| Candidate Name | Centre Number | Candidate Number |
|---|---|---|
| | | 0 |

WJEC CBAC

# GCSE

237/01

# SCIENCE
## FOUNDATION TIER
## PHYSICS 1

A.M. MONDAY, 19 January 2009

45 minutes

| For Examiner's use only | |
|---|---|
| **Total Mark** | |

**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(kWh) × cost per unit

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

wave speed = wavelength × frequency

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

*Answer* **all** *questions*.

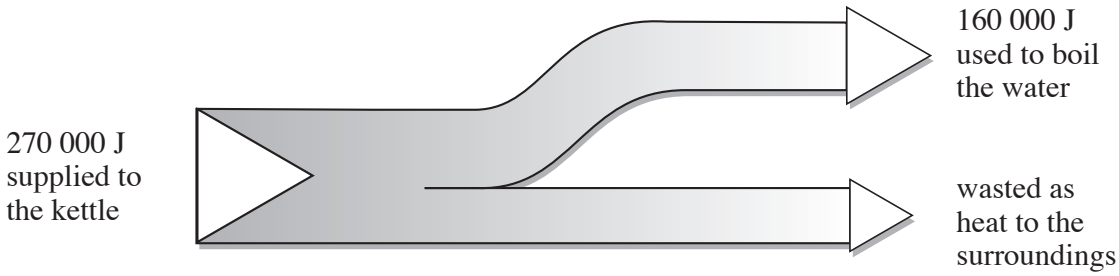
**1.** List **A** gives three energy sources used to generate electricity.
List **B** gives environmental problems that may be caused by using different energy sources.

Draw a line from each energy source in list **A** to an environmental problem it might cause in list **B**.
**Draw 3 lines only**. [3]

| **List A** | **List B** |
|---|---|
| | Produces a lot of noise |
| Nuclear | |
| | Produces large amounts of polluting gases |
| Tides | |
| | Requires large amounts of water for cooling purposes |
| Wind farm | |
| | Affects river estuaries and wildlife using the river |

3

**2.** The energy flow diagram is shown for an electric kettle boiling a quantity of water.




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

Wasted energy = ..... J

*(b)* The kettle takes 90 s to boil the water.
Use the equation

$$\text{Power} = \frac{\text{Energy supplied}}{\text{Time}}$$

to calculate the power of the kettle. [2]

Power of kettle = ..... W

3

**3.** Stars are created and eventually die over billions of years.
The sentences **A** to **E** describe the stages.
The sentences are in the wrong order.

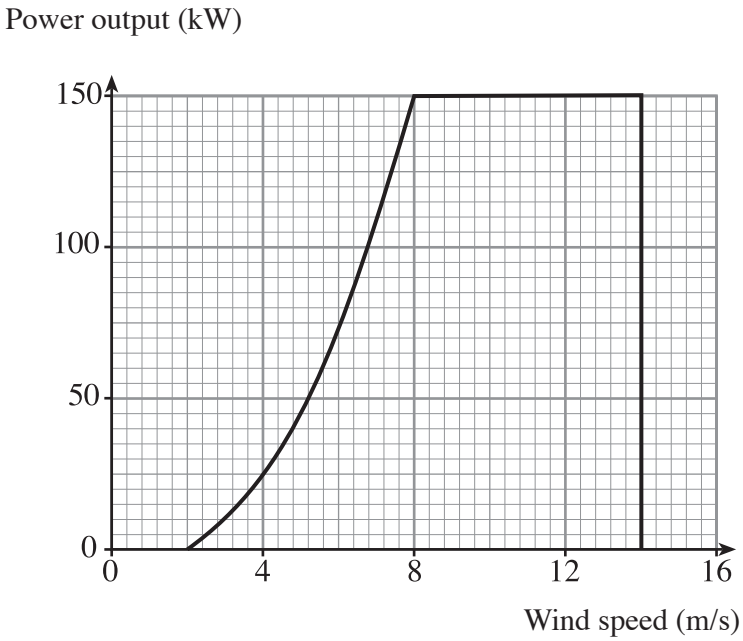
| | |
|---|---|
| **A** | Temperature and pressure build up to start fusion. |
| **B** | The star collapses to form a white dwarf. |
| **C** | Massive clouds of gas and dust are pulled together by gravity. |
| **D** | The gas and dust cloud becomes more compressed and heats up. |
| **E** | The star expands to form a red giant star. |

Arrange the sentences in the right order starting with sentence **C**.
Show your order in the boxes below. [3]


3

Examiner only

**4.** The graph shows the power output from a wind generator at different wind speeds.




(i) What is the maximum power output of the generator? [1]

Maximum power output = ..... kW

(ii) What is the minimum wind speed required to operate the generator? [1]

Minimum wind speed = ..... m/s

(iii) What happens when the wind speed is greater than 14 m/s? [1]

.....

.....

3

**5.** The diagram represents the electromagnetic spectrum.

| | | | | | | |
|---|---|---|---|---|---|---|
| Radio waves | Micro-waves | Infra Red | Visible light | Ultra violet | X-rays | Gamma rays |

*(a)* (i) Which type of radiation is used to send a signal to a television set from a remote control? [1]

.....

(ii) Which type of radiation is used to send a signal to a satellite? ..... [1]

(iii) Which type of radiation has the shortest wavelength? ..... [1]

*(b)* State why high doses of X-rays are harmful. [1]

.....

.....

4

Examiner only

**6.** A £1 coin, inserted into a pre-payment electric meter, buys 5 units (kWh) of electricity.

(i) Use the equation

$$\text{cost of 1 unit} = \frac{\text{cost}}{\text{number of units}}$$

to calculate the cost of 1 unit. [1]

Cost of 1 unit = ..... p

(ii) Use the equation

$$\text{time (h)} = \frac{\text{number of units}}{\text{power (kW)}}$$

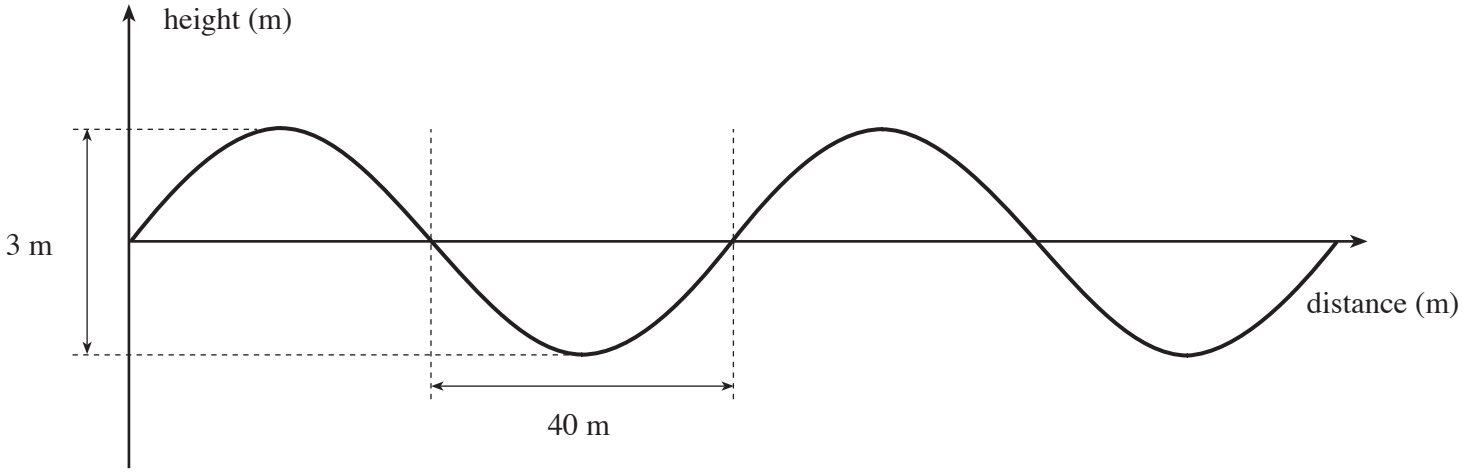
to calculate how long a 2 kW electric fire can be used before the £1 coin runs out. [2]

Time = ..... h

3

Examiner only

**7.** The diagram represents a wave on the ocean.




*(a)* Use the information given in the diagram to find:

(i) the wavelength of the wave: Wavelength = ..... m

(ii) the amplitude of the wave. Amplitude = ..... m
[2]

*(b)* The frequency of the wave is 0·14 Hz.
Use the equation

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

to calculate the speed of the wave. [2]

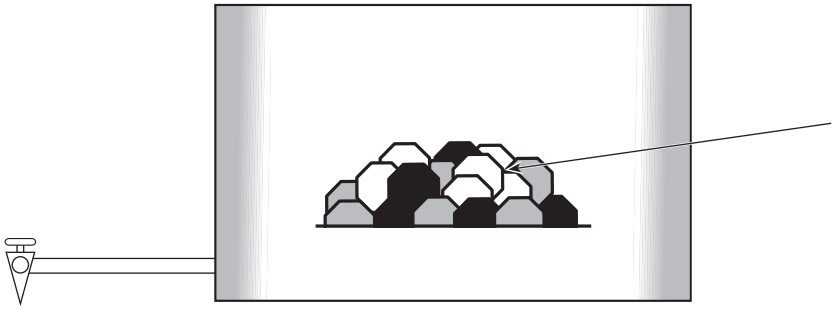
Wave speed = ..... m/s

4



**Turn over.**

**8.** The diagram shows a 'coal-effect' gas fire.




*(a)* Complete the following sentences by **underlining one word** from each bracket.

(i) Heat is transferred directly to a person sitting in front of the fire by [ **conduction / convection / radiation** ]. [1]

(ii) Heat is transferred to the person by the movement of hot air in the room, caused by [ **conduction / convection / radiation** ]. [1]

*(b)* The 'coal-effect' fire requires 6 kW of energy to provide 2·88 kW of heat to the room. Use the equation

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

to calculate the efficiency of the fire. [2]

Efficiency = ..... %

4

**9.** Read the passage carefully before answering the questions that follow.

> Current safety guidelines on the use of mobile phones assume that the health of the user can be affected because microwave signals heat up cells.
>
> Scientists in Israel have discovered an additional, biological way in which mobile phones could damage health.
>
> The scientists exposed human cells to weak mobile phone radiation. After 10 minutes, the cells showed a chemical change. This chemical change is similar to one found when cells divide. It is also found in certain cancer cells.
>
> Further research is required and the safety guidelines, based only on the heating effects of microwave radiation, are clearly out of date.

*(a)* (i) State what scientists observed 10 minutes after the start of their experiment. [1]

.....

.....

(ii) Explain why they thought their discovery was important. [1]

.....

.....

.....

(iii) This research shows a biological effect on cells.
State **one** other way in which cells are affected by microwave radiation. [1]

.....

*(b)* Suggest **two** things that should be done as a result of this piece of research. [2]

(i) .....

.....

(ii) .....

.....

5

Examiner only

**10.** *(a)* (i) State what causes the planets to orbit the Sun. [1]

.....

(ii) State the source of the Sun's energy. [1]

.....

(iii) Mars is further from the Sun than Earth is.
Why is its surface temperature lower? [1]

.....

*(b)* Diagram 1 shows the Sun (S) and the positions of the planets Earth (E), Mars (M) and Venus (V) on 1st June.
Diagram 2 shows their positions 6 months later.

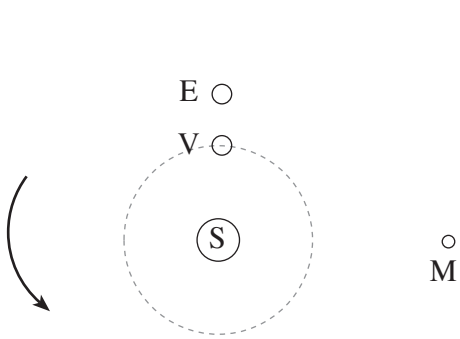



**Diagram 1**

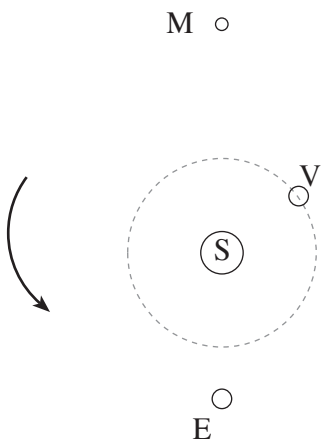



**Diagram 2**

Use the information above to answer the following questions.

(i) How long does it take Earth to orbit the Sun? ..... [1]

(ii) How long does it take Mars to orbit the Sun? ..... [1]

(iii) How can you tell that Venus orbits the Sun in less time than Earth? [1]

.....

.....

*(c)* Mars is further than Earth from the Sun. Give a reason why Mars takes longer than Earth to orbit the Sun. [1]

.....

.....

**11.** The following information plate is found on an oven that combines a microwave and a grill.

| | |
|---|---|
| Voltage | 230 V |
| Microwave power | 0·8 kW |
| Grill power | 1·2 kW |

(i) Name the **two** types of electromagnetic radiation that the oven uses to cook food. [2]

..... .....

(ii) A large joint of meat is cooked using **both** microwave and grill at full power for 1½ hours. What is the total power used to cook the meat? [1]

Total power = ..... kW

(iii) Write down in words an equation as it appears on page 2 and use it to calculate the number of units (kWh) used to cook the meat.

Equation: .....

.....

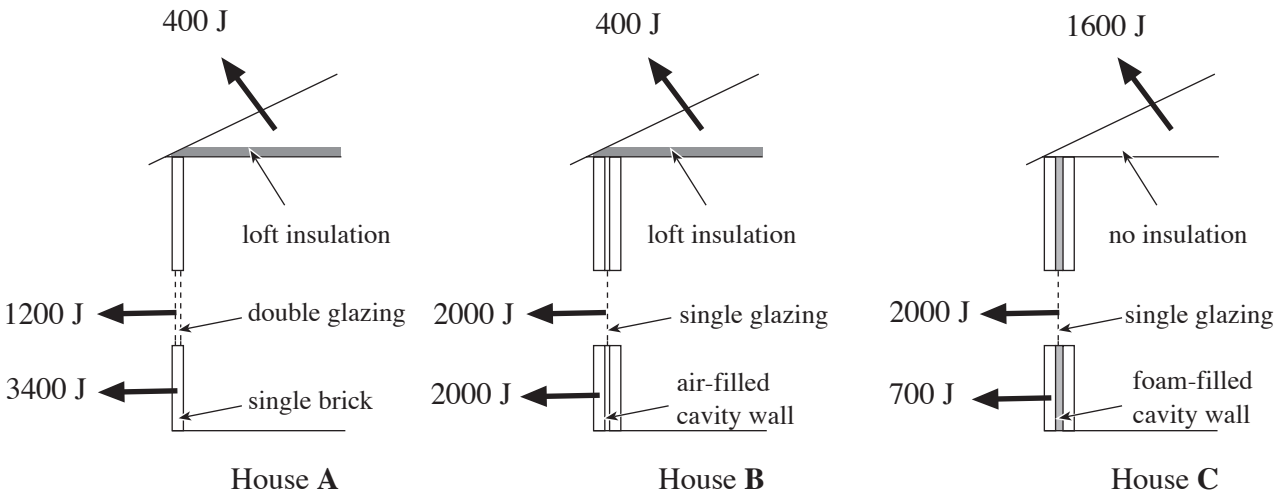
[1]

Calculation [1]

Number of units = ..... kWh

5

**12.** The diagrams show 3 houses of identical size. None of the houses is fully insulated.
The diagrams also show how much heat is lost per second from the windows, walls and roof of each house when a temperature difference of 20°C is kept between the inside and the outside.




*(a)* Use the information in the diagram to find which house loses the least heat energy per second. [1]

Answer: .....

*(b)* If the owner of house **B** installed double glazing **and** filled the cavity wall with foam, calculate how much energy she would save per second. Show your working. [2]

Total energy saved per second = ..... J

*(c)* (i) Name the process by which heat is lost through the brick walls of a house. [1]

.....

(ii) Explain why foam-filled cavity walls are better than air-filled cavity walls in reducing heat loss. [2]

.....

.....

.....