Surname	Centre Number	Candidate Number
Other Names		0

GCSE

0237/01

SCIENCE
FOUNDATION TIER
PHYSICS 1

P.M. MONDAY, 30 January 2012

45 minutes

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

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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 of the examination paper. 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

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Answer **all** *questions.*

1. List A gives four **situations** where heat is transferred. List B gives three **processes** by which heat is transferred.
Draw a line from **each** box in List A to the main process involved in the transfer of heat in List B. [4]

List A	List B
From the Sun to a roof mounted solar panel.	Conduction
From an electrical hotplate through the base of a metal saucepan.	Radiation
From the element of an electric kettle to heat all the water in the kettle.	Convection
From a fire to a person sitting directly in front of it.	

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4

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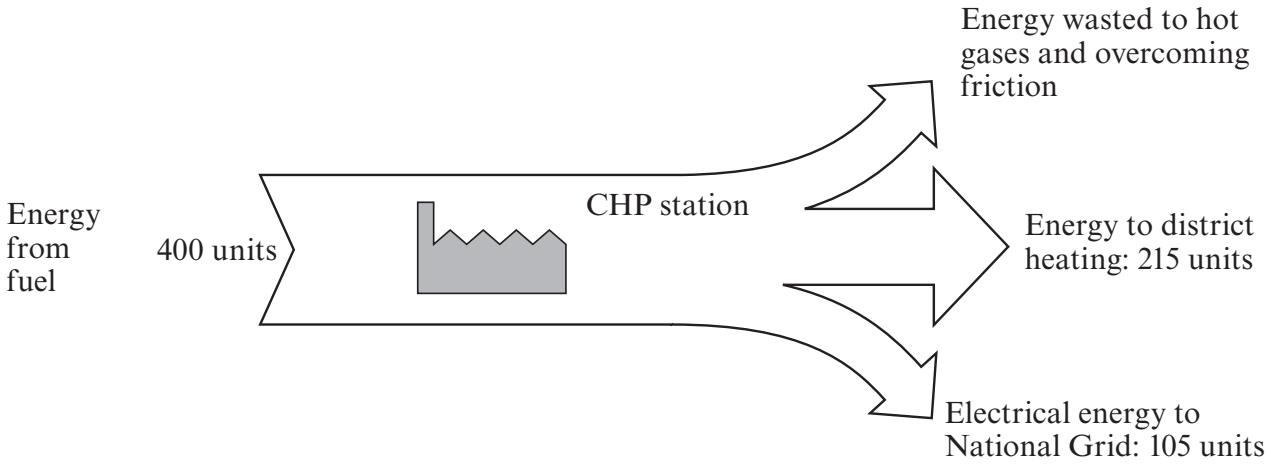
2. The energy flow diagram below is for a Combined Heat and Power [CHP] Station. These stations make use of the energy in the water that is used for cooling to provide useful energy to heat the homes close to the station.



(a) Calculate the number of units of wasted energy. [1]

Wasted energy = ... units

(b) Use the equation

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

to calculate the efficiency of the combined heat and power station.

Efficiency = ... %

[2]

3

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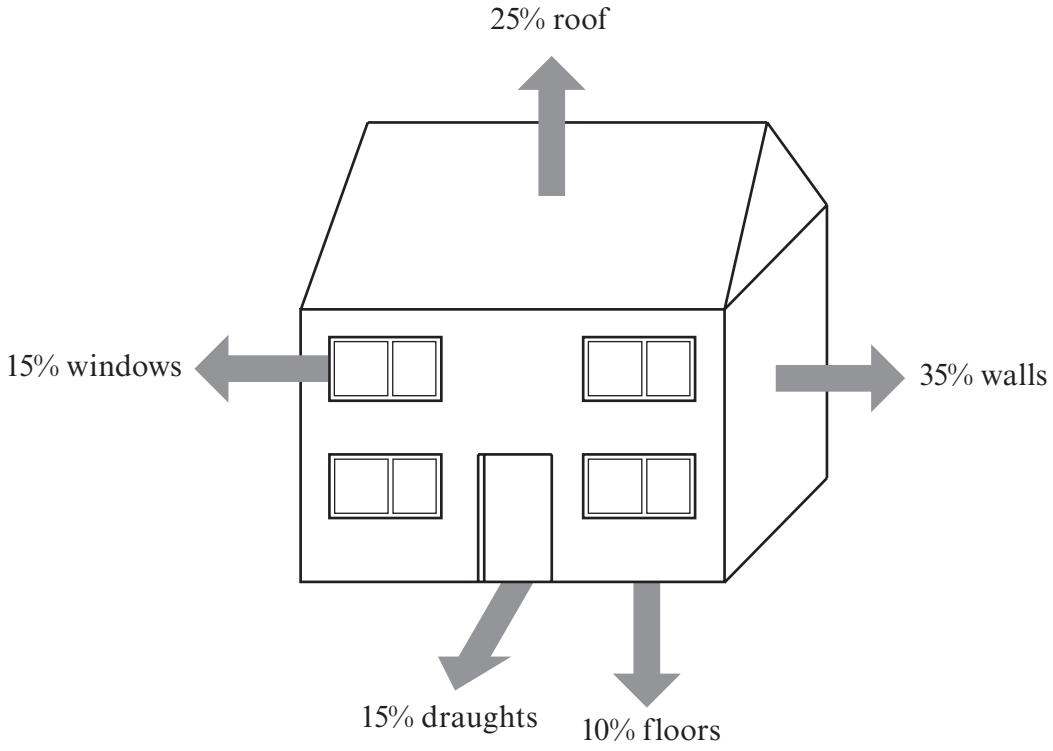
3. The diagram shows the percentage of energy lost through various places from a house without insulation.



The house has gas central heating and the gas meter readings for 2010 were as follows:

1st January 2010 = 2515 units

31st December 2010 = 4865 units

(a) (i) Calculate the number of units of gas used in 2010. ..... [1]

(ii) Use the equation

cost = units used × cost per unit

to calculate the gas bill for 2010 given that each unit of gas cost 40p.
Give the answer in £. [2]

Cost = £ .....

(b) Calculate the cost of the energy lost through the roof of the house. [2]

Cost = £ .....

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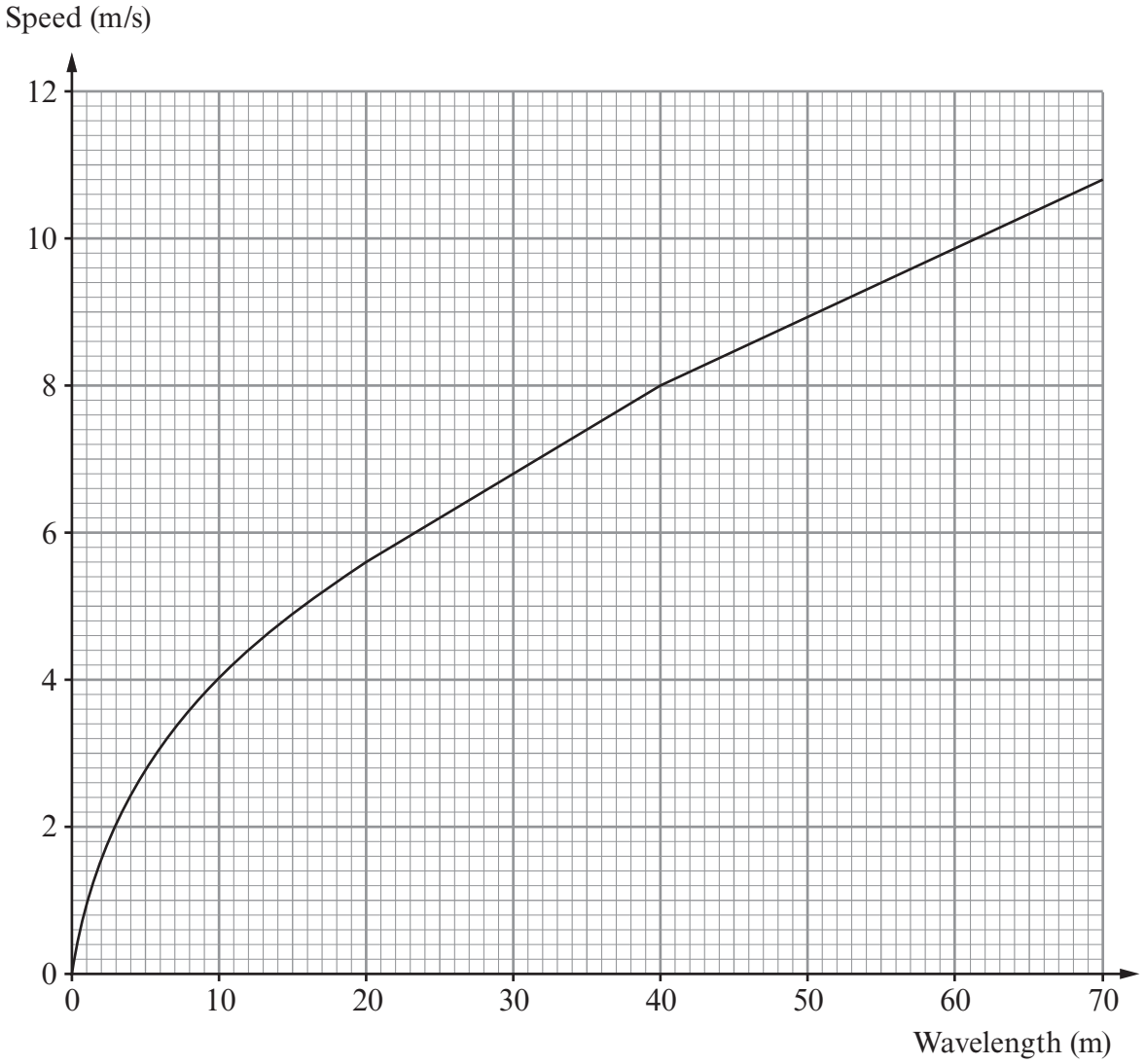
4. The graph shows how the speed of deep ocean waves depends on their wavelength.



(a) (i) Use the graph to find the speed of waves that have a wavelength of 40 m. [1]

Speed = ... m/s

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(ii) Use the equation

$$\text{frequency} = \frac{\text{wave speed}}{\text{wavelength}}$$

to calculate the frequency of these 40 m waves. [2]

Frequency = ... Hz

(b) Apart from wavelength, state **two** ways in which the properties of 10 m waves and 40 m waves are different. [2]

1. .....

.....

2. .....

.....

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5

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5. Nuclear power stations operating safely are capable of generating a large amount of electricity. Many people have strong objections to using more nuclear power.

Give **three** objections, apart from cost, that people have against the use of nuclear power. [3]

1. .....

.....

2. .....

.....

3. .....

.....

3

6. All stars are made up of mainly hydrogen and helium. They produce large amounts of energy.

When their source of energy runs out the star dies.

Astronomers have found that all galaxies contain evidence of dying stars. This evidence includes the presence of red giant stars, white dwarf stars, red super giant stars, neutron stars, black holes, and occasionally a supernova.

(a) Describe the process by which stars produce their energy. [2]

.....

.....

.....

(b) (i) What is a supernova? [1]

.....

.....

(ii) Explain why only some stars end their life in a supernova. [1]

.....

.....

.....

4

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7. The table gives information about three fuels used in a house. Use the data in the table to answer the questions that follow.

Fuel	Unit	Cost per unit	Number of MJ of energy per unit	Cost per MJ
Gas	1 therm	50p	100	0.5p
Electricity	1 kWh	12p	4	3.0p
Coal	1 kg	28p	28	1.0p

(a) (i) State which fuel provides the least amount of energy per unit. ..... [1]

(ii) State how the data shows that gas gives the best value for money. [1]

.....

.....

.....

(b) On average the household uses 8 therms of gas a week.

(i) Calculate the cost of gas per week.

Cost = ...

(ii) Calculate the number of MJ of gas used per week.

Number of MJ = ...

(iii) Calculate how much it would have cost for coal to provide the same number of MJ of energy.

Cost = ...

[3]

5

Turn over.

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8. The table below gives data about five planets in the Solar System in order of their distance from the Sun. Use the data to answer the questions that follow.

Planet	Mean surface temperature (°C)	Time for 1 orbit (years)	Length of day	Orbital speed (million km/year)
Mercury	350	0.2	0.16 years	1560
Venus	480	0.6	0.67 years	1100
Earth	22	1.0	24hr	945
Mars	–23	1.9	24hr 37min	754
Jupiter	–150	12.0	9hr 50min	413

(a) Which planet has a day which is longer than the time that it takes the planet to orbit the Sun?

[1]

.....

(b) The large amount of carbon dioxide in the atmosphere of Venus produces a massive greenhouse effect. Explain how the table shows this. [2]

.....

.....

.....

(c) Use the equation

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

to calculate the distance travelled by Jupiter in making one complete orbit of the Sun.

[3]

Distance travelled = ...

Unit = ...

6

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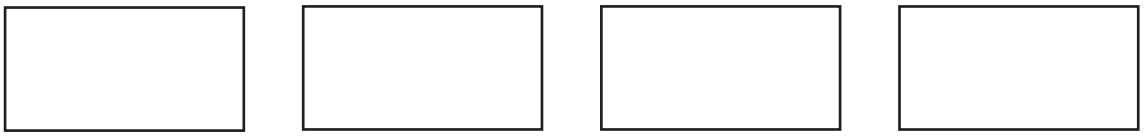
9. **Visible light, X-rays, Infra-red radiation and Radio waves** are four members of the electromagnetic spectrum.

(a) Place these four radiations in the boxes below in the order of decreasing wavelength. [2]



Longest wavelength

Shortest wavelength

(b) State **two** practical uses of Infra-red radiation. [2]

1. .....

.....

2. .....

.....

(c) State how large doses of X-rays damage cells in the body. [1]

.....

.....

.....

5

Turn over.

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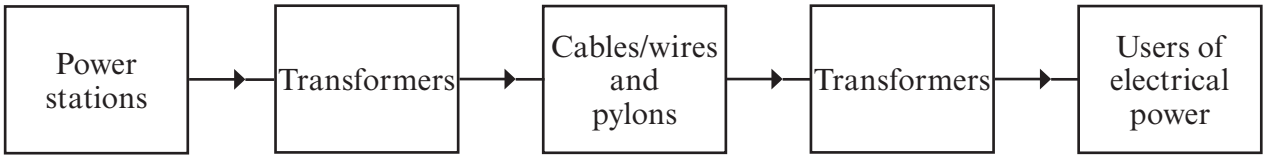
10. The National Grid is a network of cables and pylons which connects power stations together and supplies electricity to factories and homes across the country.
The block diagram shows the main parts of the National Grid.



(a) State an advantage of connecting power stations together. [1]

.....

.....

(b) (i) Give a reason why low resistance cables/wires are used for the transmission of electricity in the National Grid. [1]

.....

.....

(ii) Give a reason why the cables/wires that carry the power are held **high** above ground level. [1]

.....

.....

(c) State how and explain why both "step-up" and "step-down" transformers are used throughout the National Grid. [3]

.....

.....

.....

.....

.....

.....

6

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11. The information plate below was found on the back of a microwave oven.

Serial No. 7JAN300010X
240 V a.c. 50 Hz
0.8 kW
2450 MHz

(a) (i) Write down the power of the microwave oven in W. ..... [1]

(ii) Use the equation

energy transfer = power × time

to find how much energy is transferred by the microwave oven in 60 s. [2]

Energy transferred = ... J

(b) What does the figure 2450 MHz tell you about the microwaves? [1]

.....

.....

4

THERE ARE NO MORE QUESTIONS IN THE EXAMINATION