

Candidate Name	Centre Number	Candidate Number
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General Certificate of Secondary Education

237/01

**SCIENCE
FOUNDATION TIER (Grades G-C)
PHYSICS 1**

P.M. MONDAY, 21 January 2008

(45 minutes)

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	3	
2.	4	
3.	4	
4.	4	
5.	5	
6.	5	
7.	3	
8.	4	
9.	3	
10.	5	
11.	6	
12.	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.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

EQUATIONS

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy transfer} = \text{power} \times \text{time}$$

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

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

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

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

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

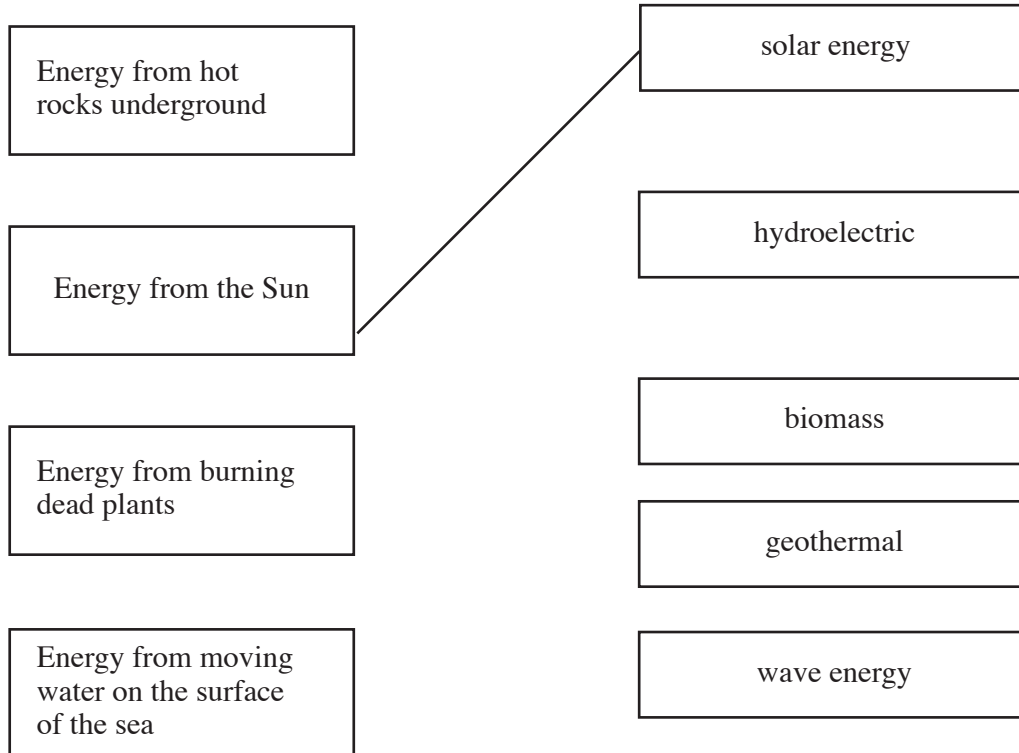
Answer all questions.

1. Renewable sources of energy are being used for generating electricity.

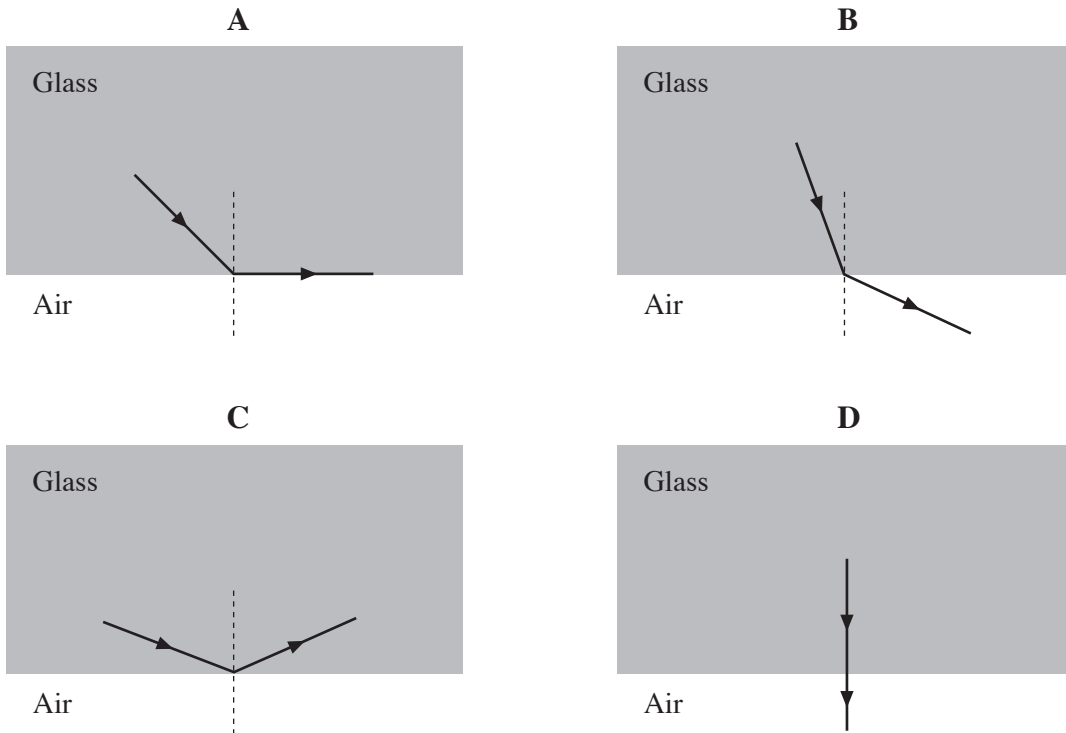
Draw a straight line connecting each description in the boxes on the left with the boxes on the right hand side.

One has been done for you.

[3]



2. The diagrams show a ray of light hitting a surface between glass and air.

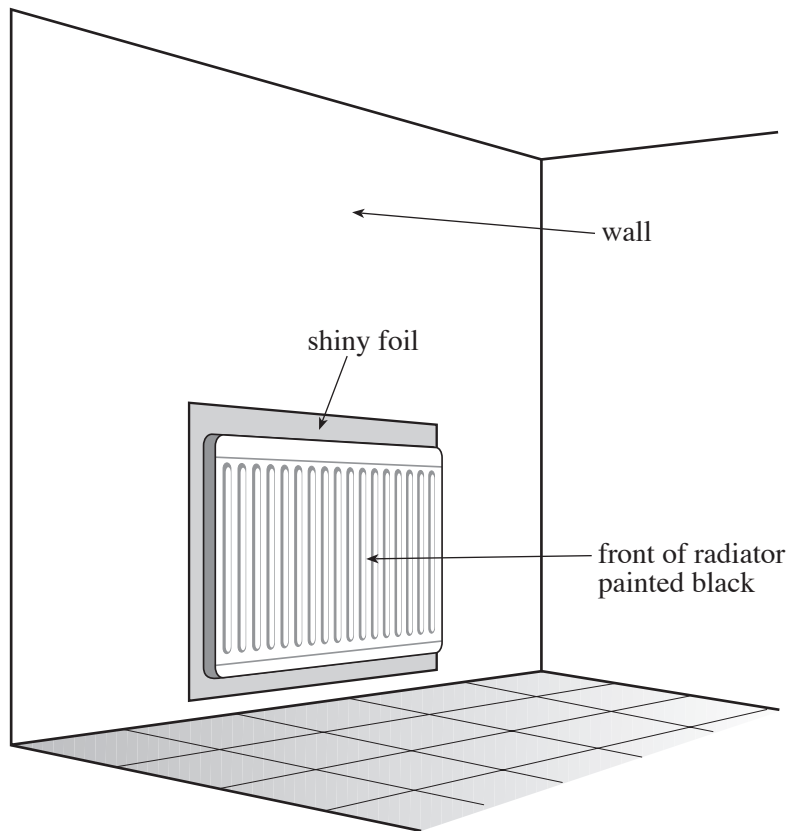


- (a) (i) Which diagram, **A**, **B**, **C** or **D**, shows a ray of light that is not refracted? [1]
- (ii) Which diagram shows total internal reflection? [1]
- (iii) Which diagram shows a ray of light that is refracted at the critical angle? [1]
- (b) State one practical use of total internal reflection. [1]

.....

4

3. The diagram shows a radiator in a room.



(a) Complete each sentence below by choosing the correct word from the box. Each word may be used once, more than once or not at all.

conduction	convection	radiation
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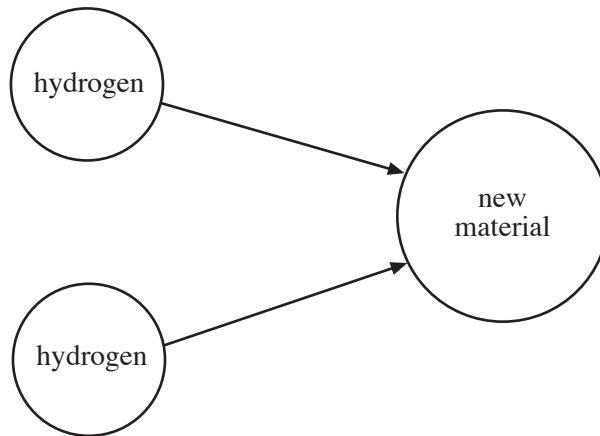
(i) By painting the front of the radiator black, it gives out more heat by [1]

(ii) The shiny foil reflects heat back into the room by [1]

(b) State two ways in which the householder can reduce the use of fuels to heat the room. [2]

1.
.....
2.
.....

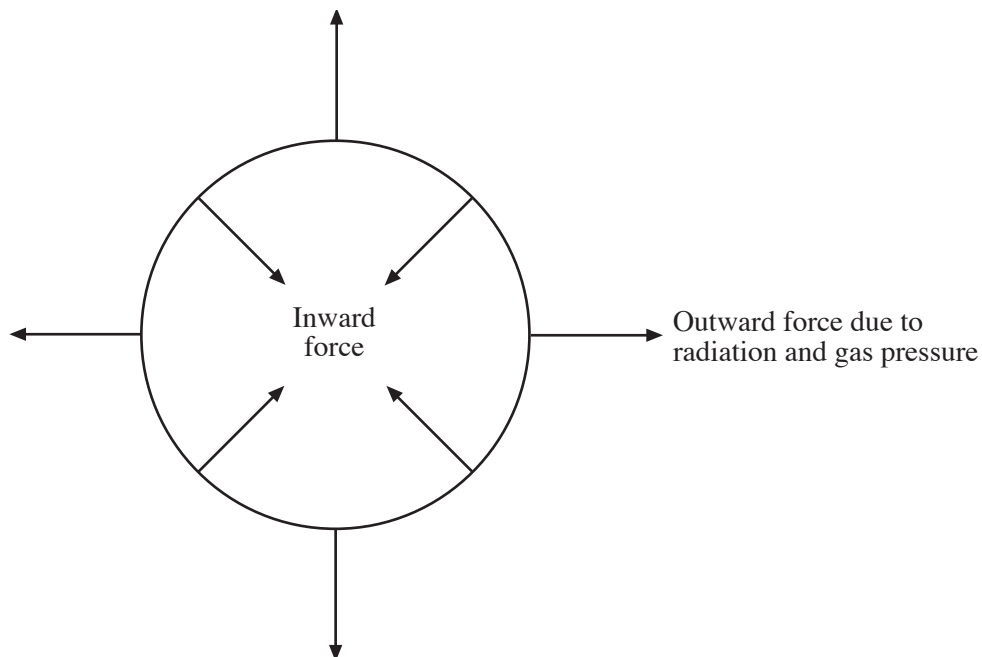
4. Stars give out energy when hydrogen atoms join together to make a new material.



- (a) Underline the correct answer from the choices in the brackets below.

- (i) Hydrogen atoms join together to make (dust / ice / helium). [1]
- (ii) Joining hydrogen atoms in this way is called (burning / fusion / combining). [1]

- (b) The following diagram shows the forces acting on a star.

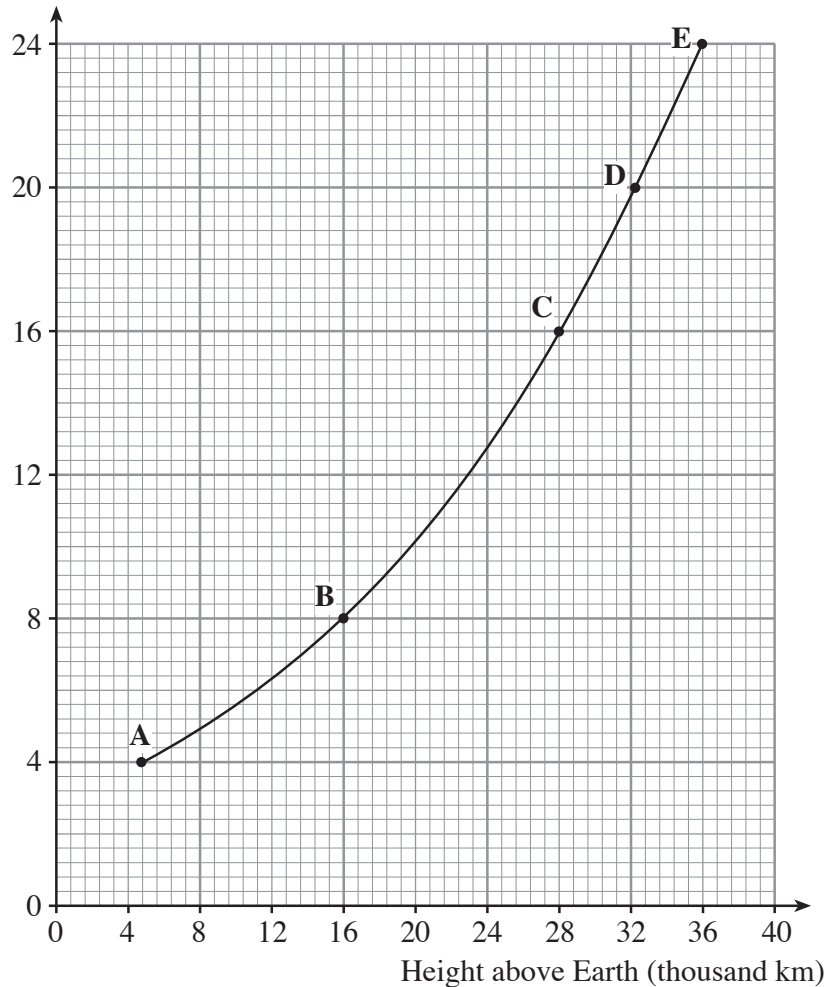


- (i) Name the inward force [1]
- (ii) What can you say about the star when the outward and inward forces are balanced? [1]

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5. Artificial (man-made) satellites are sent into orbit around the Earth to do a variety of jobs. The graph below shows how a satellite's orbit time depends on the height above the Earth.

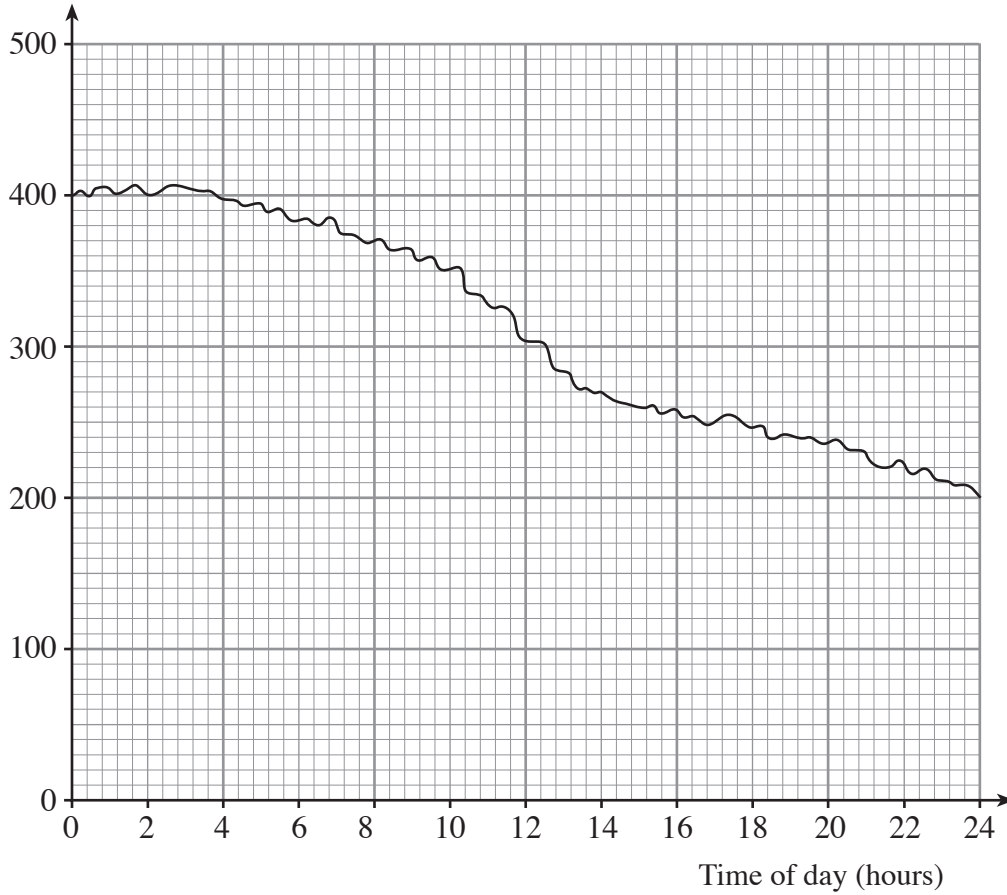
Time to orbit once (hours)



- (a) (i) Use the graph to find the time taken for satellite B to orbit once. [1]
 Time = hours
- (ii) How many times would B orbit the Earth in one day (24h)? [1]
 Number of times =
- (b) (i) Use the graph to find the height of a satellite that orbits once in 16 hours. [1]
 Height = thousand km.
- (ii) Which one of the points (A, B, C, D, or E) shows the satellite that stays above the same point on the Earth at all times? [1]
- (c) State one use for artificial satellites. [1]

6. The graph shows how the useful electrical power from all of the wind farms in Denmark changed through one day on 25 June 1997.

Useful power output (MW)



- (a) Describe how the wind strength changed during the day. [1]

- (b) (i) Use the graph to find the useful power output of the wind farms at 14.00 hours. [1]

Power output = MW

- (ii) At 14.00 hours the total power **input** to the wind farms was 650 MW.

Use the equation:

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

to find the efficiency of the wind farms.

[2]

Efficiency = %

- (c) Name one other renewable energy source that could be used to produce electricity. [1]

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5

7. Scientists work by making theories and testing them.

Here is a list of some of the things they do. The list is **not** in the correct order.

A Scientists evaluate their experiments

B Scientists analyse the results of their experiments.

C Scientists make theories about what goes on around them

D Scientists test theories by doing experiments.

E Scientists change their theories when they get unexpected results.

F Scientists notice what goes on around them.

Put **this list of letters** into the correct order in the boxes below.

Two boxes have been completed for you.

[3]

3

8. A 2 kW washing machine is used to wash a pile of clothes. The machine gives two options:

Cycle A: The wash takes 1.5 hours
Cycle B: The wash takes 3.0 hours.

- (a) (i) Use the following equation

$$\text{Units used} = \text{power (kW)} \times \text{time (h)},$$

to calculate the number of units used if the owner uses **cycle B** to wash the clothes.

[1]

Number of units used =

- (ii) 1 unit of electricity costs 10p.

Use the equation

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

to find the cost of doing the washing, using **cycle B**.

[1]

Cost = p.

- (iii) State why **cycle A** would only cost half as much as **cycle B**.

[1]

.....

- (b) State one advantage **to the environment** of choosing cycle A to do the washing.

[1]

.....

4

9. The table shows some information about electrical appliances used in the home.

The first row is complete.

Electrical appliance	Power in Watts	Power in kW	Cost of using the appliance for 1 hour (p)
Kettle	2000	2.0	18
T.V.	100	0.9
Vacuum cleaner	0.7	6.3

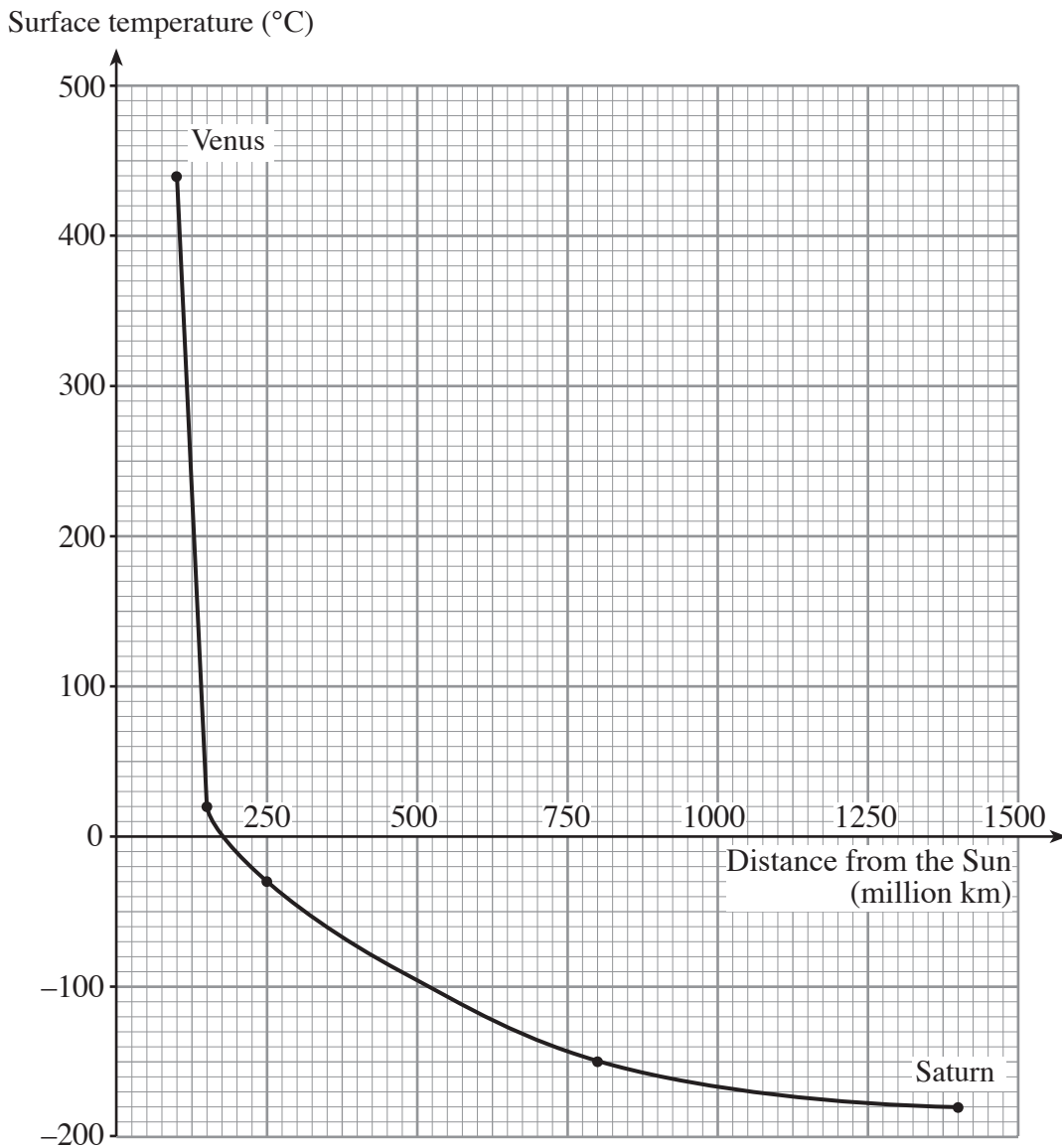
(i) **Fill in the blank spaces in the table.** [2]

(ii) State a reason for a T.V. being so cheap to use for 1 hour. [1]

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3

10. The graph gives information about 5 planets that orbit the Sun. Two of the planets are named.



- (a) Describe carefully how the temperature changes as the distance from the Sun increases. [2]

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.....

- (b) The fourth planet from the Sun is 250 million km from it.

(i) What is its surface temperature?°C [1]

(ii) What is the name of this planet? [1]

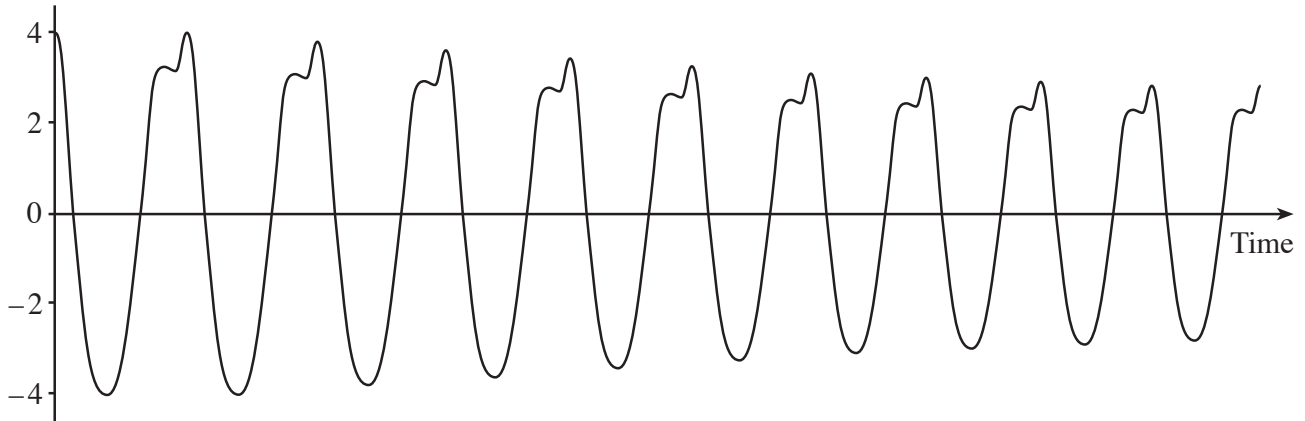
- (c) How many of the 5 planets shown are gas giants? [1]

5

11. On December 26th 2004, an earthquake under the Indian Ocean sent out a tsunami wave that travelled with terrific speed.

The diagram shows the earthquake's shock wave that was detected in China.

Distance (units)



- (i) Write down the maximum amplitude of the wave. units [1]
- (ii) How many complete waves are shown? [1]
- (iii) The frequency of the shock wave is 50 Hz and it travelled with a speed of 5 000 m/s.

Explain what a frequency of 50 Hz means. [1]

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.....

- (iv) Write down **in words**, an equation **as it appears on page 2** and **use it** with the data in part (iii) to calculate the wavelength of the wave.

Equation:

..... [1]

Calculation: [2]

Wavelength = m

6

12. A house owner improves the insulation in his home by laying fibre glass on the floor of the attic and spraying the inside of the roof tiles with foam insulation.

Here is some information about both types of insulation.

The payback time is the number of years taken for the savings to cover the cost of putting in the insulation.

Type of insulation	Cost of insulation (£)	Savings per year (£)	Payback time (years)
Attic floor fibre glass	112	3
Under-roof foam spray	1750	175

- (a) Complete the table.

[2]

- (b) Explain why both foam and fibre glass are good insulators of heat.

[2]

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4