Candidate Name	Centre Number	Candidate Number
		0

WJEC CBAC

GCSE

237/01

SCIENCE
FOUNDATION TIER
PHYSICS 1

A.M. FRIDAY, 20 June 2008

45 minutes

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

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator.

INSTRUCTIONS TO CANDIDATES

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 × cost per unit

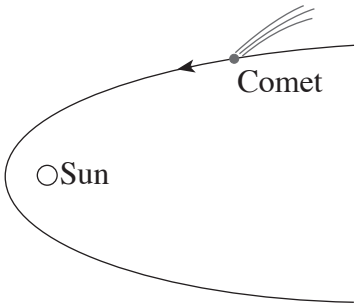
$$\text{efficiency} = \frac{\text{useful energy transfer}}{\text{total energy input}} \times 100\%$$

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

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

Answer **all** *questions.*

1. The diagram shows the path taken by a comet as it comes close to the Sun.



(a) What name is given to the **shape** of the path of the comet? ..... [1]

(b) In the position shown, is the comet speeding up, slowing down or travelling at the same speed? [1]

.....

(c) Choose one word from the box below to complete the sentences that follow. [3]

stars	galaxies	moons	nebulae	red giants

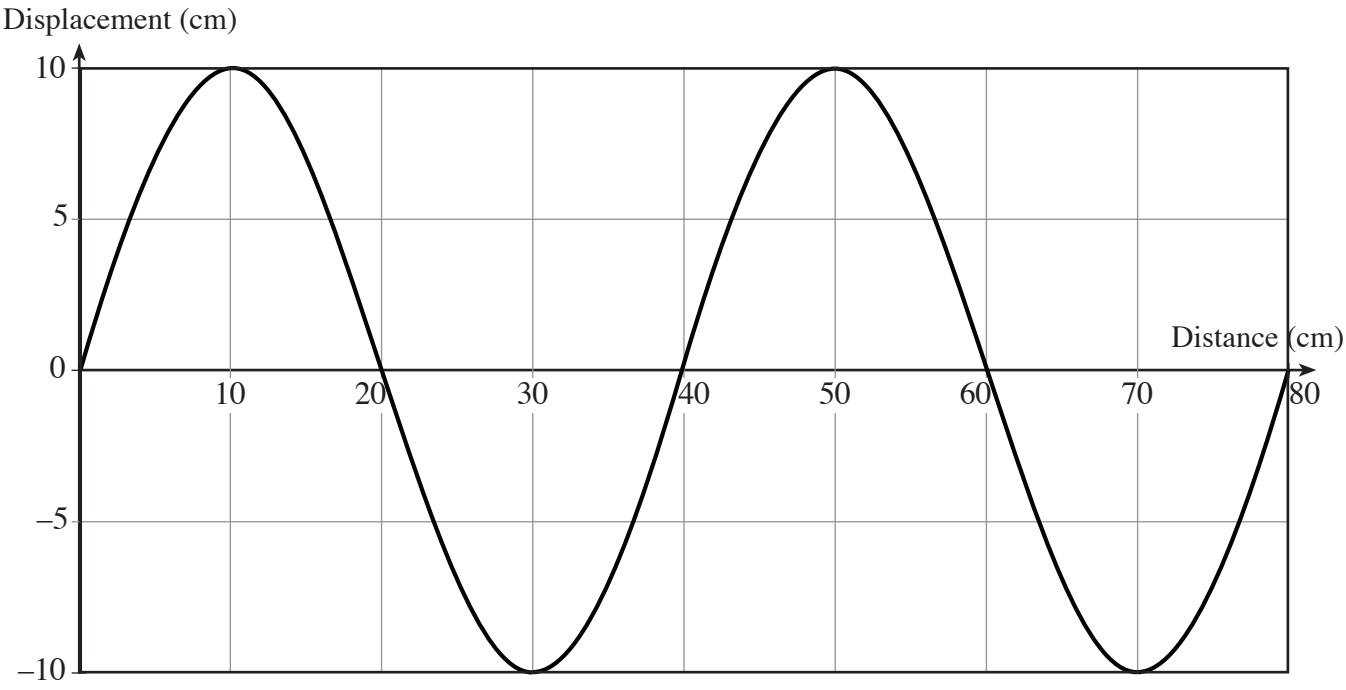
(i) The Solar system contains the Sun, planets, comets and ..... .

(ii) Our Sun is one of many ..... in the Universe.

(iii) All ..... release their energy from nuclear reactions.

5

2. The diagram below shows a wave.



(a) (i) How many complete waves are shown in the diagram? ..... [1]

(ii) Write down the wavelength. Wavelength = ... cm [1]

(iii) Write down the amplitude. Amplitude = ... cm [1]

(b) The wave travels with a speed of 160 cm/s.

Use the equation

$$\text{frequency} = \frac{\text{wavespeed}}{\text{wavelength}}$$

to calculate the frequency of the wave. [2]

Frequency = ... Hz

5

Examiner only

3. The statements below are about optical fibres.
Only **three** of them are correct.
Tick (✓) the correct statements. [3]

Electricity travels very fast through optical fibres. ☐

An optical fibre can carry more messages than a single wire. ☐

Signals through an optical fibre are more difficult to tap into than signals through wires. ☐

Signals through optical fibres suffer more interference than signals through wires. ☐

Optical fibres are more expensive to produce than wires. ☐

Messages through optical fibres travel at the speed of light . ☐

3

4. The table shows the amount of heat energy lost through the loft and walls of a house with and without insulation.
The table shows how much heat energy is lost **per minute** at two temperatures.

Part of house	Type of insulation	Heat Energy lost (kJ) per minute	
		House temperature 21°C	House temperature 22°C
Loft	No insulation	43	54
	Fibre glass insulation	9	10
Walls	No insulation	3	4
	Foam insulation in the cavity	1	2

Use information from the table to answer the following questions.

(a) (i) For the house temperature of 21 °C, **which part of the house** loses most heat energy every minute? [1]

.....

(ii) For the house temperature of 22 °C, **which type of insulation** loses 10 000 joules of heat energy every minute? [1]

.....

(b) The house is kept at 22 °C.

(i) Work out the total heat energy lost per minute from the house **with no insulation**. [2]

Heat energy lost = ... kJ per minute.

(ii) Calculate the heat energy **saved** per minute by adding fibre glass insulation **to the loft**. Show your working. [1]

Heat energy saved = ... kJ per minute.

5. Read this passage carefully.

> The government is planning to build more nuclear power stations and wind farms. Nuclear power stations are expensive to build but they don't give out greenhouse gases when they produce electricity. They produce energy for long periods without needing refuelling.
>
> Wind farms are built in wild and beautiful places and only operate when it is windy. They don't use fuel and produce small amounts of electricity.

Fill in the table with one advantage and one disadvantage of nuclear power stations and windfarms. [4]

	Nuclear power station	Windfarms
Advantage	.....	.....
	.....	.....
	.....	.....
	.....	.....
Disadvantage	.....	.....
	.....	.....
	.....	.....
	.....	.....

4

6. The table gives information about the four planets that are nearest the Sun.

They are NOT in order from the Sun.

Planet	Distance from the Sun (millions of km)	Diameter of planet (km)
A	228	6 800
B	108	12 000
C	58	4 900
D	150	12 800

(a) (i) Name planet **C**. ..... [1]

(ii) Which planet (**A**, **B**, **C** or **D**) is Mars? ..... [1]

(iii) Which of the planets (**A**, **B**, **C** or **D**) is the biggest? ..... [1]

(iv) Which planet (**A**, **B**, **C** or **D**) would you expect to be the coldest? ..... [1]

(b) In June 2006, a group of scientists met to discuss whether or not Pluto should be called a planet. Its diameter is about 3 000 km.
In their meeting, the scientists decided to drop Pluto from the list of planets because it was too small.
Use the figures in the table to **estimate** the smallest diameter that they agreed would be accepted as a planet. [1]

Smallest diameter = ... km

5

7. There are three types of UV (Ultra Violet) radiation.
Each has a different effect on the skin.
They all come to us from the Sun.

Type of Ultra Violet radiation	Wavelength (nanometres)	Points of interest
UV**A**	320 to 400	Not harmful in normal doses. It is used to treat some skin complaints.
UV**B**	290 to 320	Used for tanning the skin.
UV**C**	100 to 290	This is the most ionising of the three radiations.

(a) (i) Name the type of UV with the longest wavelength. ..... [1]

(ii) Name the type of UV which would be most damaging to the skin. ..... [1]

(b) (i) Tick (✓) the box in the e.m. spectrum below which shows UV radiation. [1]

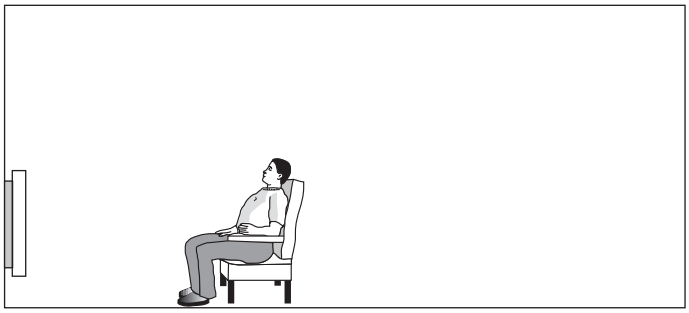
Radio			Visible			Gamma

(ii) Name one part of the e. m. spectrum that has a wavelength smaller than that of UV waves. [1]

.....

4

8. A heater is used to heat a room as shown in the diagram below.
Heat is transferred in the room by the processes of **conduction**, **convection** and **radiation**.



(a) (i) Which process transfers heat directly to a person sitting in a chair in front of the heater? [1]

.....

(ii) Which process transfers heat to the ceiling and around the room? [1]

.....

(b) The room heater has a power rating of 2k W and is used by a family for 35 hours.

(i) Use the equation

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

to calculate the number of units used. [1]

Number of units used = ...

(ii) Use the equation

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

to find the cost of using the heater if 1 unit costs 10p. [1]

Cost = ... p

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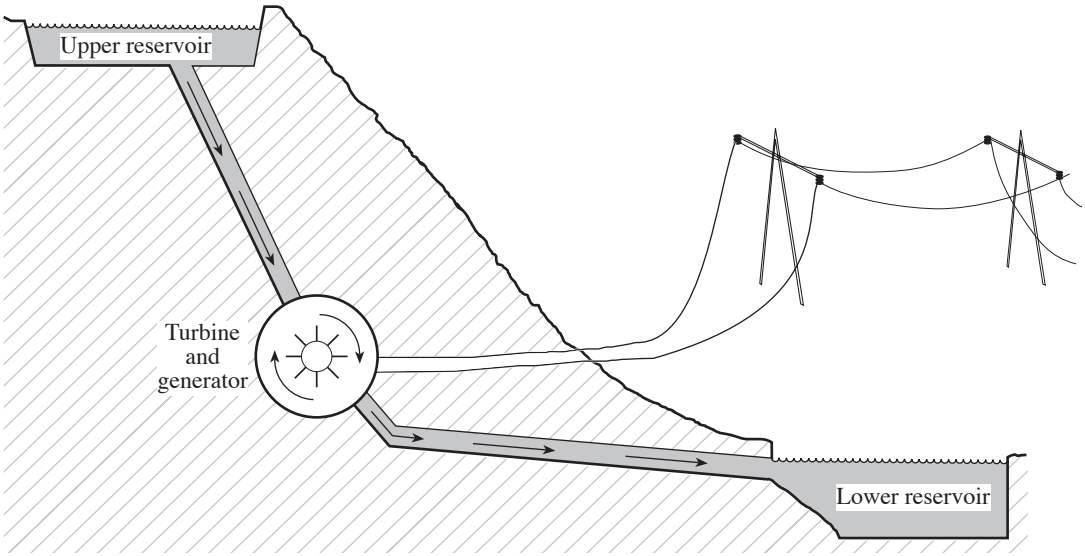
9. The diagram shows how electricity is generated in a hydroelectric power station that is in a National Park – an area of outstanding natural beauty.



The electricity that is generated is passed to a transformer. It is then sent along wires that are underground for the first few kilometres and along wires supported by pylons after that.

The power station is only used when we need more electricity than the rest of the power stations around the country can supply.

(a) State one advantage of generating electricity in a hydroelectric power station. [1]

.....

.....

(b) (i) Give a reason why the electrical wires are taken underground for the first few kilometres. [1]

.....

.....

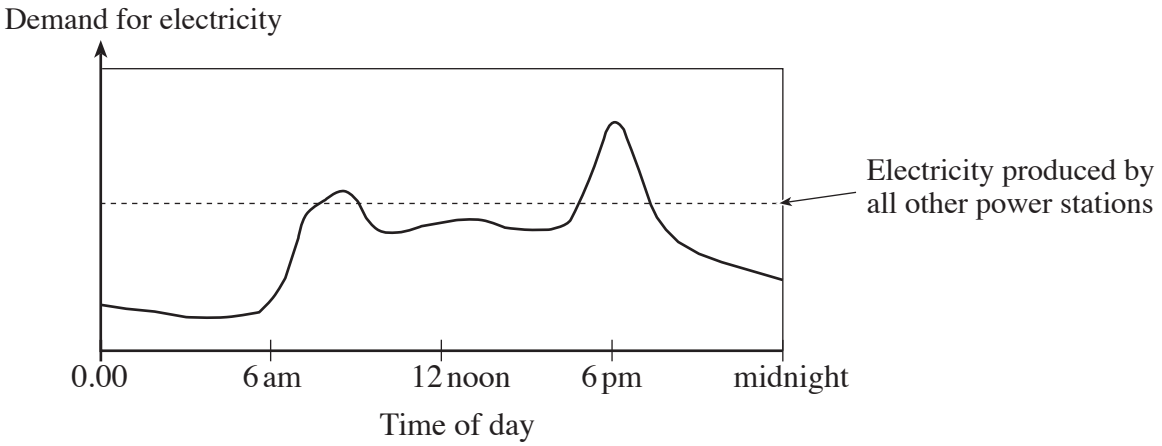
(ii) The transformer is used before the electricity is sent along the wires. Explain **what** the transformer does to the electricity and **why** it is used. [2]

.....

.....

.....

(c) The need for electricity changes through the day in the way shown below.



(i) (I) The demand for electricity is greatest around 6 pm. At what other time is demand greater than the supply from all other power stations? [1]

.....

(II) Give **one** reason why the demand for electricity is highest at these times. [1]

.....

.....

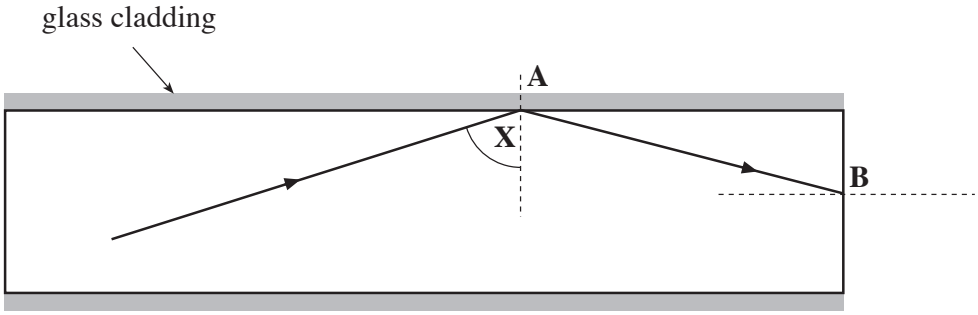
(ii) In the early hours of the morning, the water in the lower lake of this power station is pumped back up to the upper reservoir. By looking at the graph above, suggest why it is done at this time. [1]

.....

.....

7

10. The diagram shows a ray of light passing through part of an optical fibre. The thin fibre is covered by glass cladding.



(a) When a ray of light hits the side of the glass fibre at **A** it follows the path shown.

(i) What name is given to the change of direction of the light at **A**? [1]

.....

(ii) What can you say about the angle labelled **X**? [1]

.....

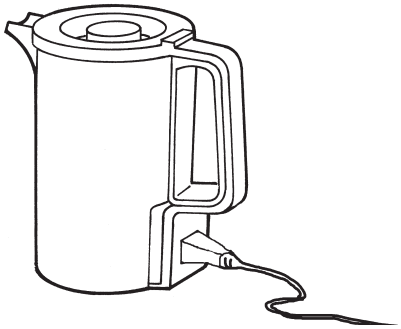
(b) How does the density of the glass cladding compare with the density of the glass fibre? [1]

.....

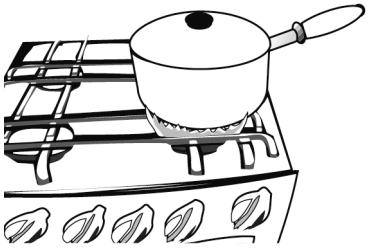
(c) **Complete the diagram** to show how the ray emerges into the air at point **B**. [1]

4

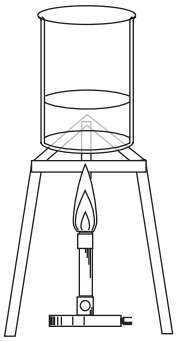
11. The same volume of water is heated in three different ways as shown below.



Plastic kettle



Metal saucepan



Glass beaker

Type of heater	Total heat energy supplied (J)	Heat transferred to the water (J)	Efficiency
Kettle	30 000	24 000	
Gas hob	20 000	12 000	60%
Bunsen burner	18 000	9 900	55%

(a) Write down **in words**, an equation **as it appears on page 2** and **use it** to calculate the efficiency of the kettle.

Equation: .....

..... [1]

Calculation: [2]

Efficiency = ... %

(b) Give a reason why the kettle loses less heat than the saucepan by the process of conduction. [1]

.....