water waves

....	microwaves	Infra red	Visible light	....	X rays	Gamma Rays

(b) Some electromagnetic waves can be used for communications.

(i) Name the wave that is used by remote controls. .....

(ii) Name the wave that is used to communicate with satellites in space.

..... [2]

(c) Some of these waves can be harmful.

(i) Name **one** wave from the list that can ionise cells in the body.

.....

(ii) What is the danger from a large dose of infra red rays?

.....

..... [2]

6

7. The table shows information about three electrical appliances.

Appliance	Power (W)	Power (kW)	Units (kWh) used in 1 week
Kettle	2100	2.1	5
Electric oven	.....	4.0	12
Microwave oven	900	0.9	1

(a) (i) What does "kW" stand for? ..... [1]

(ii) **Complete the table**. [1]

(iii) State which appliance uses the most energy every second. ..... [1]

(b) Use the equation:

$$\text{time (h)} = \frac{\text{units used (kWh)}}{\text{power (kW)}}$$

to calculate the number of hours that the electric oven is used in 1 week. [1]

Time used = ... h

(c) All three appliances are used for 1 week.

(i) Calculate the total number of units used. [1]

Number of units used = ... kWh

(ii) 1 unit of electricity costs 12p.
Use the equation

$$\text{Cost} = \text{units used} \times \text{cost per unit}$$

to calculate the cost of using all three appliances for 1 week. [2]

Cost = ...

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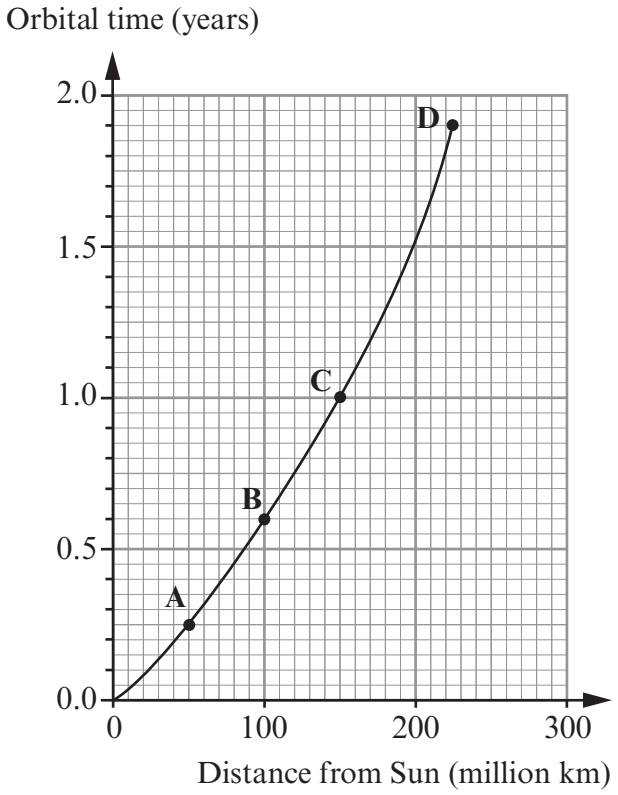
8. The graph shows how the orbital time of the inner four planets varies with their distance from the Sun.



(a) How far from the Sun is the planet with an orbital time of 0.6 years? [1]

Distance from Sun = ... million km

(b) **Name** the planet labelled C on the graph. ..... [1]

(c) How much longer does planet D take to orbit than planet C?

Time = ... years [1]

(d) **Name** the planet that is one third the distance of C from the Sun.

..... [1]

4

Turn over.

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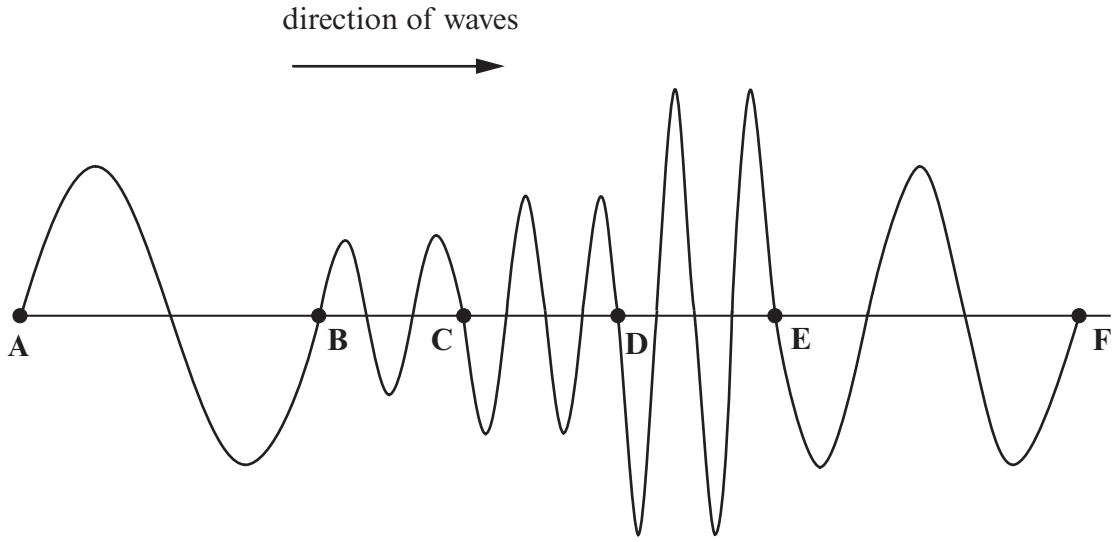
9. The diagram shows a train of waves.



(a) How many waves are shown between A and C? ..... [1]

(b) **Between which two of the points**, A, B, C, D, E and F is

(i) the wavelength biggest? .....

(ii) the amplitude smallest? ..... [2]

(c) (i) The eight waves between A and F cover a distance of 240 cm.
Calculate the **average** wavelength of the waves. [1]

Average wavelength = ... cm

(ii) The frequency of these waves is 10 Hz.

Use the equation:

Wave speed = frequency × wavelength

to calculate the average speed of these waves. [1]

Wavespeed = ... cm/s

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10. A number of windfarms are due to be built around Britain in the near future. The following table shows where they are to be built. The highlands of Scotland which are some of the windiest places in Britain face the Atlantic Ocean.

WINDFARMS BEING BUILT FOR FUTURE USE				
Location	Onshore (on land)		Offshore (at sea)	
	Number	Total power output (MW)	Number	Total power output (MW)
England	3	21	5	1450
Northern Ireland	1	20	0	0
Scotland	18	810	0	0
Wales	3	33	0	0
Totals	**25**	**884**	**5**	**1450**
Average power output		**35.4**		**290**

Source: *Information adapted from: http://www.bwea.com/statistics*

(a) In which part of Britain is the largest number of windfarms due to be built?

..... [1]

(b) Give **two** reasons why offshore wind farms are expected to produce much more energy than onshore wind farms. [2]

.....

.....

.....

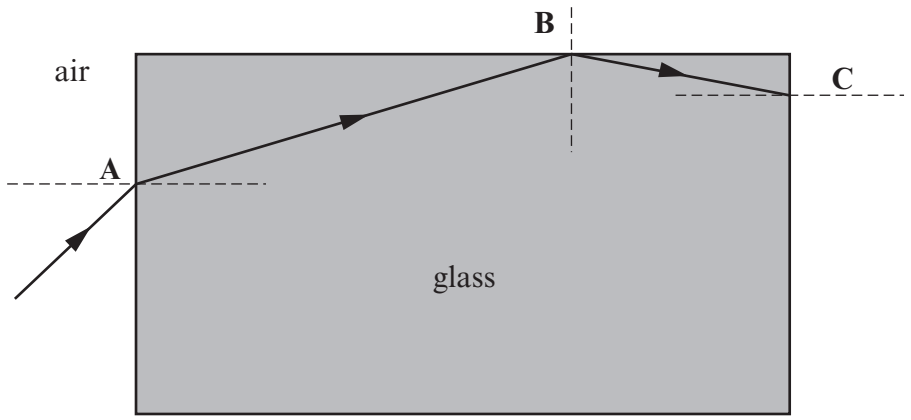
.....

(c) Calculate the average (mean) power expected from the Scottish wind farms. [2]

Average (mean) power = ... MW

5

11. The diagram shows light travelling from air into a glass block.



(a) (i) What name is given to the bending of light at point **A**? ..... [1]

(ii) Give a reason why the light changes direction at **A**. [1]

.....

.....

(b) State what is happening to the light at point **B**. [1]

.....

(c) At point **C**, the light passes out into the air.

(i) Give **one** reason why it does not go back into the block as it does at point **B**. [1]

.....

.....

(ii) **Draw** the ray direction into the air at point **C**. [1]

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