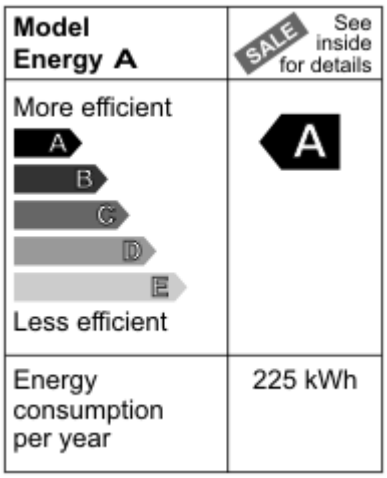
Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1.

The diagram shows the label from a new freezer.



(a) An old freezer has an energy consumption per year of 350 kWh.

Use the equation in the box to calculate the extra cost of using the old freezer for one year compared with using a new 'A' rated freezer.

total cost = number of kilowatt-hours × cost per kilowatt-hour

Assume 1 kilowatt-hour (kWh) of energy costs 12 p.

Show clearly how you work out your answer.

_____

_____

Extra cost per year = £ _____

(2)

(b) The price of the new freezer was reduced in a sale.

Reducing the price reduces the payback time for replacing the old freezer from 12 years to 9 years.

Calculate, in pounds, how much the new freezer was reduced in the sale.

Show clearly how you work out your answer.

_____

_____

Price reduced by = £ _____

(2)

(c) An advertisement in a shop claims that:

'Replacing an old freezer with a new 'A' rated freezer will benefit the environment.'

Do you agree that replacing the freezer will benefit the environment?

Answer yes or no. _____

Explain the reasons for your answer.

_____

_____

_____

_____

(2)

(Total 6 marks)

Q2.

(a) In winter, energy is transferred from the warm air inside a house to the air outside.

(i) What effect will the energy transferred from the house have on the air outside?

_____

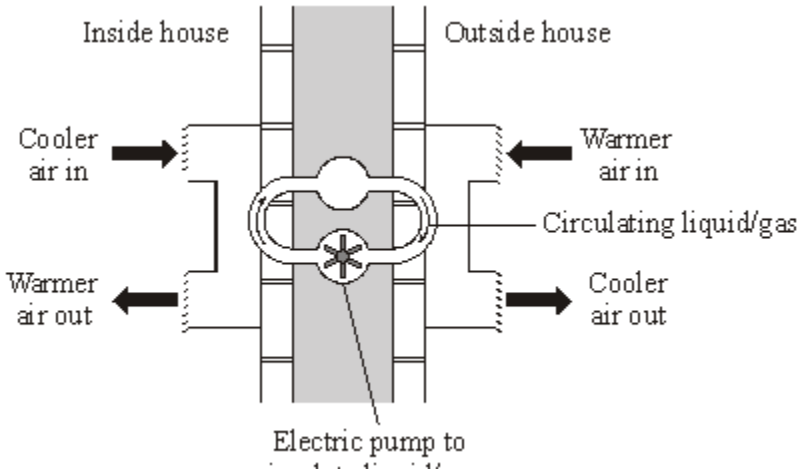
(1)

(ii) What would happen to the energy transfer if the temperature inside the house were reduced? Assume the temperature outside the house does not change.

_____

(1)

(b) To increase energy efficiency, a householder installs a heat exchanger to an outside wall of the house. The heat exchanger uses heat from the air outside to warm the inside of the house. The diagram shows the idea of the heat exchanger.



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(i) Why does the heat exchanger cost money to run?

_____

(1)

(ii) The heat exchanger is cost effective in reducing energy consumption. Explain why.

_____

_____

_____

_____

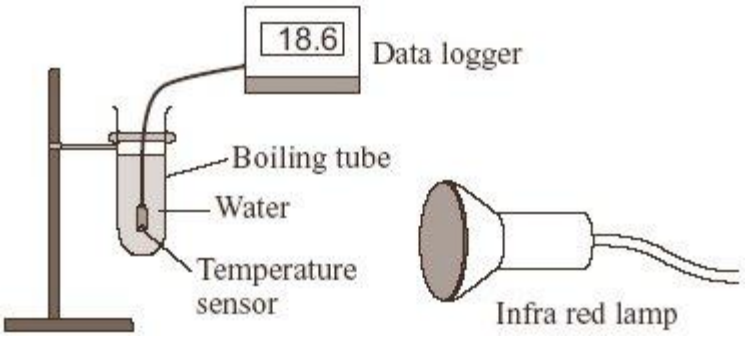
(2)

(Total 5 marks)

Q3.

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?

_____

(1)

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

_____

(1)

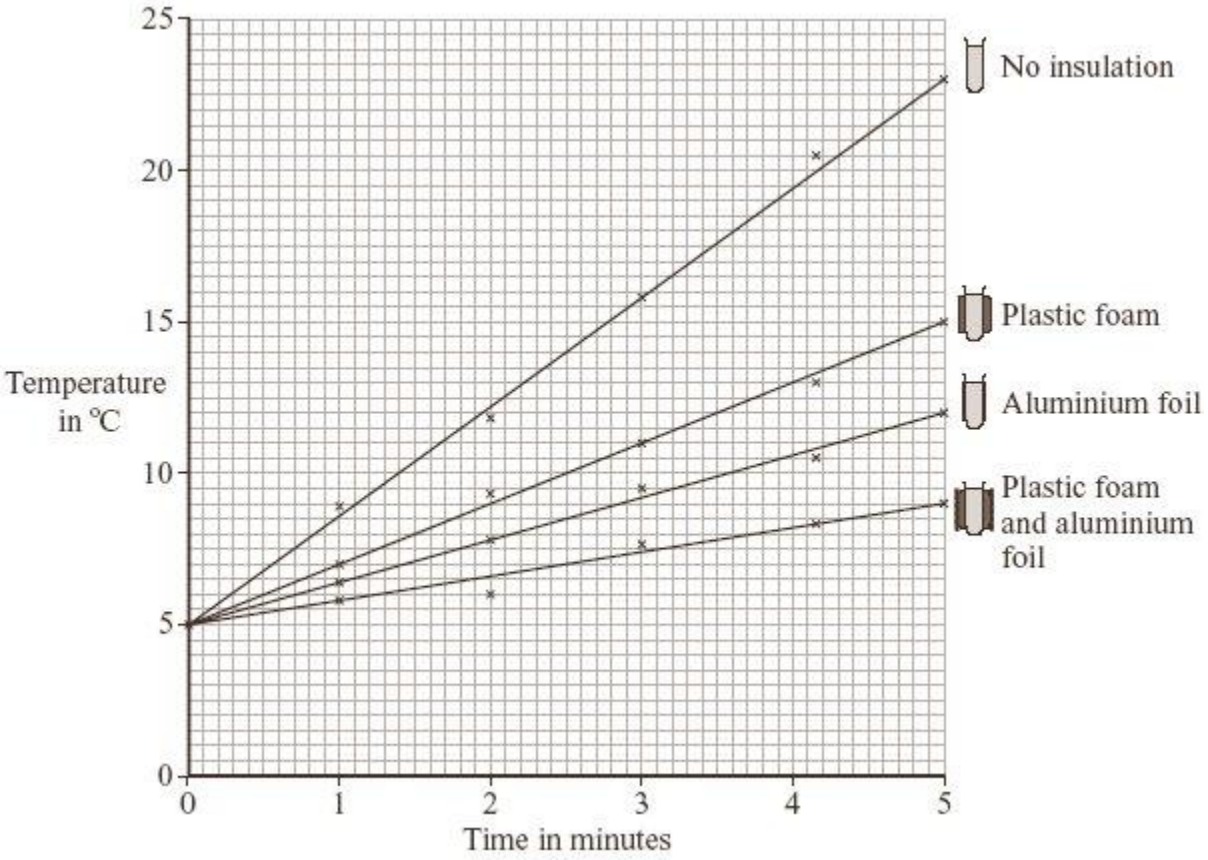
(iii) Give **one** advantage of using a temperature sensor and data logger instead of a glass thermometer to measure temperature.

_____

_____

(1)

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



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

_____

_____

(1)

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

_____

(1)

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

_____

_____

_____

_____

_____

(2)

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

_____

_____

_____

_____

(2)
(Total 9 marks)