Candidate Name	Centre Number	Candidate Number
		0

General Certificate of Secondary Education

672/01

GCSE IN APPLIED SCIENCE (Double Award)
Unit 2: Science and Society
FOUNDATION TIER (Grades G-C)

P.M. FRIDAY, 18 January 2008

(1 hour 15 minutes)

For Examiner's use only	
Section A	
Section B	
Total	

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.

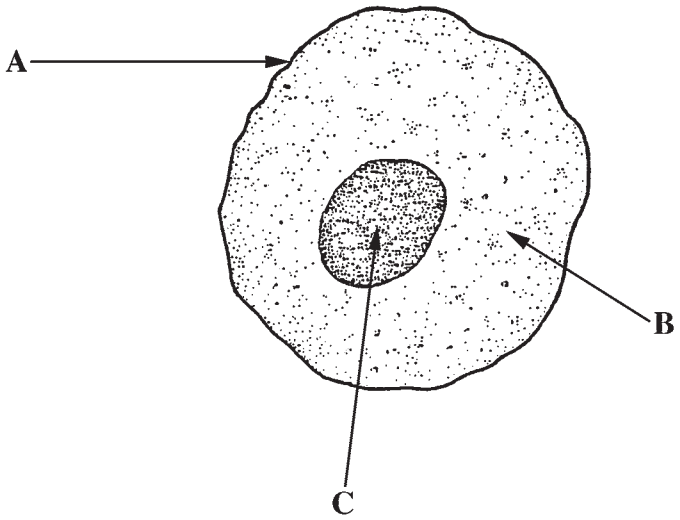
You are reminded to show all your working. Credit is given for correct working even when the final answer given is incorrect.

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

SECTION A (56 marks)

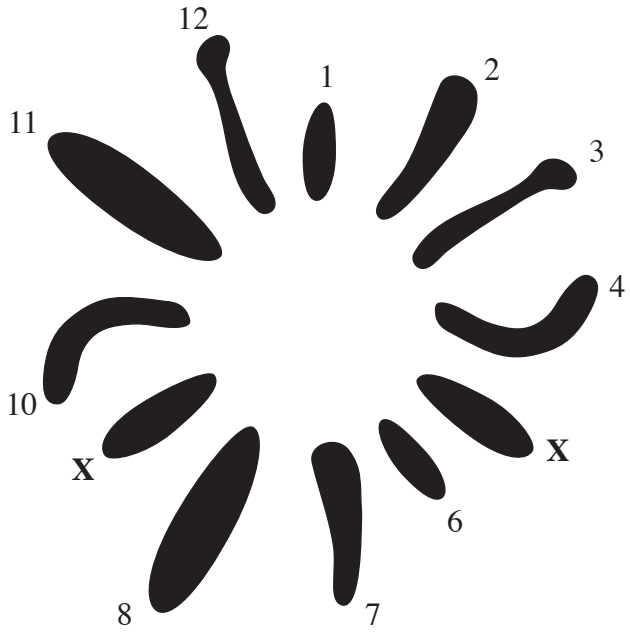
Answer **all** *the questions in the spaces provided.*

1. *(a)* Complete the table below to identify the parts of the animal cell. [3]



Part of the cell	A, B or C
Nucleus	.....
Cell membrane	.....
Cytoplasm	.....

(b) The diagram shows chromosomes from a human cell.



(i) Which part of the cell A, B or C contains the chromosomes? ..... [1]

(ii) State how many X chromosomes are present. ..... [1]

(iii) State whether the cell comes from a male or female. ..... [1]

(iv) Chromosomes always come in matching pairs.
For example, in the diagram, **1** and **6** are a matching pair.
Now fill in the gaps in the table. [2]

Chromosome	**Matching pair**
1	6
2	.....
3	.....

2. *(a)* Many scientists believe that global warming is causing temperatures on the Earth to increase.

(i) Give **one** reason why burning fossil fuels may cause global warming. [1]

.....

(ii) Give **one** way that cutting down forests may cause global warming. [1]

.....

(b) This story appeared in a newspaper.

> Next Tuesday, a British Airways 737 jet will begin its short flight from London to Newquay.
>
> The 260-mile flight will be the first of a daily service for 150 passengers to the popular Cornish resort.
>
> Environmentalists argue planes produce more carbon dioxide than trains.

(i) Why are the environmentalists against the flights? [1]

.....

(ii) The table below shows the carbon cost of making the journey from London to Newquay by three different methods.

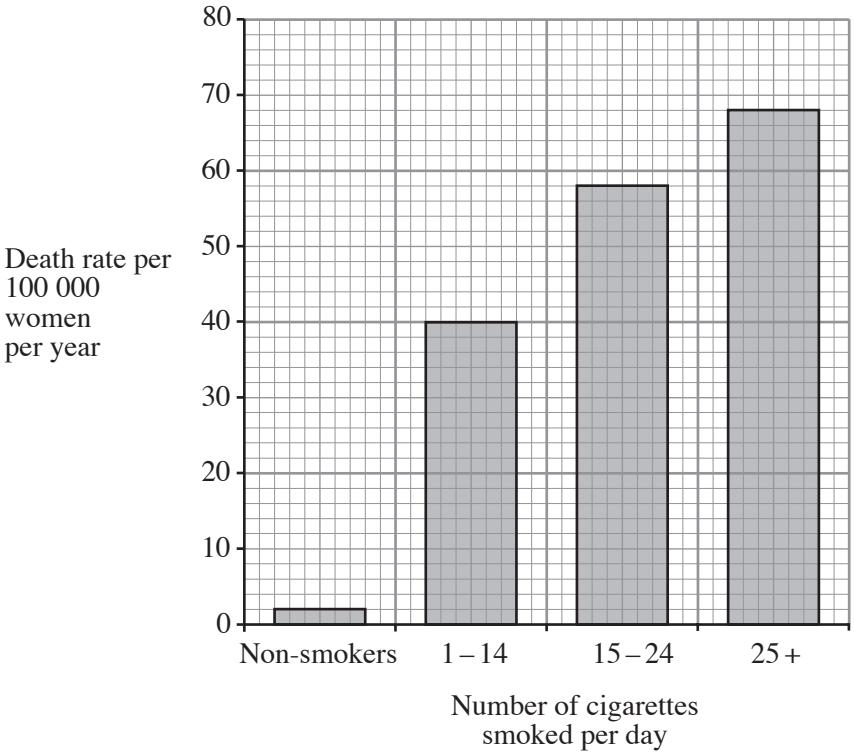
Transport method	Number of passengers	Carbon cost (kg)	Carbon cost per passenger (kg)
Aeroplane	150	100	0.67
Car	4	80	.....
Train	100	20	.....

(I) Complete the table. [2]

(II) Use the data to give **one** reason why cars should be used less. [1]

.....

3. The bar graph shows how women's death rate from chest disease is affected by smoking.



(i) Name **one** chest disease caused by smoking. ..... [1]

(ii) What is the death rate from chest disease for non-smoking women? ..... [1]

(iii) How much **higher** is the death rate for women who smoke 10 cigarettes per day than for non-smokers? ..... [1]

(iv) **Name** the chemical that makes smokers addicted to cigarettes. [1]

.....

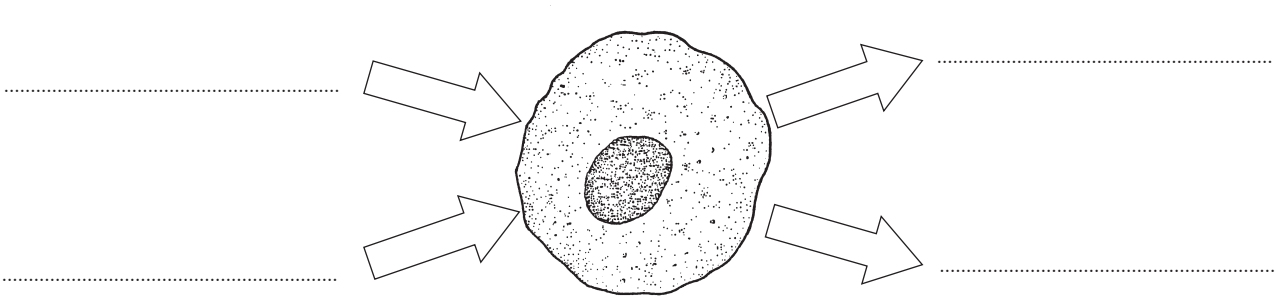
4. Respiration is the process that releases energy in living cells.

The four substances involved in respiration are:

carbon dioxide, **oxygen,** **water,** **glucose.**

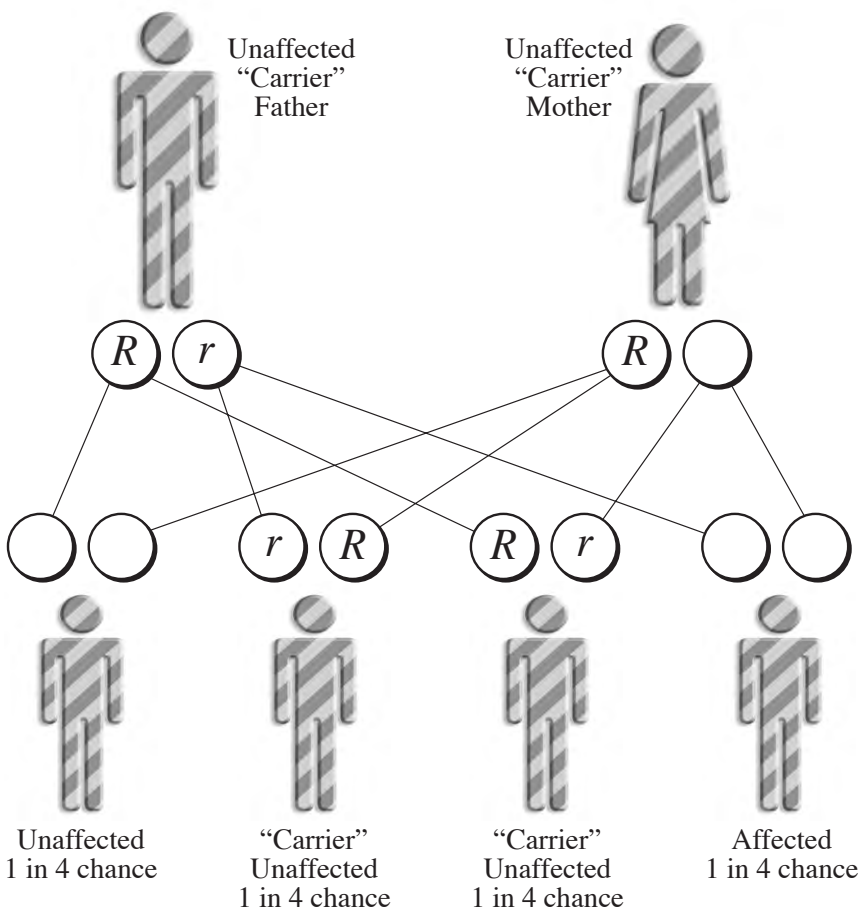
Label the cell to show which substances enter the cell for respiration to take place, and which substances leave the cell as waste products. [4]

Enter cell **Leave cell**



5. Cystic Fibrosis is caused by a single faulty recessive allele **r**.
Both mother and father **do not** suffer from the disease but both carry **r** the recessive allele.

(i) Complete the diagram below, by placing the correct allele **R or r** in the empty circles. [3]



(ii) State the chance of a child **not** being affected by the disease. ..... [1]

6. *(a)* Choose a word or phrase from the box to complete the sentences.
Each word or phrase may be used once, more than once or not at all. [4]

Milky Way	universe	planet	comet	solar system

(i) A ..... and a ..... both move in orbits around the Sun.

(ii) The Sun is found in the ..... Galaxy.

(iii) The ..... contains billions of galaxies.

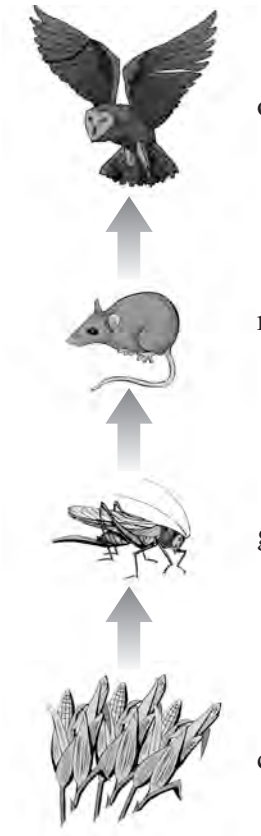
(b) The solar system was formed from a large cloud of gas and dust.

(i) Complete the next sentence by **underlining** the correct word in the brackets.

The main gas in this cloud is (oxygen / hydrogen / nitrogen). [1]

(ii) **Name** the force that pulled this gas cloud together. ..... [1]

7. The picture shows a simple food chain on a farm.



(i) **Name** the producer in the chain. ..... [1]

(ii) **Name** the herbivore in the chain. ..... [1]

(iii) Name **one** predator in the chain. ..... [1]

(iv) Name **one** carnivore in the chain. ..... [1]

(v) The grasshopper gets energy from eating corn.

From where does the corn get energy? ..... [1]

(vi) The farmer uses poison to kill most of the rats on his farm

(I) How will this affect the number of grasshoppers?

..... [1]

(II) How will this affect the owls in the area?

..... [1]

(vii) The farmer sprays the crops with pesticides.

Explain why this will have an effect on the owls. [2]

.....

.....

8. The diagram shows the regions of the electromagnetic spectrum.

Gamma rays	X-rays	Ultraviolet	Visible light	Infra red	Microwave	Radio waves

(a) Visible light travels from the Sun at 300 000 000 m/s through space.
Ultraviolet radiation also travels from the Sun.

State the speed of ultraviolet radiation through space. ..... m/s [1]

(b) (i) **Name** the type of electromagnetic radiation that can be used to sterilise hospital equipment. [1]

.....

(ii) **Name** the type of electromagnetic radiation that is used to send signals to a television from a remote control device. [1]

.....

(iii) **Name** the type of electromagnetic radiation that can be used to see security marks. [1]

.....

(iv) **Name** the region of the electromagnetic spectrum with the lowest frequency. [1]

.....

(c) (i) Give **one** reason why the skin needs to be protected from ultraviolet radiation. [1]

.....

(ii) Complete the sentence by ticking the box next to the correct gas. [1]

The gas that filters ultraviolet radiation is:

carbon dioxide ☐

ozone ☐

oxygen ☐

9. *(a)* The following list shows the names of some of the elements in the periodic table.

iron	**sulphur**	**gold**	**lithium**	**bromine**	**carbon**	**nitrogen**

(i) From the list name **one** metal that can be used straight from the ground. [1]

.....

(ii) From the list name **one** non-metal that can be used straight from the ground. [1]

.....

(iii) **Name** the element in the list with the symbol Fe. [1]

.....

(iv) **State** the symbol for gold. ..... [1]

(b) Bromine has the symbol $^{80}_{35}Br$.

It is found in Group 7 of the periodic table.

(i) State the number of electrons in an atom of bromine. ..... [1]

(ii) Other elements in Group 7 are:

$^{127}_{53}I$,	$^{19}_{9}F$,	$^{35}_{17}Cl$

Arrange these elements in order in the part of the periodic table shown below. [3]
Bromine has already been entered for you.

Group 7
.....
.....
$^{80}_{35}$**Br**
.....

SECTION B (24 marks)

Answer **all** *the questions in the spaces provided.*

10. The table shows the blood sugar levels of two boys over a period of 12 hours.

	Blood sugar (units)	
Time	**Tom**	**Jason**
4.00	8	5
6.00	6	5
8.00	18	6
10.00	2	5
12.00	8	6
14.00	22	6
16.00	18	5

(a) Give **one** reason why the data shows that Tom is a diabetic. [1]

.....

.....

(b) (i) Give **one** reason why Tom's blood sugar levels rose at 8.00 and 14.00. [1]

.....

(ii) **Explain** why Tom's blood sugar level increased by a large amount at these times. [2]

.....

.....

(c) If a person's blood sugar level falls below 4 units then they may suffer a "hypo".

(i) At what time did Tom suffer a "hypo"? [1]

.....

(ii) What could have caused his blood sugar level to drop so low that a "hypo" occurred? [1]

.....

(iii) What should Tom do to recover quickly from his "hypo"? [1]

.....

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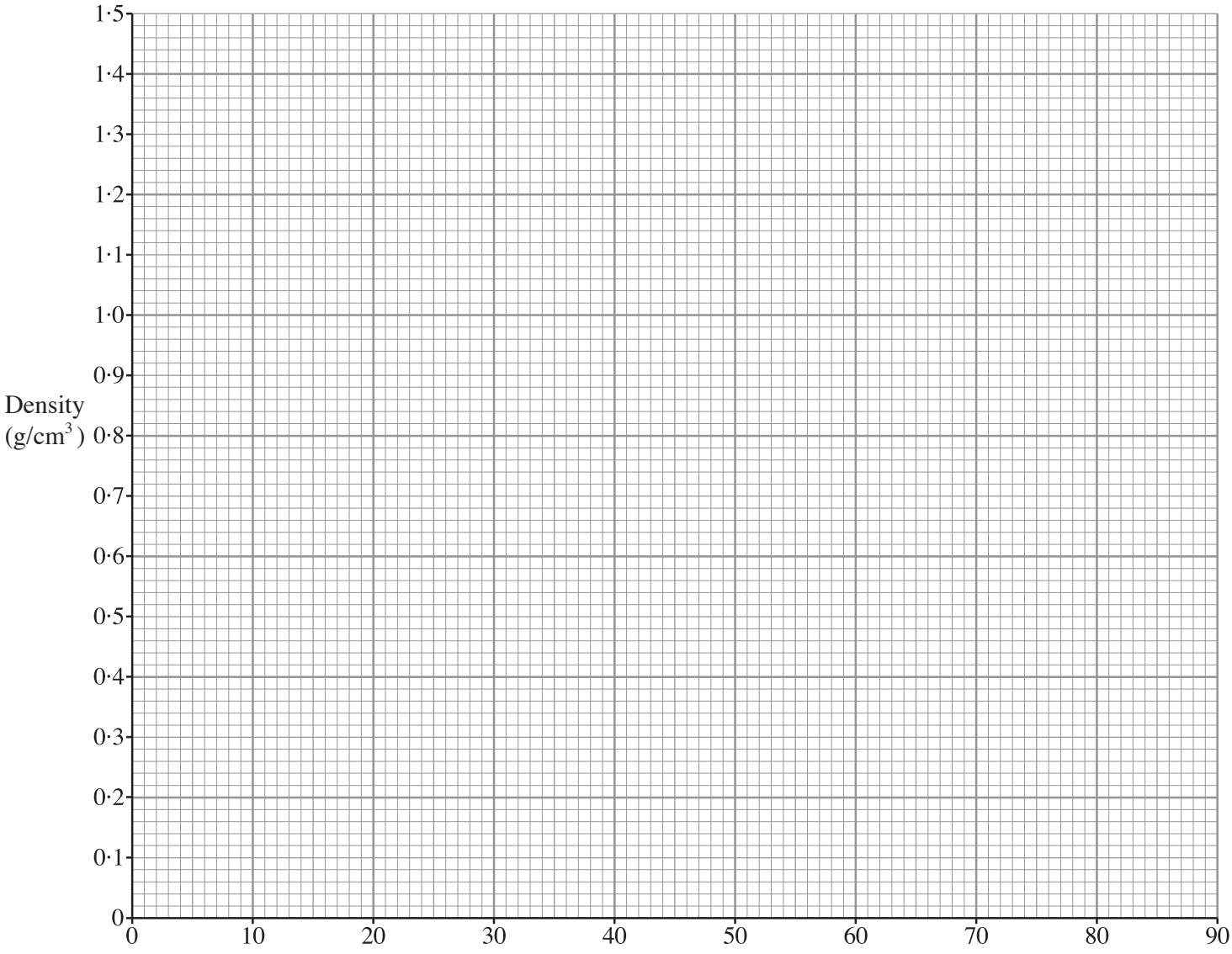
Examiner only

11. The table gives some information about the first four elements in Group 1 of the periodic table. Use this information to answer the questions that follow.

Element	Number of particles in the nucleus	Number of electrons in orbits around the nucleus	Density (g/cm^3)
Lithium	7	3	0.53
Sodium	23	11	0.97
Potassium	39	19	0.86
Rubidium	85	37	1.50

(a) (i) On the grid below, plot a graph to show how the density of the element depends on the number of particles in the nucleus. Draw a line of best fit. [3]



B3

(ii) It was expected that elements with more particles in the nucleus would have a bigger density.
Explain whether or not the data agrees with this expectation. [2]

.....

.....

(b) The electronic structure of a sodium atom can be shown as **2, 8, 1**.

(i) Write down the electronic structure of potassium. ..... [1]

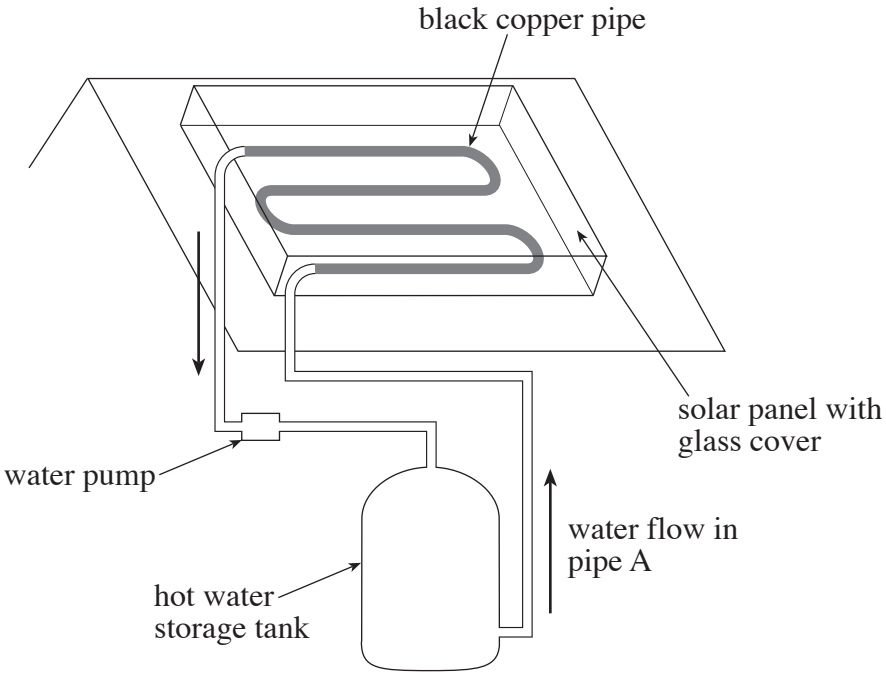
(ii) Give **one** reason why sodium and potassium have similar chemical properties. [1]

.....

(iii) From the table, state the name of the most reactive element. [1]

.....

12. A company advertises solar panels that are fitted onto the roofs of houses.
They claim that they will reduce heating costs in homes.
The solar panel system is shown in the diagram below.



(a) During the summer, 4000 J per second of energy from sunlight falls on the solar panel.
The amount of useful energy transferred to heating the water is 1600 J per second.

(i) Work out how much energy from the sunlight is wasted per second. [1]

Energy wasted = ... J/s

(ii) Use the equation

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

to calculate the efficiency of the energy transfer from sunlight to water. [2]

Efficiency = ... %

B3

(b) Before the solar panel was fitted to the roof, a 3000W immersion heater heated water for the house.
The immersion heater was switched on for 30 hours a week.

(i) Use the equation

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

to calculate the energy used by the immersion heater in 30 hours. [2]

Energy used = ... kWh

(ii) Use the equation

Total cost = energy used (kWh) × cost per unit (p)

to find the cost of using the immersion heater for 30 hours.
One unit of electricity costs 8p. [2]

Total cost = ...

(iii) After the solar panel was installed, the immersion heater was only used for 5 hours a week. Calculate how much the homeowner saved in a week. [2]

Saving = ...