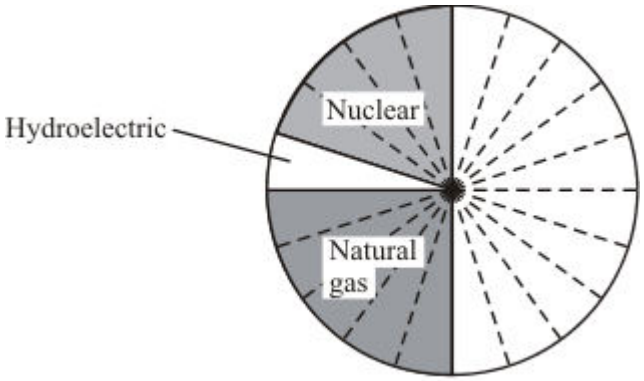
1 The table shows the main sources of energy used to generate electricity.

Energy source	Percentage (%)
coal	35
hydroelectric	5
natural gas	25
nuclear	
oil	15

(a) Complete the table by writing in the percentage for nuclear power.

(1)

(b) Use the information from the table to complete and label the pie chart below.



(2)

(c) Why can hydroelectric generators be used to meet sudden increases in the demand for electricity?

.....

(1)

(d) Gases are released when fossil fuels burn.

(i) Which **one** of these gases increases the greenhouse effect?

.....

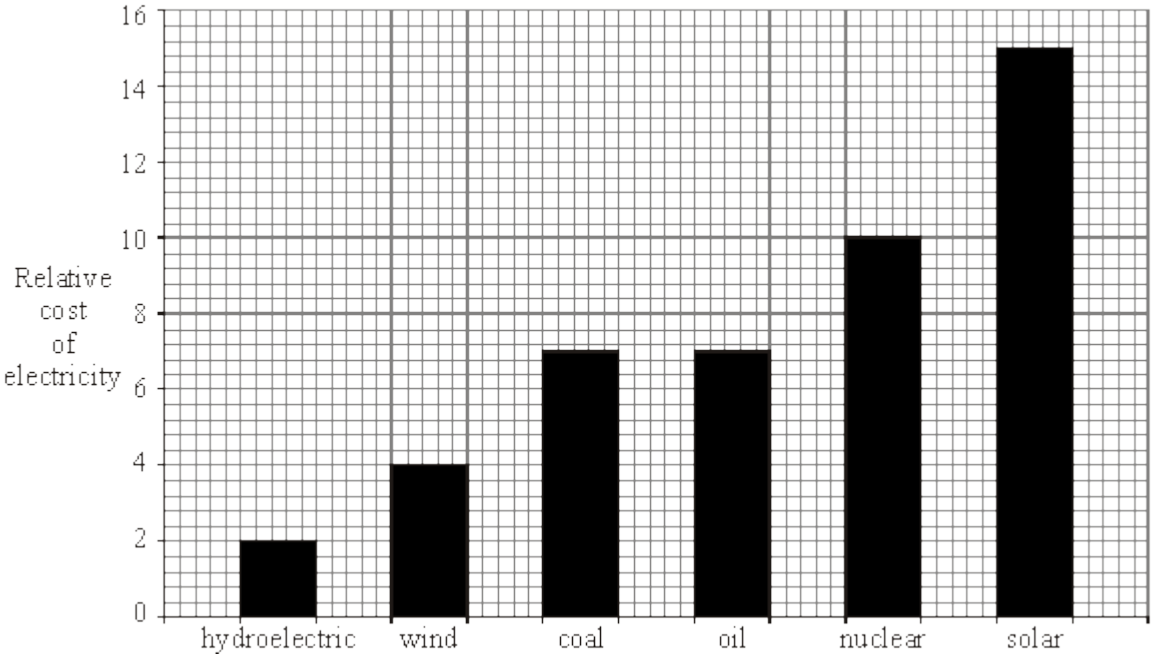
(1)

(ii) Which **one** of these gases produces acid rain?

.....

(1)
(Total 6 marks)

2 The bar chart shows the relative costs of some different energy sources that are used to generate electricity.



(a) Apart from cost, give **two** advantages that a hydroelectric power station has compared with a wind farm.

1 .....

.....

2 .....

.....

(2)

(b) Apart from cost, give **one** advantage and **one** disadvantage that a nuclear power station has compared with a coal-fired power station.

Advantage .....

.....

Disadvantage .....

.....

(2)

(c) State and explain **one** situation where it is better to use solar energy, rather than any of the other energy sources, to generate electricity.

.....

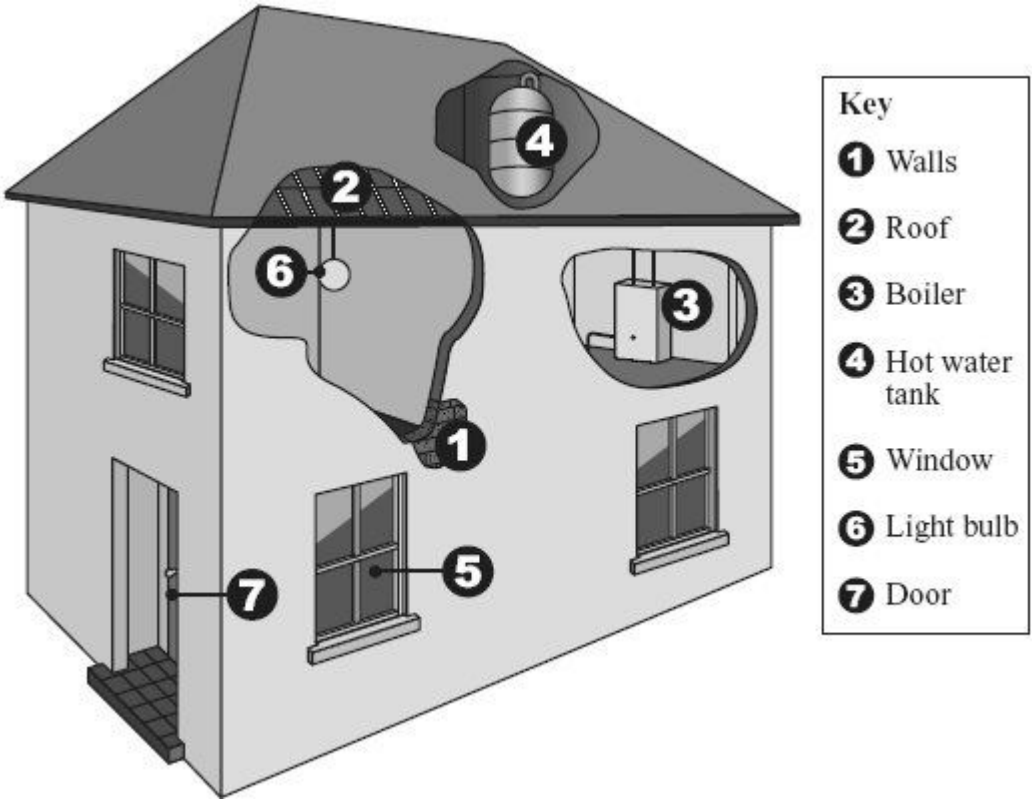
.....

.....

.....

(2)
(Total 6 marks)

3 The drawing shows parts of a house where it is possible to reduce the amount of energy lost.



(a) Give **one** way in which the amount of energy lost can be reduced from each of the following parts of the house.

1, **2** and **4** .....

5 .....

7 .....

(3)

(b) Energy consumption can be reduced by using a more efficient boiler or more efficient light bulbs.

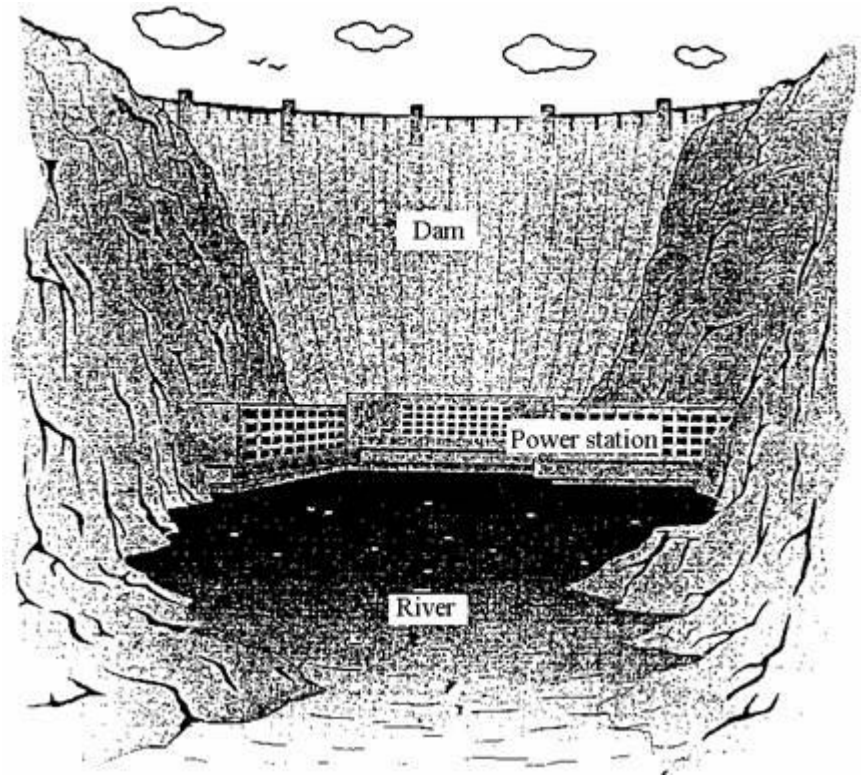
What is meant by a *more efficient* light bulb?

.....

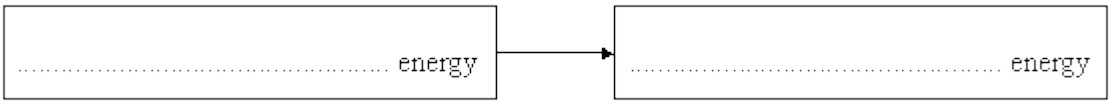
.....

(1)
(Total 4 marks)

4 The drawing shows a hydro-electric dam. Water from the top of the dam flows through pipes to the power station at the bottom of the dam.



(a) Complete the following boxes to show the **useful** energy transfer which occurs as the water flows through the pipes **to** the power station.



(2)

(b) The electricity generated by the power station is transmitted over long distances. Before this happens its voltage is increased by using a step-up transformer.

State and explain **one** advantage and **one** disadvantage of transmitting electricity at high voltage.

Advantage .....

.....

.....

.....

(2)

Disadvantage .....

.....

.....

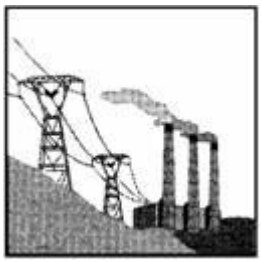
.....

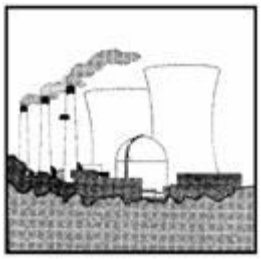
(2)
(Total 6 marks)

5 Electricity may be produced from a number of different energy resources.

(i) Complete the table below.

The first one has been done for you.

Device	Energy resource	Useful energy transfer from resource
Coal-fired power station 	Coal	Chemical ⟶ electrical
Hydroelectric power station 	Stored water	..... ⟶ electrical
Solar cell in calculator 	Sun	..... ⟶ electrical
Wind turbine 	Wind	..... ⟶ electrical
Gas-fired power station	Gas	..... ⟶ electrical

(4)

(ii) Give **one** of the five energy resources opposite, which is **not** classified as renewable.

.....

(1)

(iii) State another non-renewable energy resource.

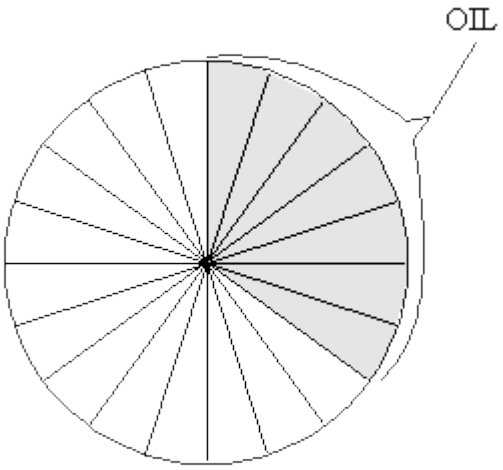
.....

(1)
(Total 6 marks)

6 The table shows the main sources of energy used in Britain in 1990.

coal	35%
oil	35%
gas	24%
nuclear	5%
moving water (hydro)	1%

(a) Finish the pie-chart, using the figures in the table.



(4)

(b) Complete the following sentences.

To release energy from coal, gas and oil they must be burned.

Coal, gas and oil are all .....

(1)

(c) Which **one** of the energy sources in the table is renewable? .....

Write down the name of **one** other renewable energy source. .....

(2)

(d) How does the amount of energy obtained from nuclear sources in 1990 compare with the amount obtained from moving water?

.....

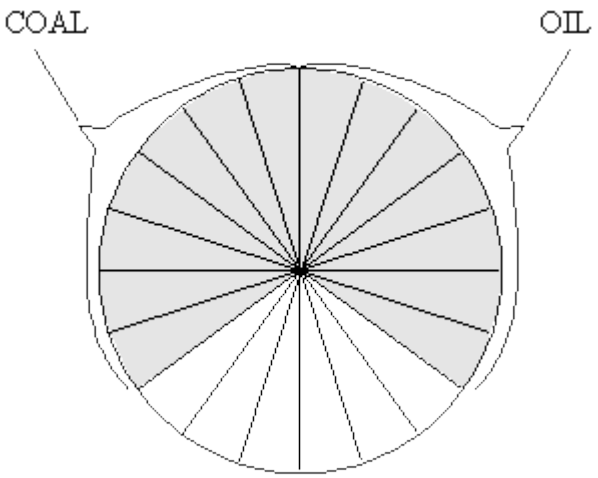
.....

(2)
(Total 9 marks)

7 The table shows the main sources of the energy used in Britain in 1990.

coal	35%
oil	35%
gas	24%
nuclear	5%
moving water (hydro)	1%

(a) Finish the pie-chart, using the figures in the table.



(3)

(b) How does the amount of energy obtained from nuclear sources in 1990 compare with the amount obtained from moving water?

.....

.....

(1)

(c) Moving water (hydro) is a renewable energy source.

Write down the name of **one** other renewable energy source.

.....

(1)

(d) Explain why electricity is **not** included in the table of energy sources.

.....

.....

(1)
(Total 6 marks)

8 A gas burner is used to heat some water in a pan.

Of the energy released by the burning gas by the time the water starts to boil:

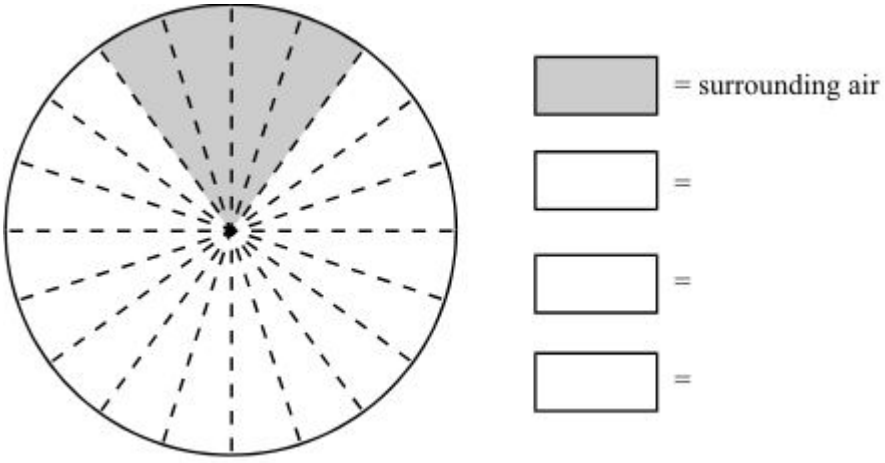
60% has been transferred to the **water**.

20% has been transferred to the **surrounding air**.

13% has been transferred to the **pan**.

7% has been transferred to the **gas burner** itself.

(a) Use the above information to complete the pie-chart.



(3)

(b) Some of the energy released by the burning gas is wasted.

(i) What happens to this wasted energy?

.....

.....

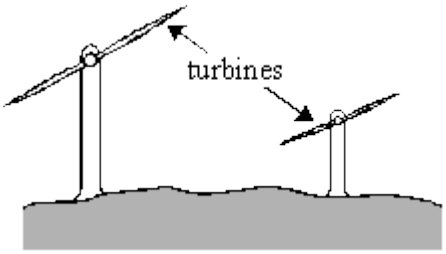
(2)

(ii) What percentage (%) of the energy from the gas is wasted? Answer: ..... %

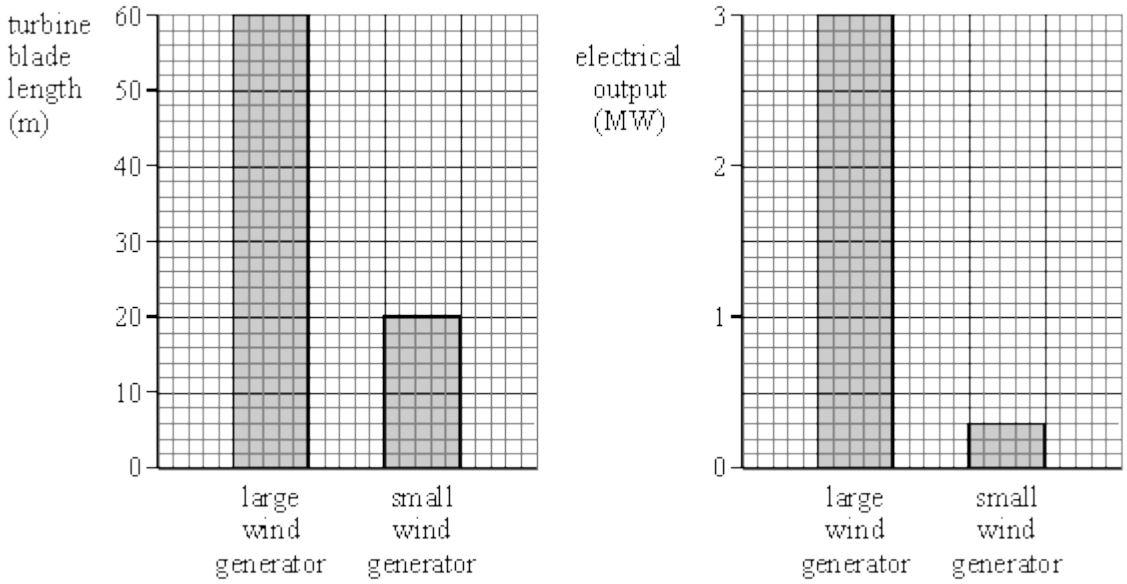
(1)

(Total 6 marks)

9 On a very windy hilltop there are two wind generators side by side.



The bar charts show the lengths of the turbine blades and the electrical outputs of the two wind generators.



Complete the following table.

	LENGTH OF TURBINE BLADE (m)	ELECTRICAL OUTPUT (MW)
Large wind generator	60	
Small wind generator		

(Total 3 marks)

10 When a gun is fired, a very large force acts on the bullet for a very short time.

The change in momentum of the bullet is given by the following relationship:

force (N) × time(s) = change in momentum (kg m/s)

(a) An average force of 4000 newton acts for 0.01 seconds on a bullet of mass 50g.

Calculate the speed of the bullet. (*Show your working.*)

.....

.....

.....

Answer ..... m/s

(4)

(b) The bullet is fired horizontally. In the short time it takes for the bullet to reach its target, its horizontal speed has fallen to 80% of its initial speed.

(i) Explain why the speed of the bullet decreases so quickly.

.....

.....

(2)

(ii) Calculate the percentage of its original kinetic energy the bullet still has when it reaches its target.

(Show your working.)

.....

.....

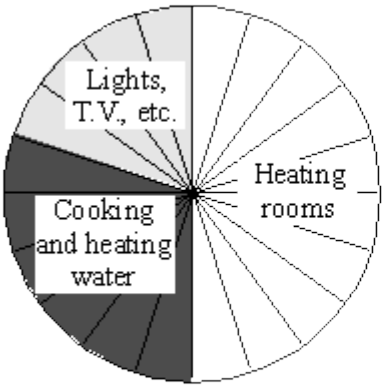
.....

.....

(4)
(Total 10 marks)

11 (a) The pie-chart shows how energy is used in a home.

Complete the table using the information on the pie-chart.

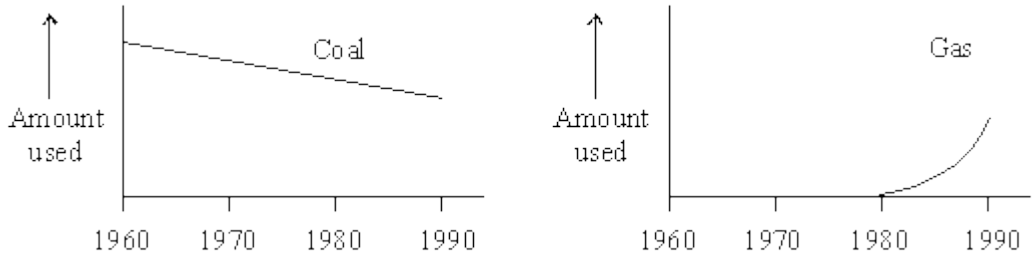


USE OF ENERGY	%
lights, T.V., etc.	20
cooking and heating water	
heating rooms	

(2)

(b) We get some of the energy we need in our homes from electricity.

The graphs show how the amounts of coal and gas used to generate electricity changed between 1960 and 1990.



Describe these changes.

Coal .....

.....

.....

Gas .....

.....

.....

(4)

(c) Read the information below.

- More carbon dioxide in the air may change the weather. Farmers may then not be able to produce the food we need.
- Burning coal produces sulphur dioxide. Burning gas does not do this.
- It is cheaper to generate electricity from gas than from coal.
- Sulphur dioxide causes acid rain which can kill fish and damage buildings.
- Two power stations generate the same amount of electricity. The one which burns gas produces less carbon dioxide than the other which burns coal.

Many people say that the change from coal to gas is better for the environment.

Why do you think they say this?

.....

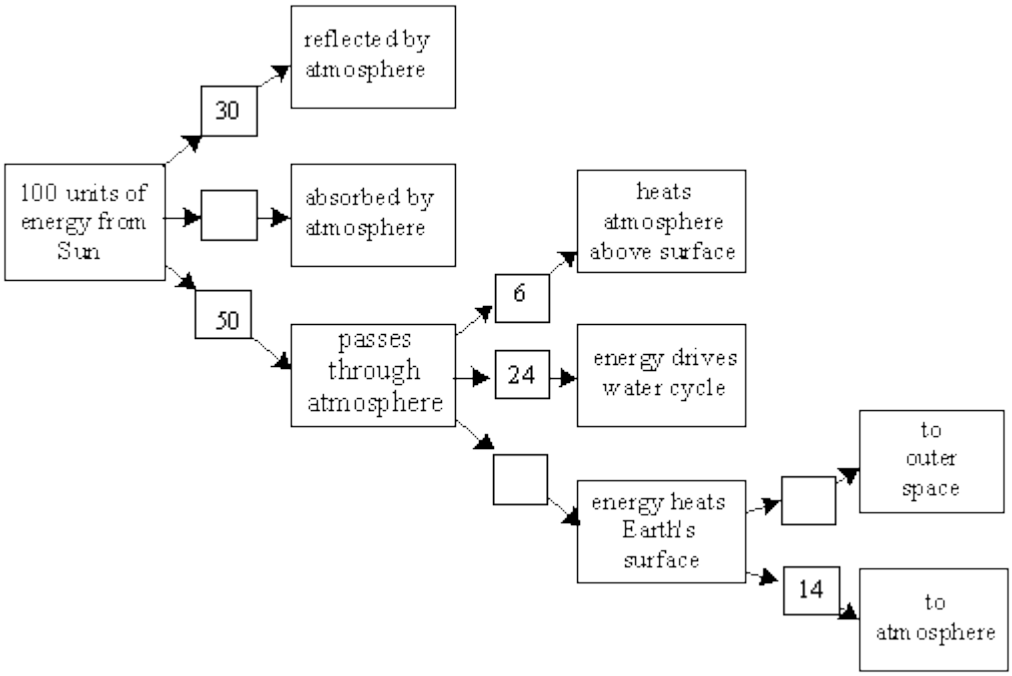
.....

.....

.....

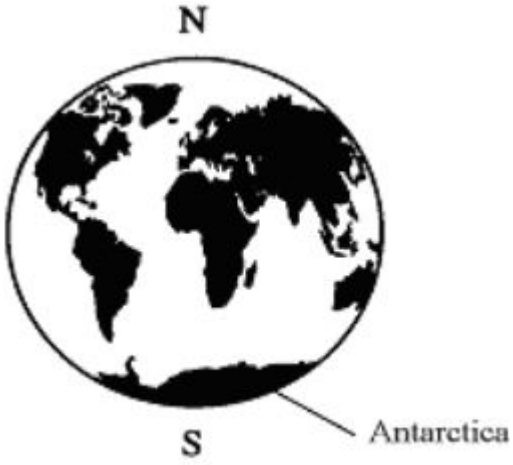
(3)
(Total 9 marks)

12 Complete the boxes on the chart to show what happens to the energy from the Sun.



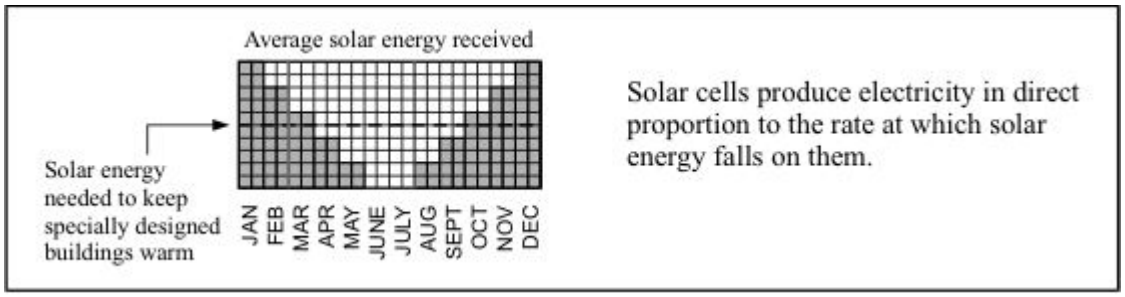
(Total 3 marks)

13 Antarctica is a huge land mass surrounding the Earth's south pole. It is covered in a very thick layer of ice and is the only remaining large area of the Earth's surface that has not been affected very much by humans.

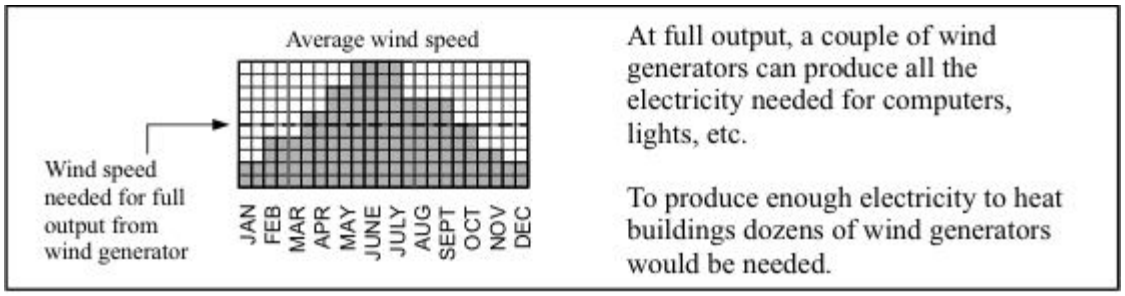


There are, however, teams of scientists from various countries studying Antarctica. These scientists need electricity for lighting, for their computers and other scientific instruments and to communicate, via satellite, with the rest of the world. The temperature in Antarctica is always sub-zero, so the scientists need some way of keeping their buildings warm. They also need fuel to be able to get around on their snowmobiles.

Scientists cannot avoid affecting the environment. However, they want to affect it as little as possible.



Solar cells produce electricity in direct proportion to the rate at which solar energy falls on them.



At full output, a couple of wind generators can produce all the electricity needed for computers, lights, etc.

To produce enough electricity to heat buildings dozens of wind generators would be needed.

Atmospheric pollution produced in one country eventually affects the whole of the Earth's atmosphere. The hole that appears each year in the ozone layer above Antarctica, for example, is mainly caused by pollutants such as CFCs from countries in the northern half of the Earth.

Discuss the advantages and disadvantages of using the following energy sources to meet the scientists' needs:

- solar energy
- energy from the wind
- natural gas (present in large quantities deep down in the Antarctic land mass)
- diesel oil (which would have to be imported)

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(Total 10 marks)