Q1. 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:

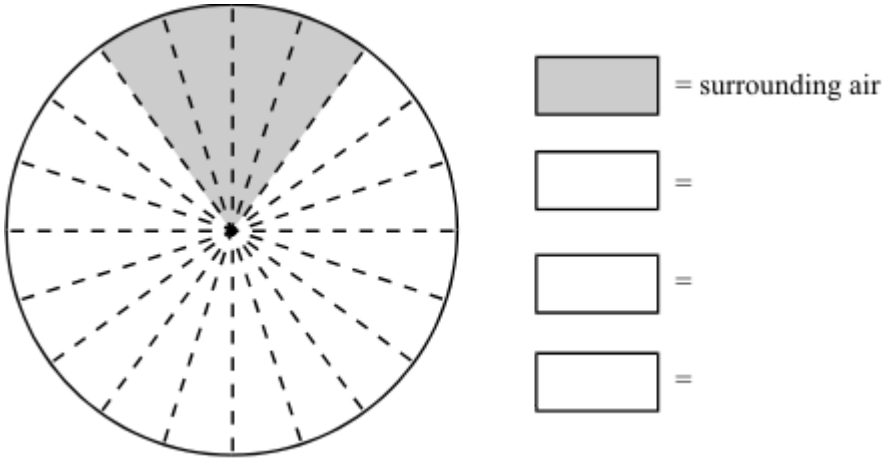
60% has been transferred to the **water**.

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?

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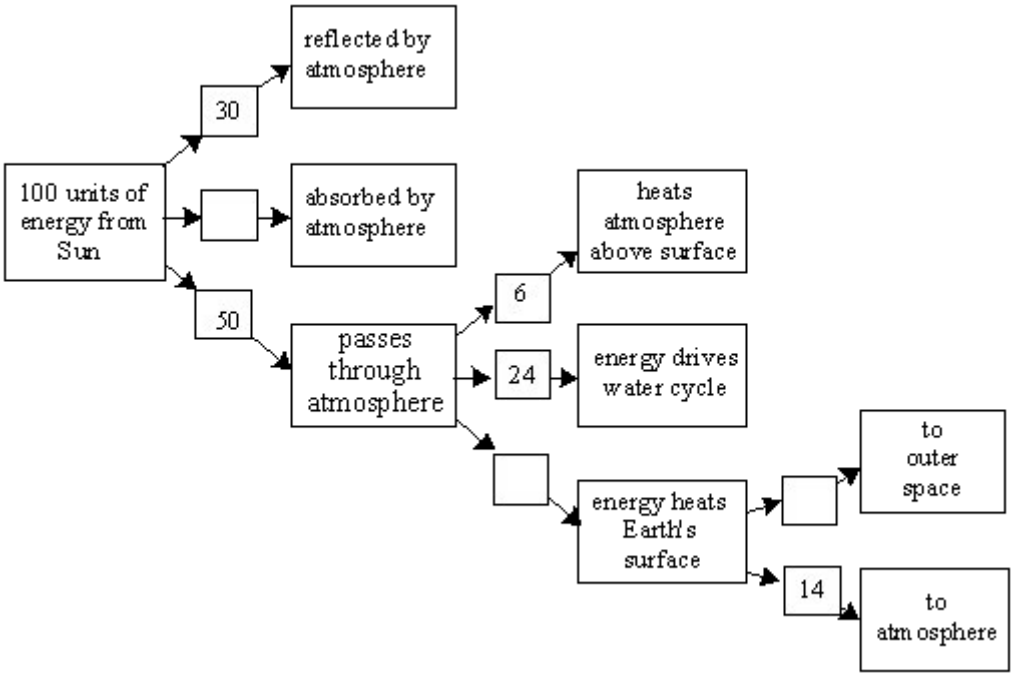
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(2)

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

(1)
(Total 6 marks)

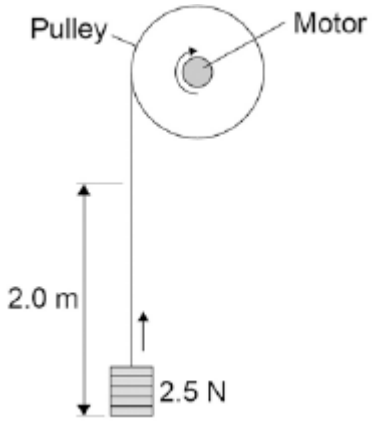
Q2. Complete the boxes on the chart to show what happens to the energy from the Sun.



(Total 3 marks)

Q3.A student investigated the efficiency of a motor using the equipment in **Figure 1**.

Figure 1



He used the motor to lift a weight of 2.5 N a height of 2.0 m.

He measured the speed at which the weight was lifted and calculated the efficiency of the energy transfer.

He repeated the experiment to gain two sets of data.

(a) Give **one** variable that the student controlled in his investigation.

.....

(1)

(b) Give **two** reasons for taking repeat readings in an investigation.

1 .....

.....

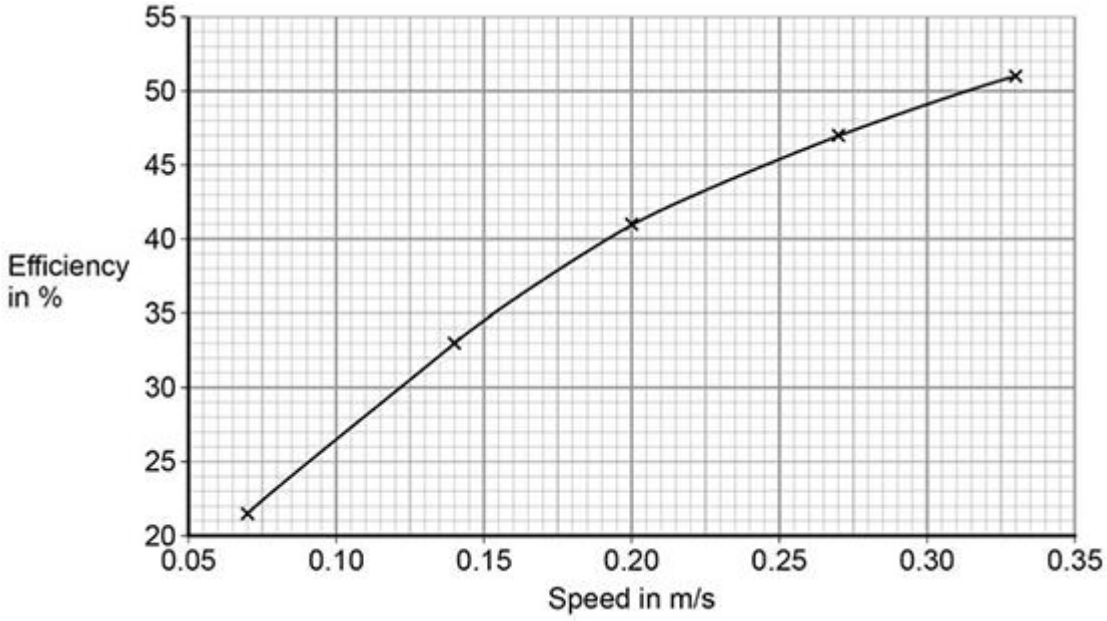
2 .....

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(2)

(c) **Figure 2** shows a graph of the student's results.

Figure 2



Give **two** conclusions that could be made from the data in **Figure 2**.

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.....

(2)

(d) Give the main way that the motor is likely to waste energy.

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(1)

(e) When the total power input to the motor was 5 W the motor could not lift the 2.5 N weight.

State the efficiency of the motor.

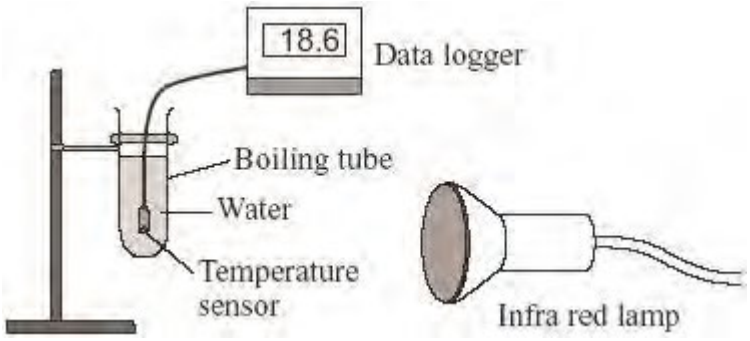
Efficiency = ... %

(1)

(Total 7 marks)

Q4. A student had read about a glacier that had been covered in insulating material. The idea was to slow down the rate at which the glacier melts in the summer.

She investigated this idea using the apparatus shown in the diagram.



(a) These are the steps taken by the student.

- Measure 30 cm^3 of cold water into a boiling tube.
- Place the boiling tube 25 cm from an infra red lamp.
- Record the temperature of the water.
- Switch on the infra red lamp.
- Record the temperature of the water every minute for 5 minutes.
- Repeat with boiling tubes covered in different insulating materials.

(i) Why did she use an infra red lamp?

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(1)

(ii) Name **one** control variable in this investigation.

.....

(1)

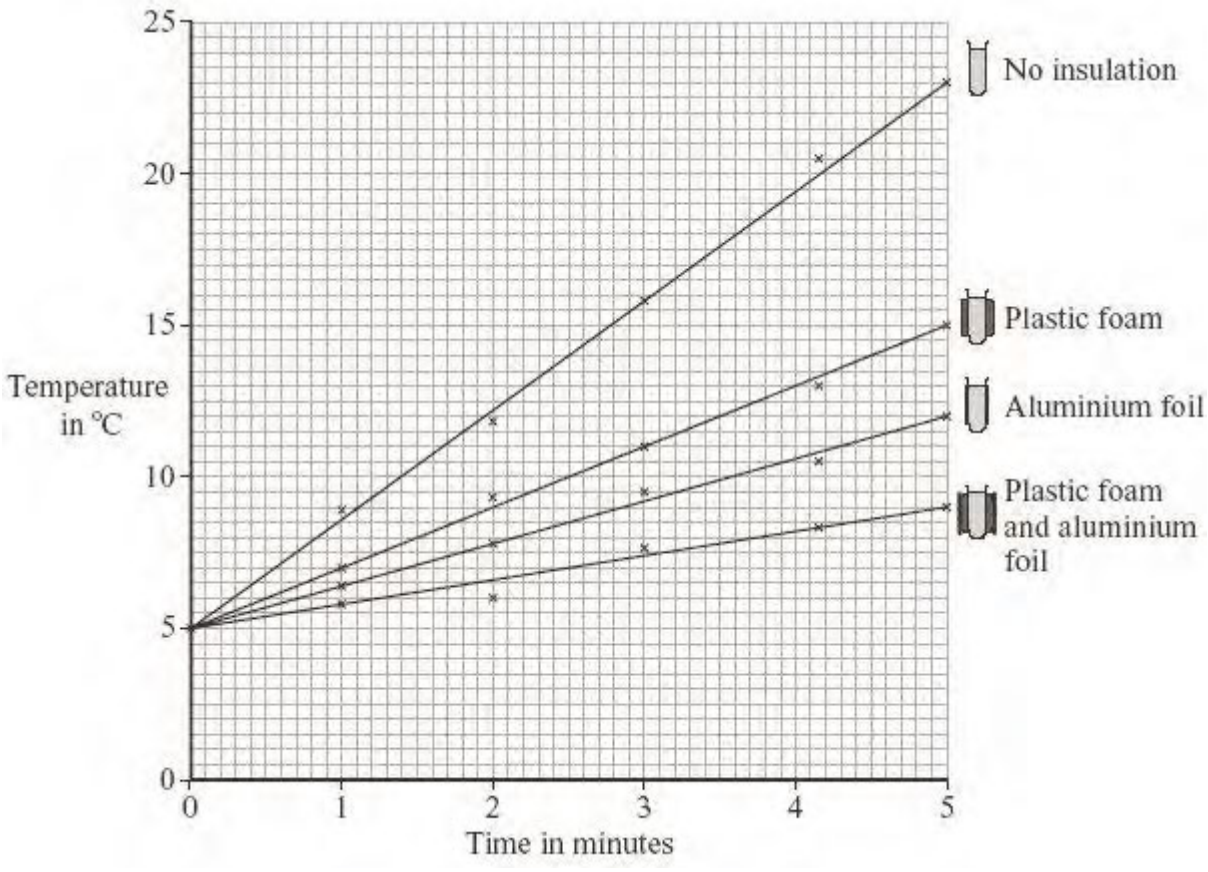
(iii) Give **one** advantage of using a temperature sensor and data logger instead of a glass thermometer to measure temperature.

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.....

(1)

(b) The results of the investigation are shown in the graph.



(i) Why did the student use a boiling tube with no insulation?

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(1)

(ii) From her results, what should she recommend is used to insulate the glacier?

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(1)

(iii) Explain why the insulation recommended by the student will reduce the heat transfer from the Sun to the glacier.

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(2)

(c) Explain, in terms of particles, how heat is transferred through the glass wall of a boiling tube.

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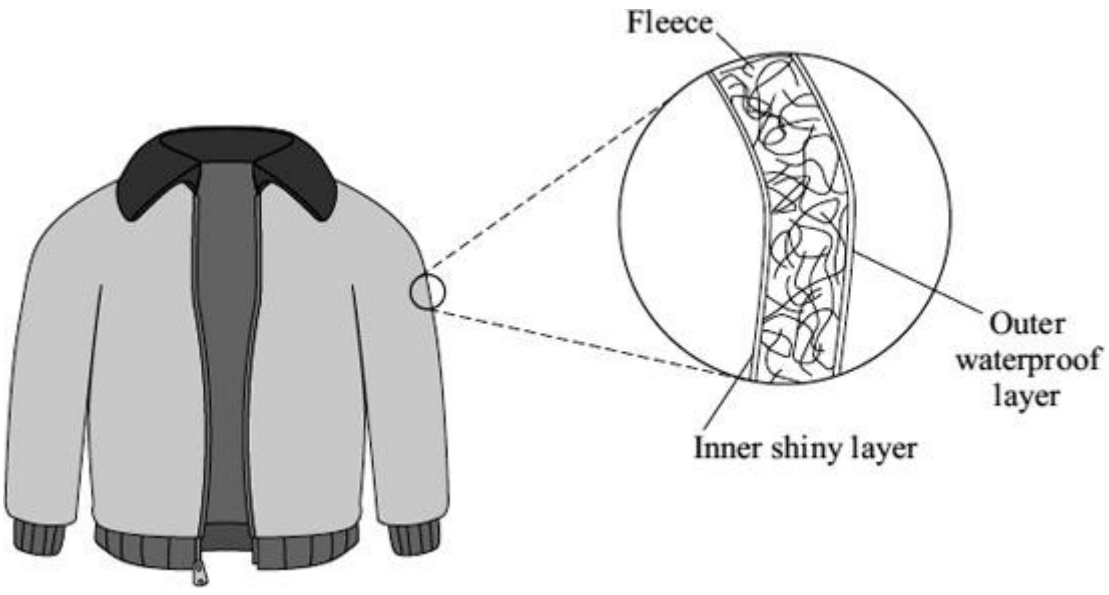
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(2)
(Total 9 marks)

Q5. (a) The diagram shows a ski jacket that has been designed to keep a skier warm. The jacket is made from layers of different materials.



(i) The inner layer is shiny to reduce heat transfer.

Which process of heat transfer will it reduce?

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(1)

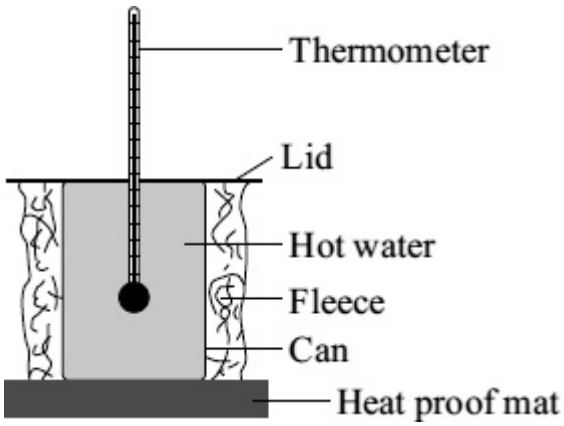
(ii) Why is the layer of fleece good at reducing the transfer of heat from a skier's body?

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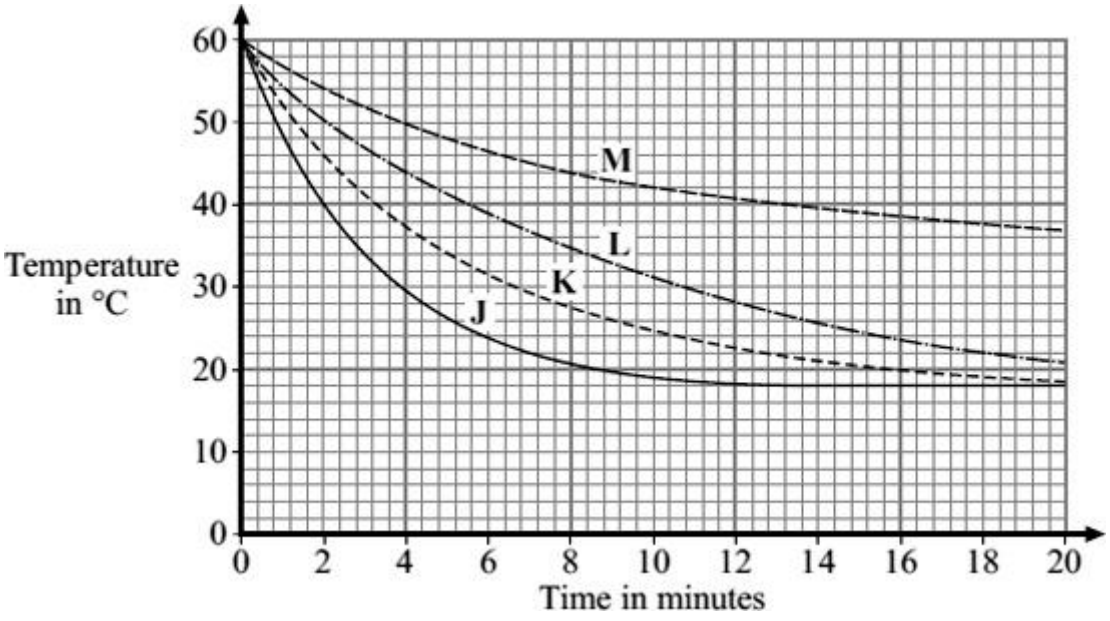
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(1)

(b) A student tested four different types of fleece, **J**, **K**, **L** and **M**, to find which would make the warmest jacket. Each type of fleece was wrapped around a can which was then filled with hot water.
The temperature of the water was taken every two minutes for 20 minutes.



The graph shows the student's results.



(i) In each test, the water cooled faster during the first five minutes than during the last five minutes. Why?

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(1)

(ii) To be able to compare the results, it was important to use the same volume of water in each test.

Give **one** other quantity that was the same in each test.

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(1)

(iii) Look at the graph line for fleece **K**.

Estimate what the temperature of the water in the can wrapped in fleece **K** would be after 40 minutes.

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(1)

(iv) Which type of fleece, **J**, **K**, **L** or **M**, should the student recommend to be used in the ski jacket?

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Give a reason for your answer.

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(2)
(Total 7 marks)