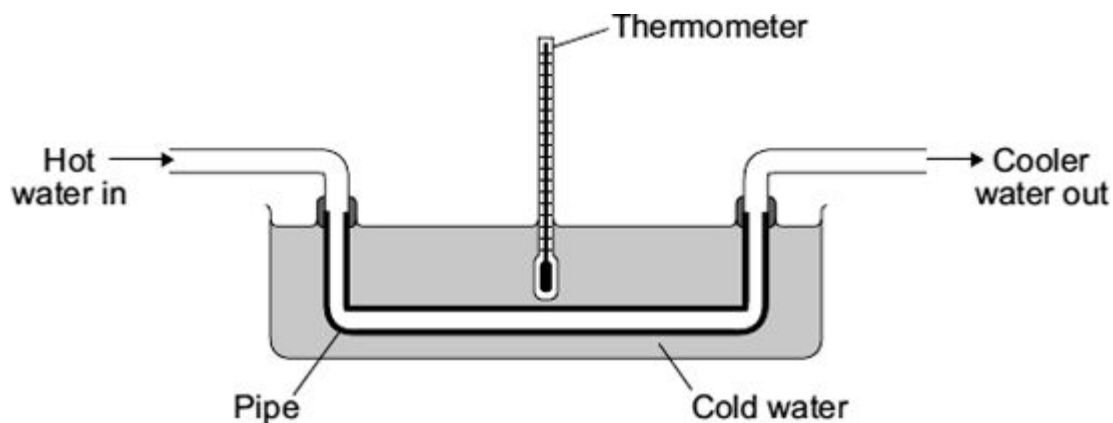


1 Heat exchangers are devices that are used to transfer heat from one place to another.

The diagram shows a simple heat exchanger used by a student in an investigation. Heat is transferred from the hot water inside the pipe to the cold water outside the pipe.



- (a) By which process is heat transferred from the hot water inside the pipe to the cold water outside the pipe?

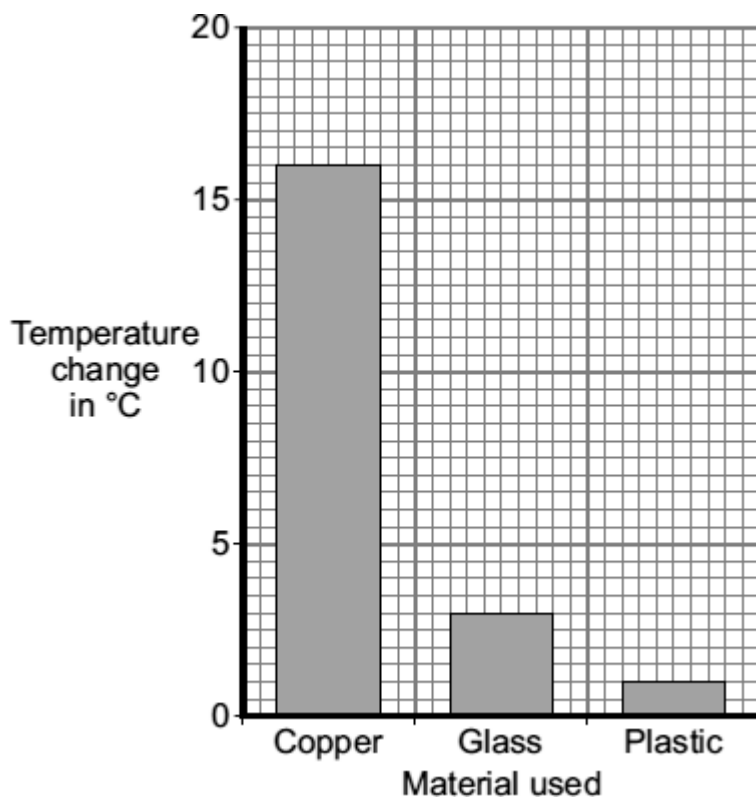
.....

(1)

- (b) The student wanted to find out if the efficiency of a heat exchanger depends on the material used to make the pipe. The student tested three different materials. For each material, the rate of flow of hot water through the pipe was kept the same.

The results obtained by the student are recorded in the table and displayed in the bar chart.

Material	Temperature of the cold water at the start in °C	Temperature of the cold water after 10 minutes in °C
Copper	20	36
Glass	20	23
Plastic	20	21



- (i) The rate of flow of hot water through the pipe was one of the control variables in the investigation.

Give **one** other control variable in the investigation.

.....

(1)

- (ii) Why did the student draw a bar chart rather than a line graph?

.....

.....

(1)

(iii) Which **one** of the three materials made the best heat exchanger?

.....

Give a reason for your answer.

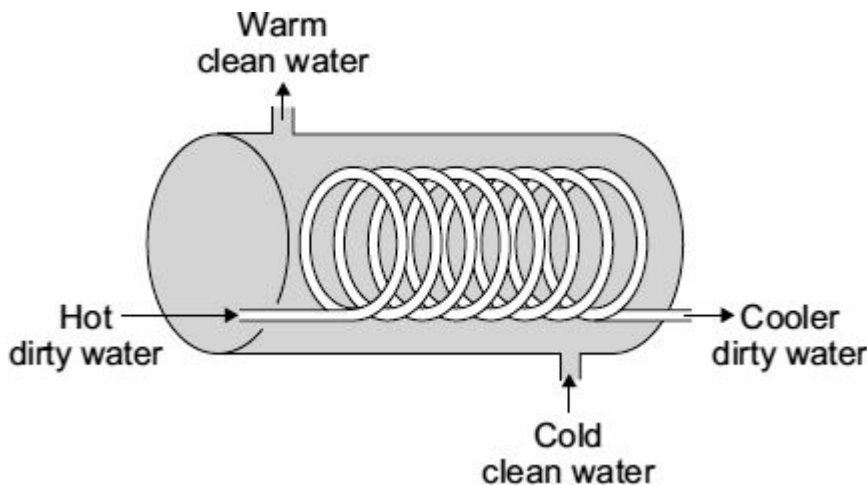
.....

.....

.....

(2)

(c) The student finds a picture of a heat exchanger used in an industrial laundry. The heat exchanger uses hot, dirty water to warm cold, clean water.



Why does this heat exchanger transfer heat faster than the heat exchanger used by the student in the investigation?

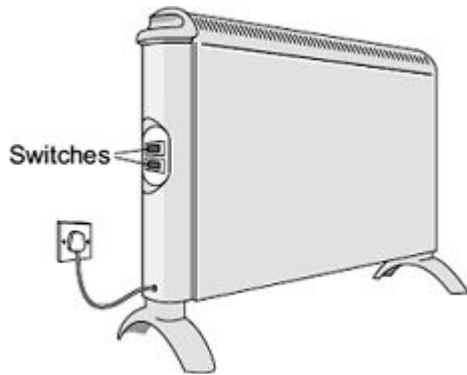
.....

.....

(1)  
(Total 6 marks)

2

- (a) The diagram shows two switches on a room heater. The heater has three power settings. The power produced by two of the settings is given in the table.



Setting	Power in watts
Low	700
Medium	1400
High	

- (i) When both switches are on, the heater works at the high power setting.

What is the power of the heater, in kilowatts, when it is switched to the **high** power setting?

.....

Power = ..... kilowatts

(1)

- (ii) The heater is used on the **high** power setting. It is switched on for 1½ hours.

Calculate the energy transferred from the mains to the heater in 1½ hours.

Show clearly how you work out your answer and give the unit.

.....

.....

.....

Energy transferred = .....

(3)

- (iii) This type of heater is a very efficient device.

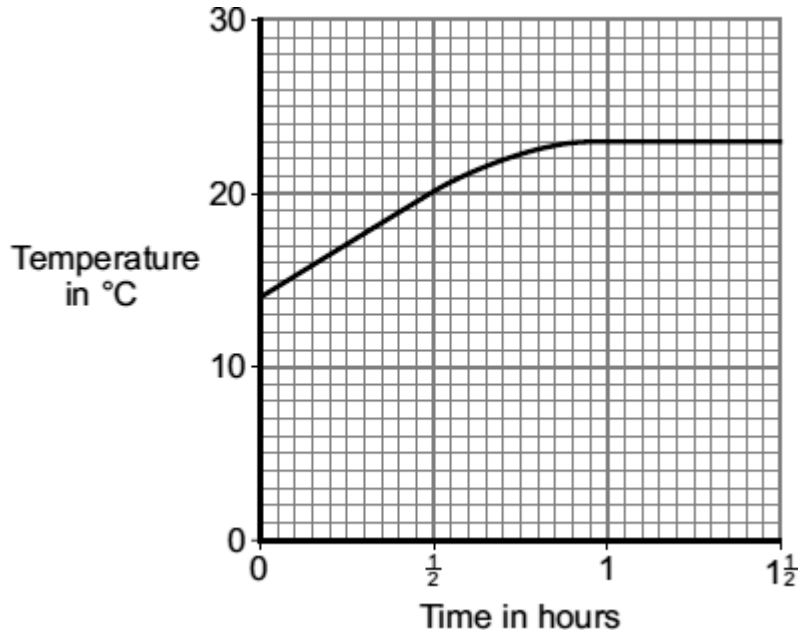
What is meant by a device being very efficient?

.....

.....

(1)

- (b) The graph shows how the temperature of a room changes during the 1½ hours that the heater is used.



After 1 hour, the temperature of the room has become constant, even though the heater is still switched on.

Explain why.

.....

.....

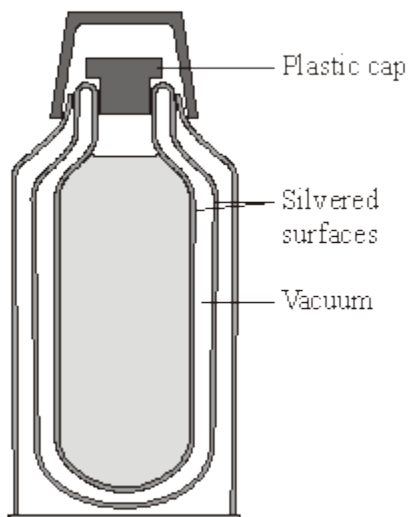
.....

.....

(2)  
(Total 7 marks)

**3**

A vacuum flask is designed to reduce the rate of heat transfer.



- (a) (i) Complete the table to show which methods of heat transfer are reduced by each of the features labelled in the diagram.

The first row has been done for you.

Feature	Conduction	Convection	Radiation
vacuum	*	*	
silveredsurfaces			
plastic cap			

(2)

- (ii) Explain why the vacuum between the glass walls of the flask reduces heat transfer by conduction and convection.

.....

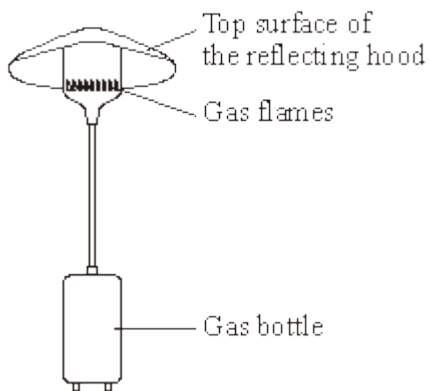
.....

.....

.....

(2)

(b) The diagram shows a gas flame patio heater.



(i) Explain why the top surface of the reflecting hood should be a light, shiny surface rather than a dark, matt surface.

.....  
.....  
.....

(2)

(ii) Most of the chemical energy in the gas is transformed into heat. A **small** amount of chemical energy is transformed into light.

Draw and label a Sankey diagram for the patio heater.

(2)

(iii) State why the total energy supplied to the patio heater must always equal the total energy transferred by the patio heater.

.....  
.....

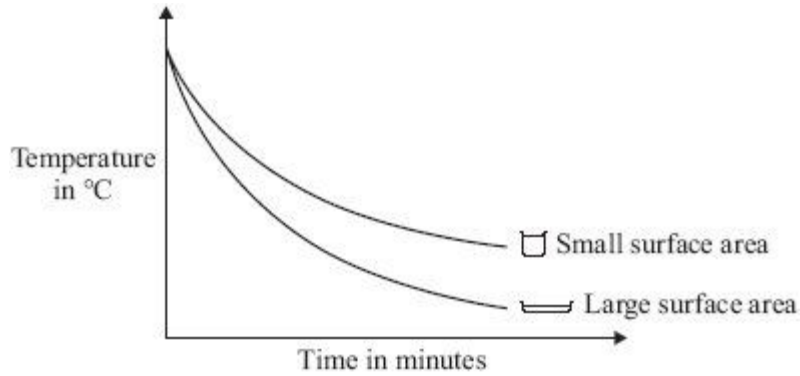
(1)

(Total 9 marks)

4

(a) The graph compares how quickly hot water cooled down in two glass beakers with different surface areas.

The volume of water in each beaker was the same.



Describe how the surface area of the water affected how fast the water cooled down.

.....

.....

(1)

(b) Some foxes live in a hot desert environment.



This type of fox has very large ears.

Explain how the size of the fox's ears help it to keep cool in a hot desert.

.....

.....

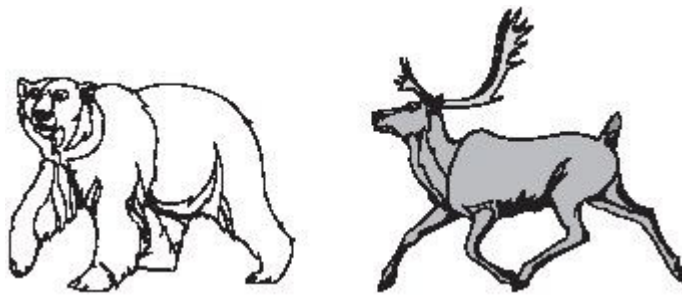
.....

.....

(2)



(c) Polar bears and reindeer are adapted to live in cold environments.



Use the words in the box to complete the following sentences.

<b>conduction</b>	<b>convection</b>	<b>radiation</b>
-------------------	-------------------	------------------

(i) The white colour of a polar bear's fur helps to keep the polar bear warm by reducing the heat lost by .....

(1)

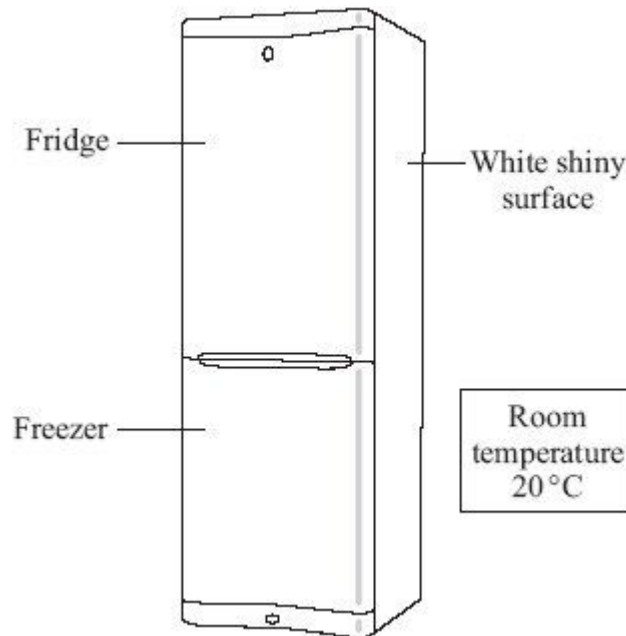
(ii) The hairs of a reindeer are hollow. The air trapped inside the hairs reduces the heat lost by .....

(1)

(Total 5 marks)

5

The diagram shows a fridge-freezer.



(a) By which method is heat transferred through the walls of the fridge-freezer?

.....

(1)

(b) The inside of the fridge is at 4 °C. The inside of the freezer is at -18 °C.

Into which part of the fridge-freezer will the rate of heat transfer be greater?

Draw a ring around your answer.

**the fridge**

**the freezer**

Give a reason for your answer.

.....

.....

(1)

(c) The outside surface of the fridge-freezer is white and shiny.

Give **two** reasons why this type of surface is suitable for a fridge-freezer.

1 .....

.....

2 .....

.....

(2)

**(Total 4 marks)**

**6**

(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?

.....

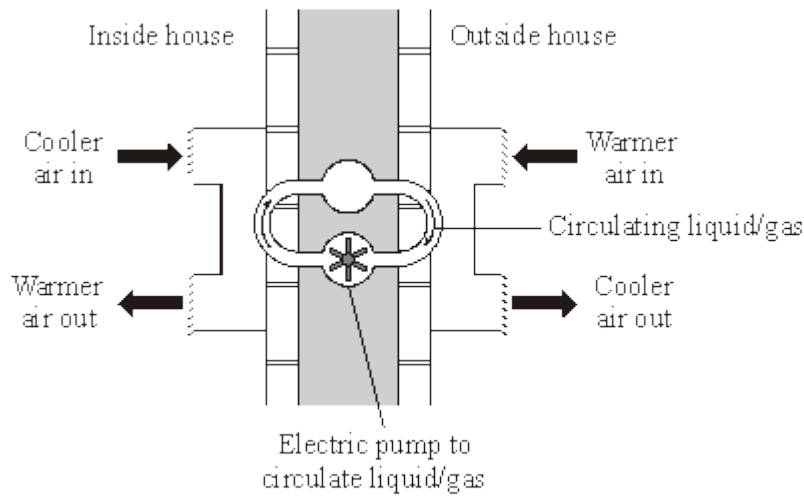
(1)

(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.



*Physics Through Applications edited by J Jardine et al (OUP, 1989), copyright © Oxford University Press, reprinted by permission of Oxford University Press.*

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

.....

(1)

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

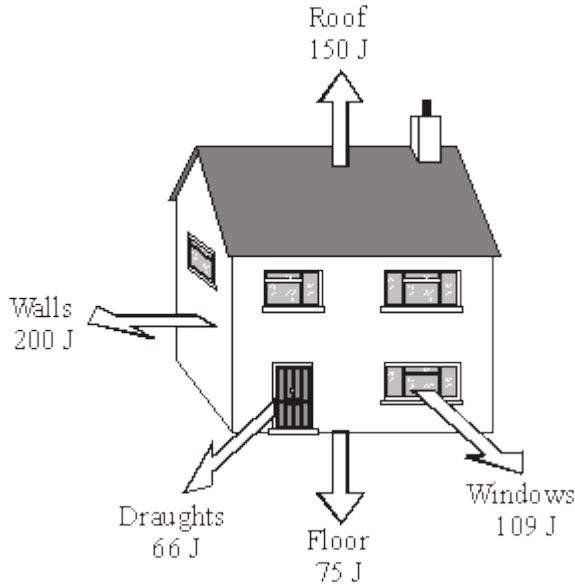
.....  
.....  
.....  
.....

(2)

(Total 5 marks)

7

(a) The diagram shows how much heat is lost each second from different parts of an uninsulated house.



(i) Each year, the house costs £760 to heat.

How much money is being wasted because of heat lost through the roof?

Show clearly how you work out your answer.

.....  
 .....

(2)

(ii) Insulating the loft would cut the heat lost through the roof by 50 %.

The loft insulation has a payback time of  $1\frac{1}{2}$  years.

How much did the loft insulation cost to buy?

.....

Cost of loft insulation = £ .....

(1)

(b) What happens to the wasted energy?

.....  
 .....

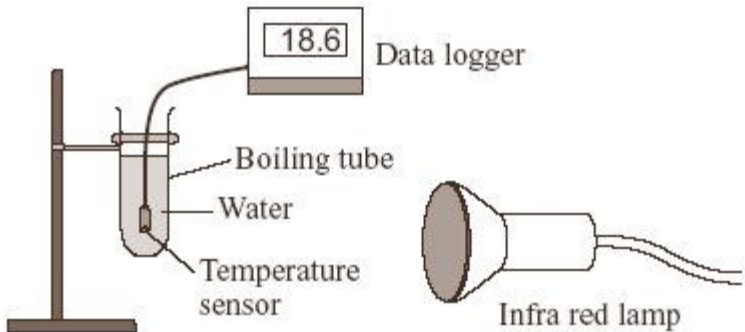
(1)

(Total 4 marks)

8

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<sup>3</sup> 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)

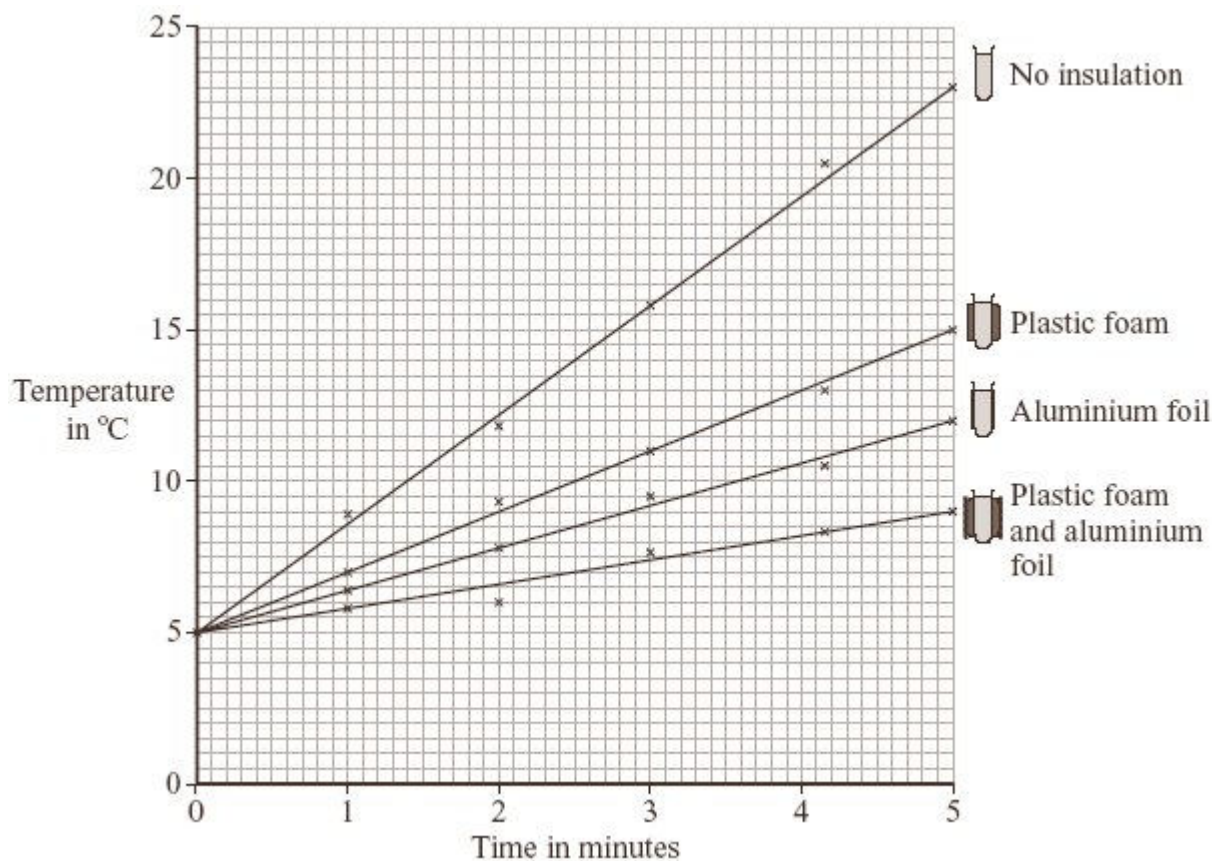
(iii) Give **one** advantage of using a temperature sensor and data logger instead of a glass thermometer to measure temperature.

.....

.....

(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)

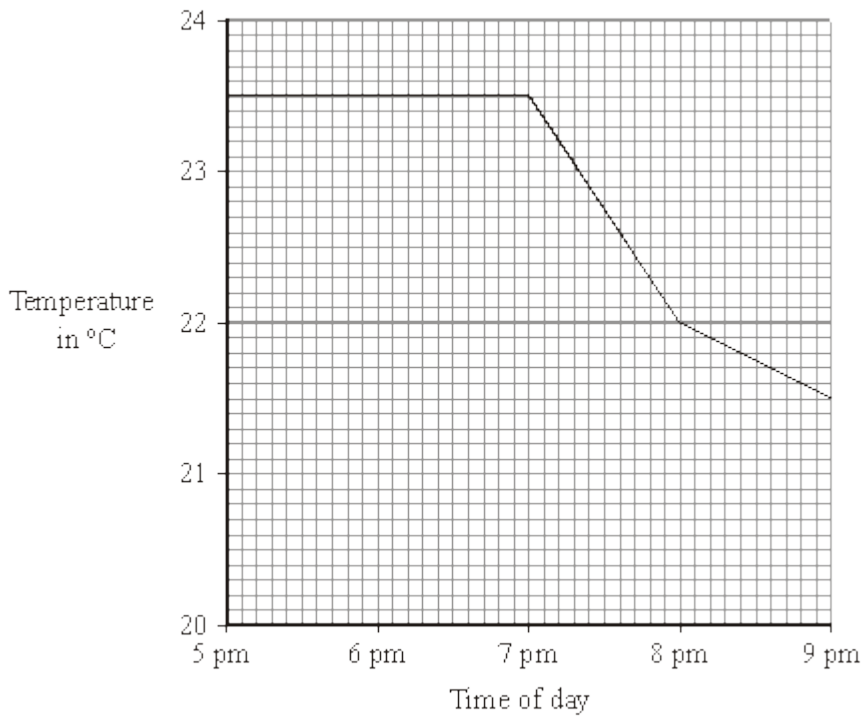
- (c) Explain, in terms of particles, how heat is transferred through the glass wall of a boiling tube.

.....  
.....  
.....  
.....

(2)  
(Total 9 marks)

9

- (a) The graph shows the temperature inside a flat between 5 pm and 9 pm. The central heating was on at 5 pm.



- (i) What time did the central heating switch off?

.....

(1)

(ii) Closing the curtains reduces heat loss from the flat.

What time do you think the curtains were closed?

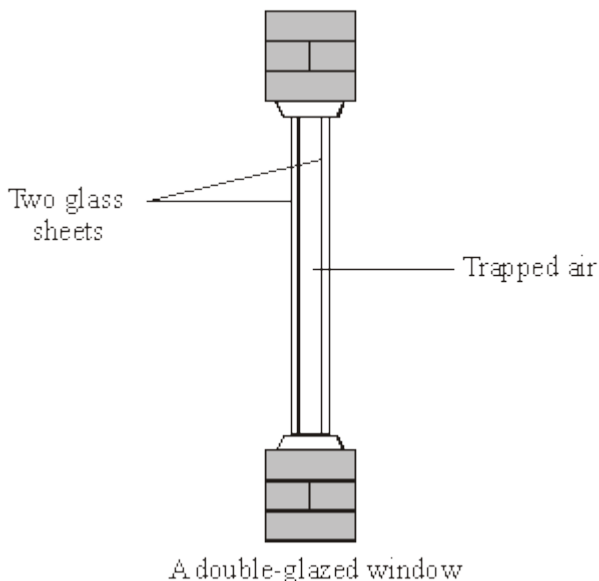
.....

Give a reason for your answer.

.....

(2)

(b) Less heat is lost through double-glazed windows than through single-glazed windows.



Complete the following sentences by choosing the correct words from the box. Each word may be used once or not at all.

**conduction    conductor    convection    evaporation    insulator    radiation**

Air is a good ..... . When trapped between two sheets of glass it reduces heat loss by ..... and .....

(3)

(c) The table gives information about three types of house insulation.

Type of insulation	Cost to install	Money save each year on heating bills	Payback time
Double glazing	£4000	£200	20 years
Loft insulation	£300	£100	3 years
Cavity wallinsulation	£600	£150	



- (i) Use the information in the table to calculate the payback time for cavity wall insulation.

.....

**(1)**

- (ii) Explain why people often install loft insulation before installing double glazing or cavity wall insulation.

.....

.....

.....

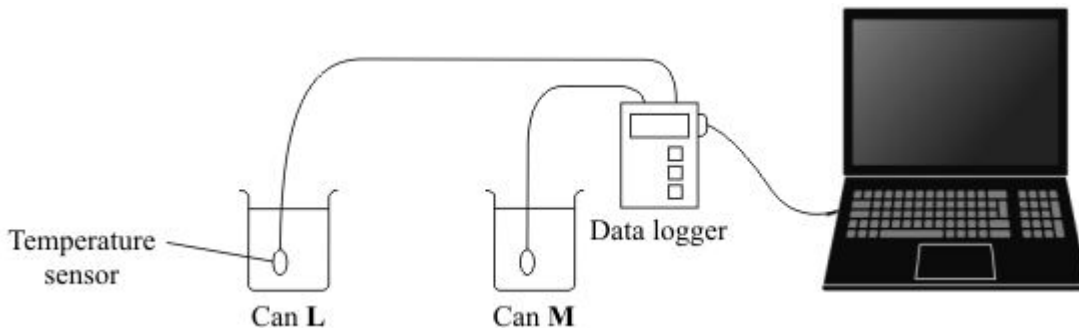
.....

**(2)**

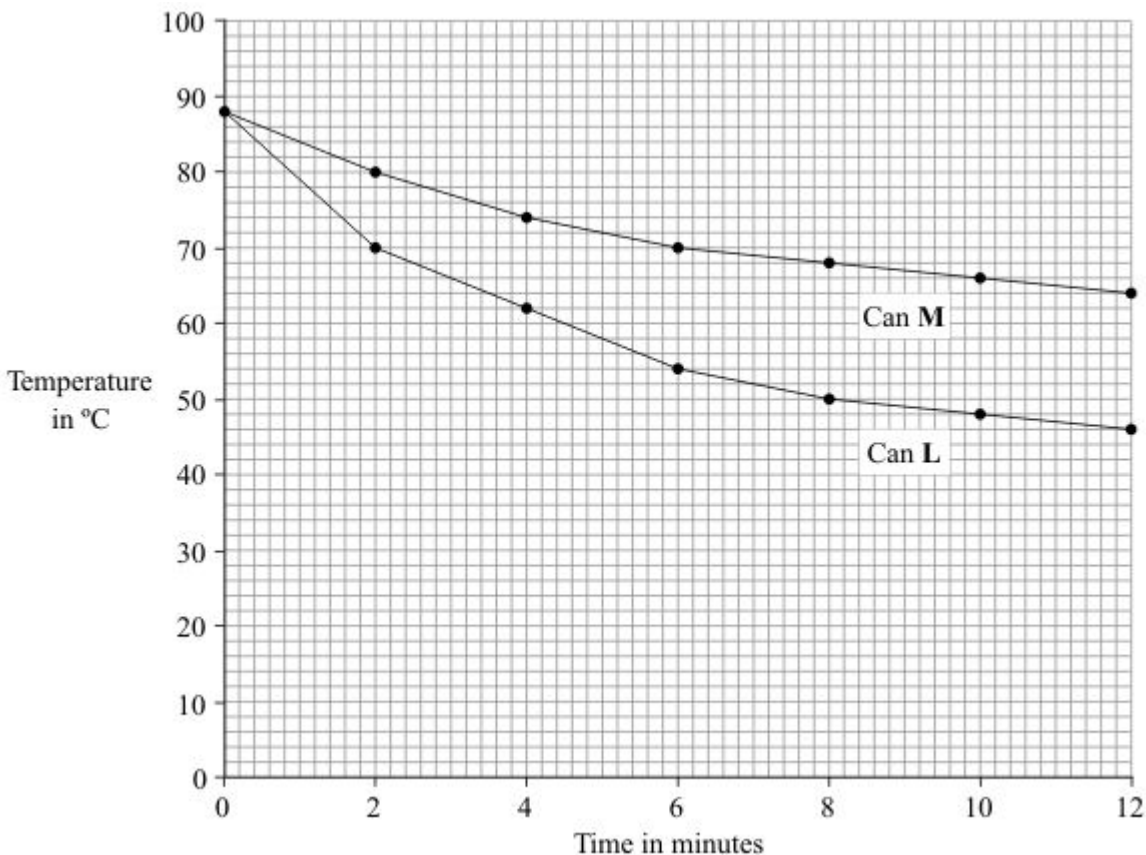
**(Total 9 marks)**

10

A student was asked to investigate the heat loss from two metal cans, L and M. The cans were identical except for the outside colour.



The student filled the two cans with equal volumes of hot water. He then placed the temperature sensors in the water and started the data logger. The computer used the data to draw the graph below.



(a) Which **one** of the following is a categoric variable?

Put a tick (✓) in the box next to your answer.

the outside colour of the cans

the starting temperature of the hot water

the time

the volume of hot water

(1)

(b) For can **L**, state the temperature drop of the water:

(i) in the **first** two-minute interval

.....

(1)

(ii) in the **second** two-minute interval.

.....

(1)

(c) In both cans the water cooled faster at the start of the investigation than at the end of the investigation. Why?

.....

.....

(1)

(d) One can was black on the outside and the other can was white on the outside.

What colour was can **L**? .....

Explain the reason for your answer.

.....

.....

.....

(3)  
(Total 7 marks)

**11**

- (a) The table gives information about some ways of reducing the energy consumption in a house.

Method of reducing energy consumption	Installation cost in £	Annual saving on energy bills in £
Fit a new hot water boiler	1800	200
Fit a solar water heater	2400	100
Fit underfloor heating	600	50
Fit thermostatic radiator valves	75	20

Which way of reducing energy consumption is most cost effective over a 10-year period?

To obtain full marks you must support your answer with calculations.

.....

.....

.....

.....

.....

.....

**(3)**

- (b) Explain why using an energy-efficient light bulb instead of an ordinary light bulb reduces the amount of carbon dioxide emitted into the atmosphere.

.....

.....

.....

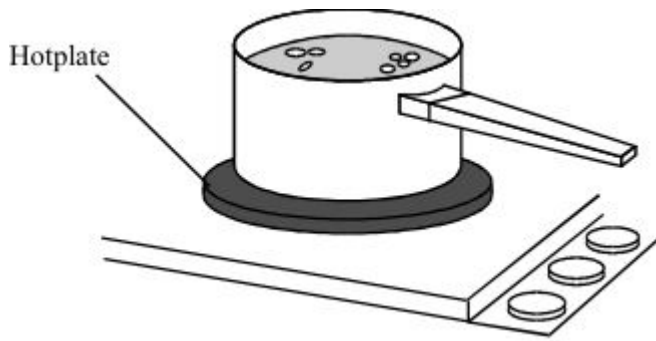
.....

**(2)**

**(Total 5 marks)**

12

The drawing shows water being heated in a metal saucepan.



- (a) Explain, in terms of the particles in the metal, how heat energy is transferred through the base of the saucepan.

.....

.....

.....

.....

(2)

- (b) Energy is transferred through the water by convection currents. Explain what happens to cause a convection current in the water. The answer has been started for you.

As heat energy is transferred through the saucepan, the water particles at the bottom

.....

.....

.....

.....

.....

.....

.....

.....

.....

(3)

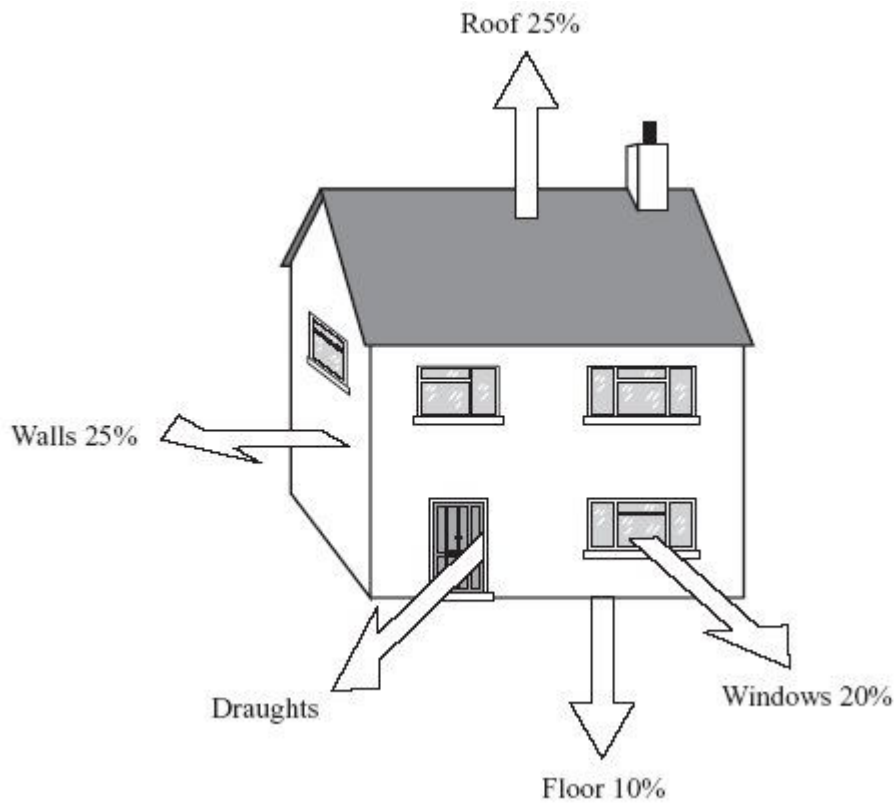
(c) Some energy is transferred from the hotplate to the air by *thermal radiation*. What is meant by *thermal radiation*?

.....  
.....

(1)  
(Total 6 marks)

13

(a) The diagram shows the ways in which heat energy can be transferred from an old house.



(i) Calculate the percentage of energy transferred by draughts.

% energy transferred by draughts = .....

(1)

(ii) Complete the following sentence using **one** of the words from the box.

<b>conduction</b>	<b>convection</b>	<b>radiation</b>
-------------------	-------------------	------------------

Draughts transfer heat energy by .....

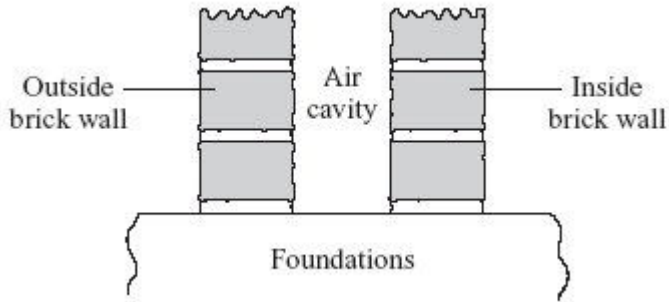
(1)

(iii) State **one** way of reducing the heat transfer by draughts.

.....

(1)

(b) The diagram shows a section through the walls of a house built in 1930.



Explain how the air cavity between the two walls reduces the heat transfer from the house.

.....  
 .....  
 .....  
 .....

(2)

(c) The table shows the installation costs and yearly savings on energy bills for different methods of insulating a house.

Method of insulation	Installation cost in £	Yearly saving on energy bills in £
Double glazing	4000	65
Loft insulation	240	60
Cavity wall insulation	600	80

(i) Give **one** reason why loft insulation is often fitted to an old house before double glazing or cavity wall insulation.

.....  
 .....

(1)

- (ii) The time it takes for the saving on energy bills to equal the cost of installing the insulation is called the pay-back time.

Calculate the pay-back time for loft insulation.

.....

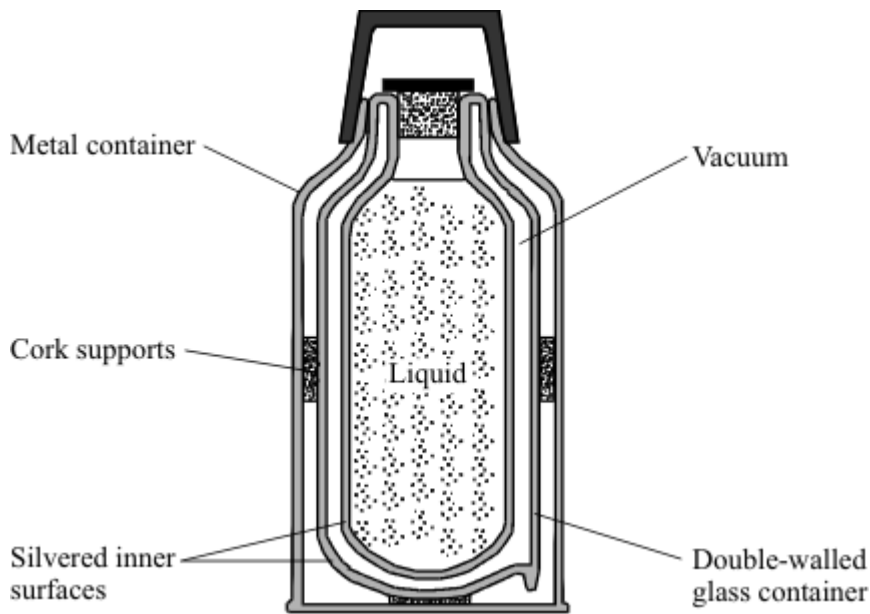
Pay-back time = ..... years

(1)

(Total 7 marks)

14

The vacuum flask shown has five features labelled, each one designed to reduce heat transfer.



- (a) (i) Which labelled feature of the vacuum flask reduces heat transfer by both conduction and convection?

.....

(1)



(ii) Explain how this feature reduces heat transfer by **both** conduction and convection.

.....  
.....  
.....  
.....  
.....

(2)

(b) (i) Which labelled feature of the vacuum flask reduces heat transfer by radiation?

.....

(1)

(ii) Explain how this feature reduces heat transfer by radiation.

.....  
.....  
.....  
.....  
.....  
.....

(2)

(Total 6 marks)

15

Many people use a sleeping bag when they sleep in a tent. Sleeping bags, designed to keep a person warm, have a fibre filling.



(i) Complete the sentence by choosing the correct words from the box.

conduction    convection    radiation

The fibre is designed to reduce heat transfer by ..... and .....

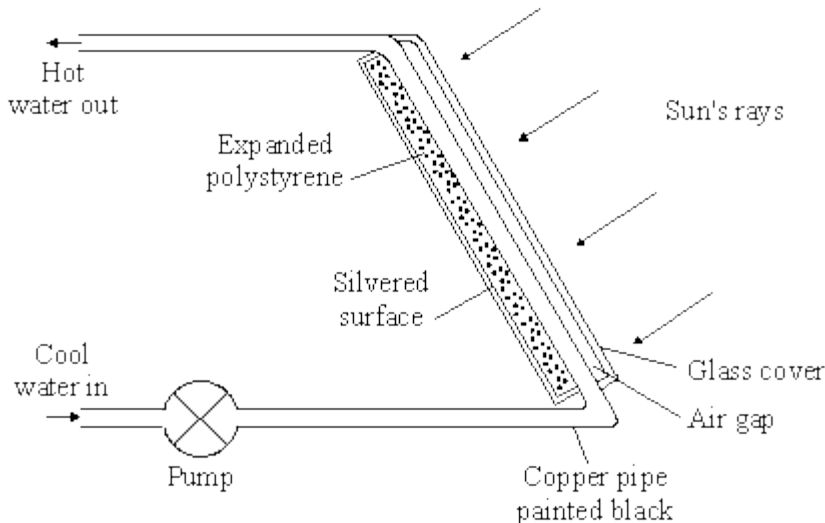
(ii) Explain why the fibre is good at reducing heat loss from a person sleeping in the bag.

.....  
.....  
.....  
.....

(Total 3 marks)

16

The diagram shows part of a solar water heater. Water circulating through the solar panel is heated by the Sun.



(i) Complete the following sentence.

Heat energy is transferred from the Sun to the solar panel by .....

(1)

(ii) The pipe inside the solar panel is black. Why?

.....  
 .....

(1)

(iii) There is a layer of expanded polystyrene behind the black pipe. Why?

.....  
 .....

(1)

(iv) A silvered surface is used at the back of the solar panel. Explain why.

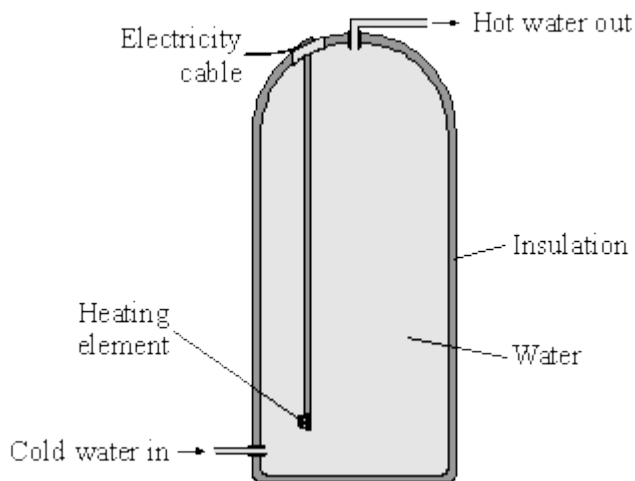
.....  
 .....

(2)

(Total 5 marks)

17

(a) The diagram shows an immersion heater used to heat water inside a tank. Heat is transferred through the water by convection.



(i) Draw arrows on the diagram to show the movement of the water in the tank when the heating element is switched on.

(2)

- (ii) Explain how a convection current is set up in the water. The explanation has been started for you.

When the heating element is switched on, the hot water nearest the element rises

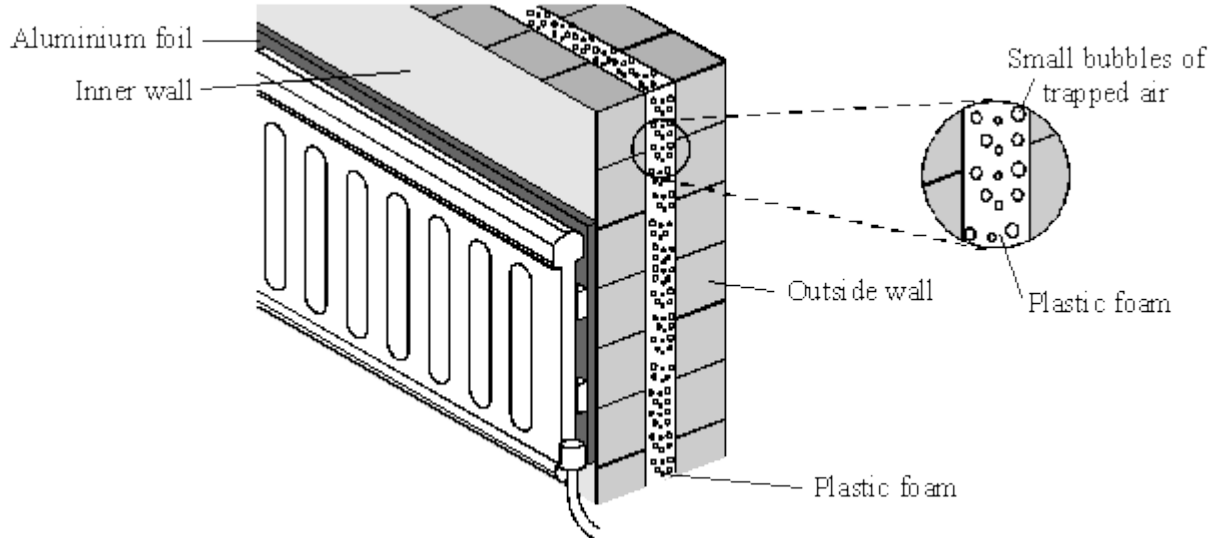
*because* .....

.....

.....

(2)

- (b) The diagram shows **two** ways to reduce heat loss through the walls of a house.



- (i) How is the aluminium foil able to reduce heat loss?

.....

.....

(1)

- (ii) The plastic foam is good at reducing heat loss through the walls. Explain why.

.....

.....

.....

.....

.....

(3)

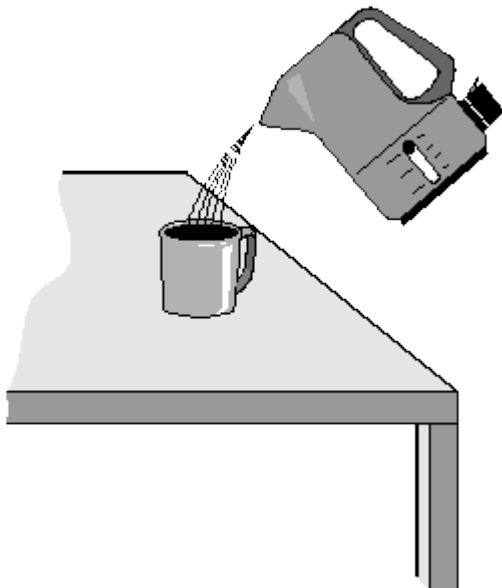
- (c) Evaporation is an important heat transfer process. When sweat evaporates, it takes heat energy from your body. As humidity increases, you are more likely to feel hot and uncomfortable. Explain why.

.....  
.....  
.....

(2)  
(Total 10 marks)

18

- (a) The diagram shows hot water being poured into a mug.



- (i) Complete the sentence by choosing the correct words from the box. Each word may be used once or not at all.

air	mug	table	water
-----	-----	-------	-------

Heat energy is being transferred from the ..... to  
the .....

(1)

- (ii) When will this transfer of heat energy stop?

.....  
.....

(1)

(b) In the box are the names of four types of fuel used to heat homes.

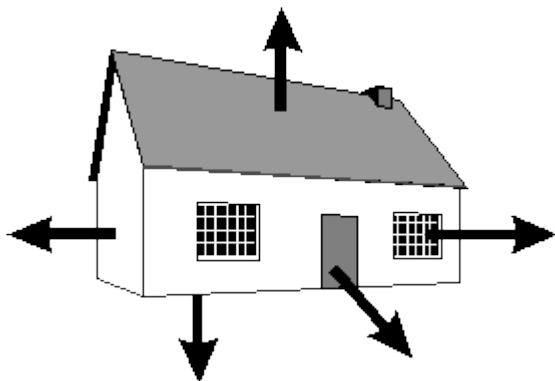
coal	gas	oil	wood
------	-----	-----	------

Which **one** of these types of fuel is renewable?

.....

(1)

(c) The diagram shows where heat energy is lost from a house.



(i) Complete the sentences by choosing the correct words from the box. Each word may be used once or not at all.

conduction	conductor	convection	electric	evaporation	insulator
------------	-----------	------------	----------	-------------	-----------

The amount of heat energy lost through the windows by  
..... can be reduced by using thick  
curtains. The curtains trap a layer of air and air is a good  
..... . The curtains will also stop  
..... currents pulling cold air  
into the room through small gaps in the window.

(3)

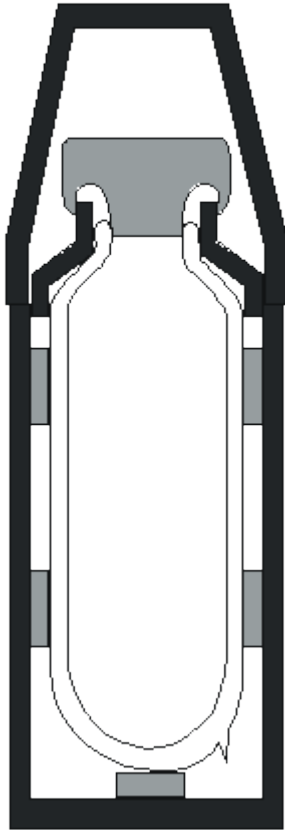
(ii) Write down **one** other way of reducing heat loss from a house.

.....  
.....

(1)  
(Total 7 marks)

19

The diagram below shows a vacuum flask.



(a) Give **two** features of the flask which reduce heat loss by conduction.

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

(2)

(b) Give **one** feature of the flask which reduces heat loss by radiation.

.....

(1)  
(Total 3 marks)

20

(a) When an electric kettle is switched on it will take a few minutes to boil the water. Once switched off it will gradually cool down.

(i) When the kettle is switched on the water heats. Explain how all of the water is heated.

.....  
.....

(ii) The kettle is now switched off and begins to cool.

(1) Describe how heat energy is transferred **through** the walls of the kettle.

.....  
.....  
.....

(2) Describe how the heat energy is transferred **from** the walls of the kettle.

.....  
.....  
.....

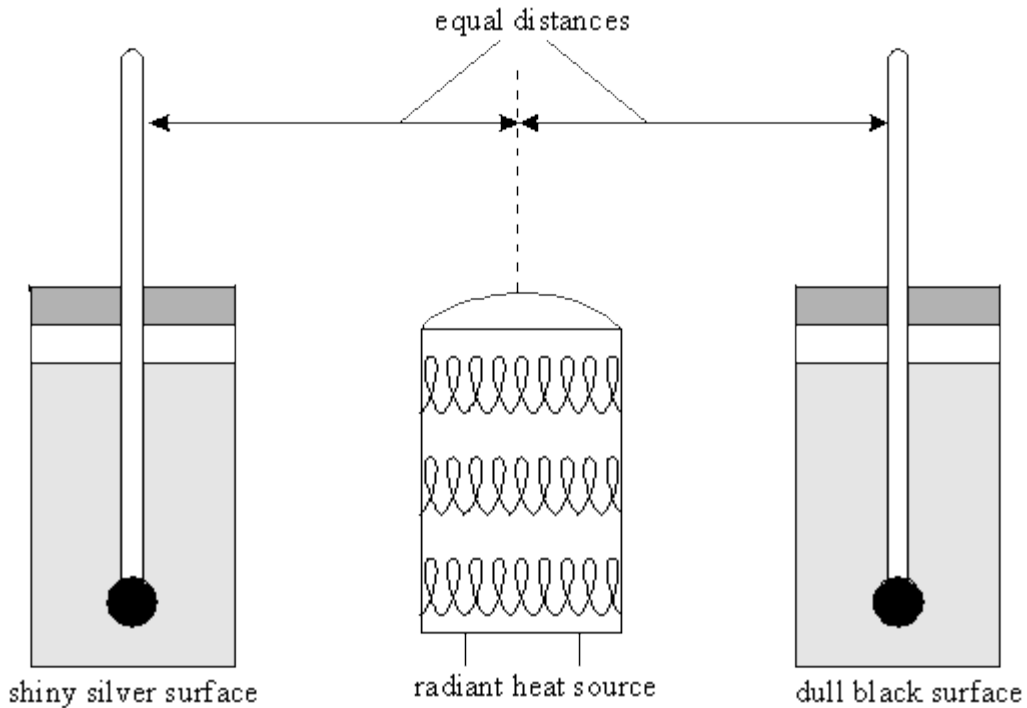
(iii) Describe how heat losses from the surface of a metal kettle may be kept small.

.....  
.....

(4)



- (b) A shiny metal can and a dull black can are filled with the same amounts of cold water. A radiant heater is placed exactly half way between the cans as shown in the diagram below.



Two thermometers are used to measure the temperature of the water in each can every minute.

- (i) Suggest how the temperature of the water in the dull can would be different from the temperature of the water in the shiny can after ten minutes.

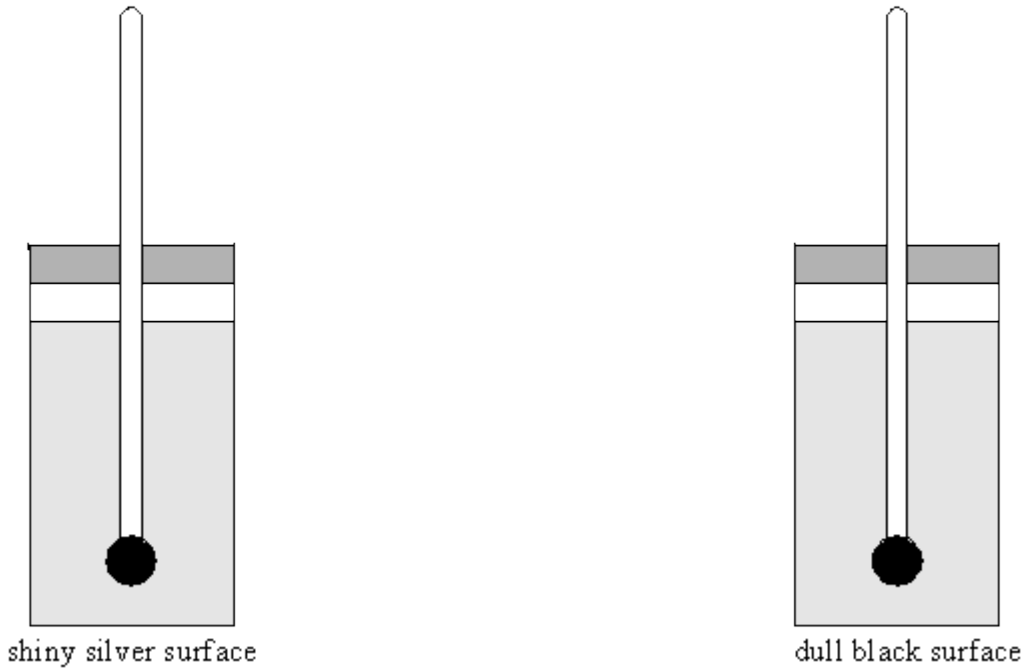
.....  
.....

- (ii) Explain your answer to part (i).

.....  
.....  
.....  
.....

(3)

- (c) The radiant heater was removed and both the cans were filled with the same amount of boiling water, as shown in the diagram below.



The temperature was recorded every minute for ten minutes.

- (i) Suggest how the temperature of the water in the dull can would be different from the temperature of the water in the shiny can after ten minutes.

.....  
.....

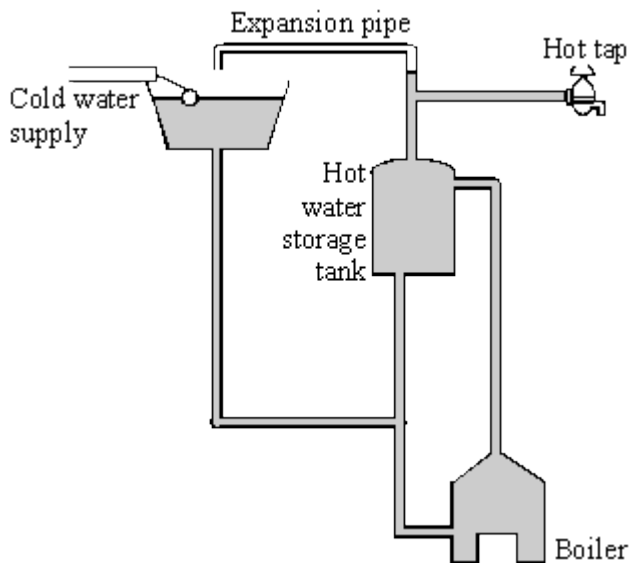
- (ii) Explain your answer to part (i).

.....  
.....

**(3)**  
**(Total 10 marks)**

21

(a) The diagram shows a hot water system.



(i) Explain why the boiler is below the hot water tank.

.....

.....

.....

(ii) Why is heat energy transferred from hot water in the tank to the surrounding air?

.....

.....

(iii) Name the process by which energy is transferred through the sides of the tank.

.....

(iv) How may heat loss from the hot water tank be reduced?

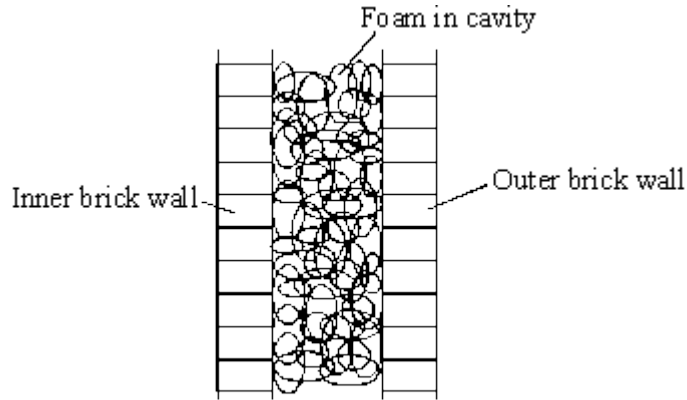
.....

.....

.....

(6)

- (b) One way of reducing heat loss from a house is by cavity wall insulation. Foam is pumped between the inner and outer brick walls as shown in the diagram.



How is heat loss from a house reduced by:

- (i) having a cavity wall?

.....

.....

.....

.....

- (ii) filling the cavity with foam?

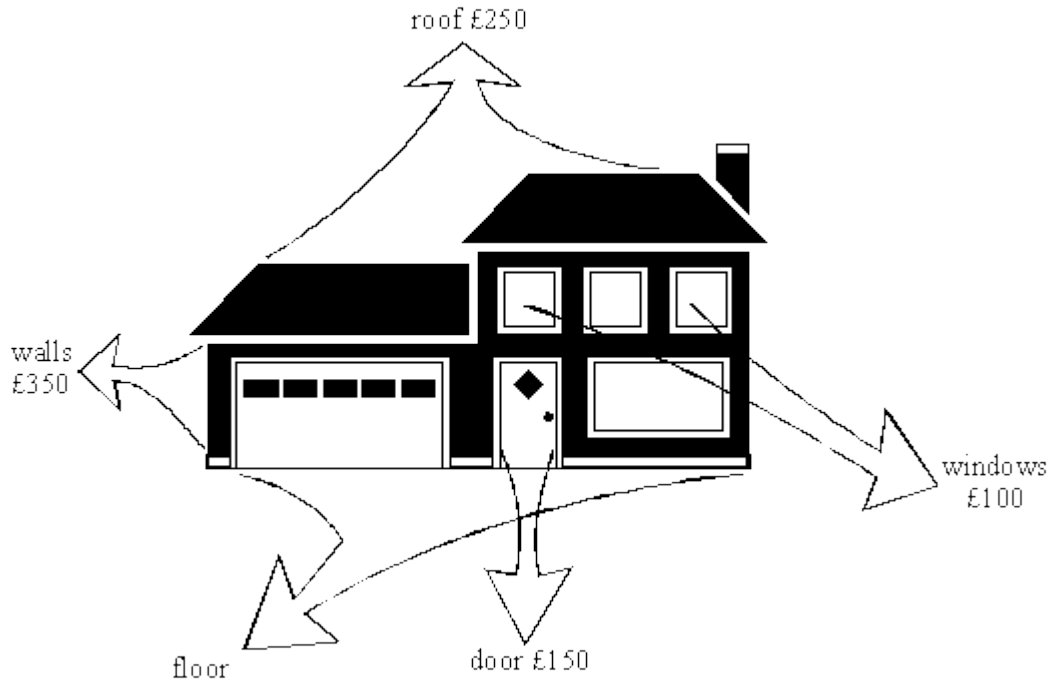
.....

.....

(3)  
(Total 9 marks)

22

The diagram below shows a house which has **not** been insulated. The cost of the energy lost from different parts of the house during one year is shown on the diagram.



(a) The total cost of the energy lost during one year is £1000.

(i) What is the cost of the energy lost through the floor?

.....

(2)

(ii) Suggest one way of reducing this loss.

.....

(1)

(b) The table below shows how some parts of the house may be insulated to reduce energy losses. The cost of each method of insulation is also given.

WHERE LOST	COST OF ENERGY LOST PER YEAR (£)	METHOD OF INSULATION	COST OF INSULATION (£)
roof	250	fibre-glass in loft	300
walls	350	foam filled cavity	800
windows	100	double glazing	4500
doors	150	draught proofing	5

(i) Which method of insulation would you install first? Explain why.

.....  
.....  
.....  
.....

(3)

(ii) Which method of insulation would you install last? Explain why.

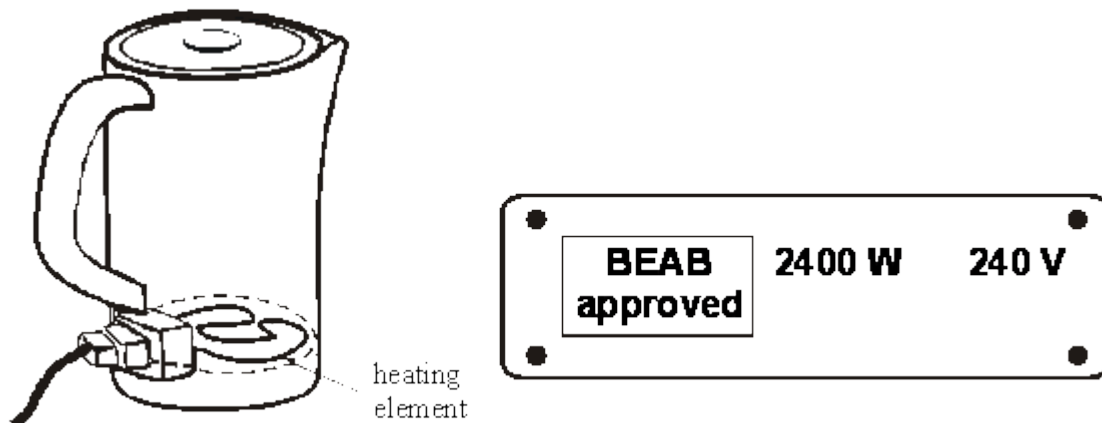
.....  
.....  
.....  
.....

(3)

(Total 9 marks)

23

The diagram below shows an electric kettle and the label on the bottom of the kettle.



The water at the bottom of the kettle will heat up first.  
This is because the heating element is near the bottom of the kettle.  
Convection currents will then cause the rest of the water in the kettle to be heated.

(i) What are convection currents?

.....

(1)

- (ii) Explain how convection currents are produced.  
(Your answer should refer to **density** and **temperature**.)

.....

.....

.....

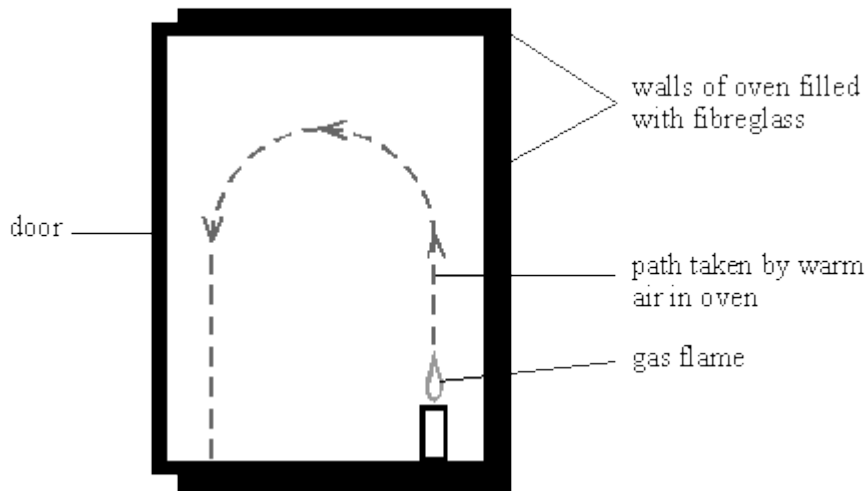
.....

.....

(4)  
(Total 5 marks)

24

The diagram shows a section through a gas oven.



Use words from the list to complete the sentences.

**conduction      convection      insulation      radiation      resistance**

The outside of the door gets hot because energy is transferred through the door by .....

Energy is transferred from the gas flame to the rest of the oven by the movement of air.

This type of energy transfer is called .....

The walls of the oven are packed with fibreglass to reduce energy transfer. Energy transfer is reduced because fibreglass provides good .....

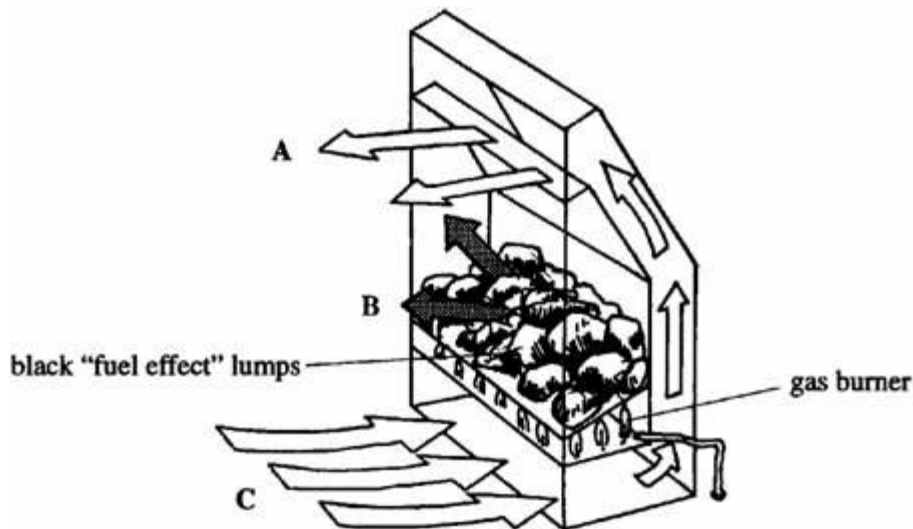
The outside of the cooker is white and shiny.

This reduces energy transfer by .....

**(Total 4 marks)**

**25**

The diagram comes from a leaflet about a “coal effect” gas fire. It shows how air circulates through the fire.





(a) Explain in detail why the air travels from **C** to **A**.

.....

.....

.....

.....

.....

.....

(4)

(b) The black “fuel effect” lumps become very hot.

(i) Name the process by which the lumps transfer thermal energy to the room as shown at **B**.

.....

(1)

(ii) Suggest **one** feature of the black “fuel effect” lumps which make them efficient at transferring energy.

.....

.....

(1)

(Total 6 marks)

**26**

The table gives information about some methods of conserving energy in a house.

Conservation method	Installation cost in £	Annual saving on energy bills in £
Cavity wall insulation	500	60
Hot water tank jacket	10	15
Loft insulation	110	60
Thermostatic radiator valves	75	20

(a) Explain which of the methods in the table is the most cost effective way of saving energy over a 10 year period. To obtain full marks you must support your answer with calculations.

.....  
.....  
.....  
.....

(3)

(b) Describe what happens to the energy which is 'wasted' in a house.

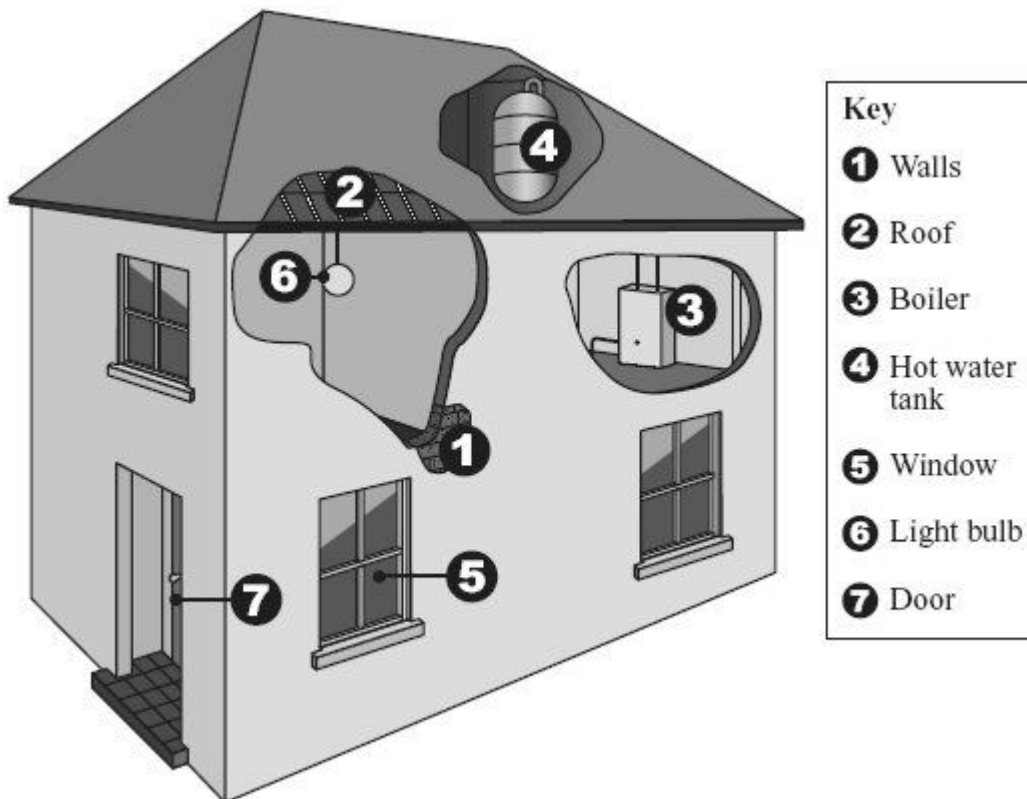
.....  
.....  
.....  
.....

(2)

(Total 5 marks)

27

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)**

**28**

People do a number of things to reduce the energy loss from their homes.

(a) Describe **one** thing they may do to cut down the energy loss through:

(i) the roof;

.....

**(1)**

(ii) the outside walls;

.....

**(1)**

(iii) the glass in the windows;

.....

**(1)**

(iv) gaps around the front and back doors.

.....

**(1)**

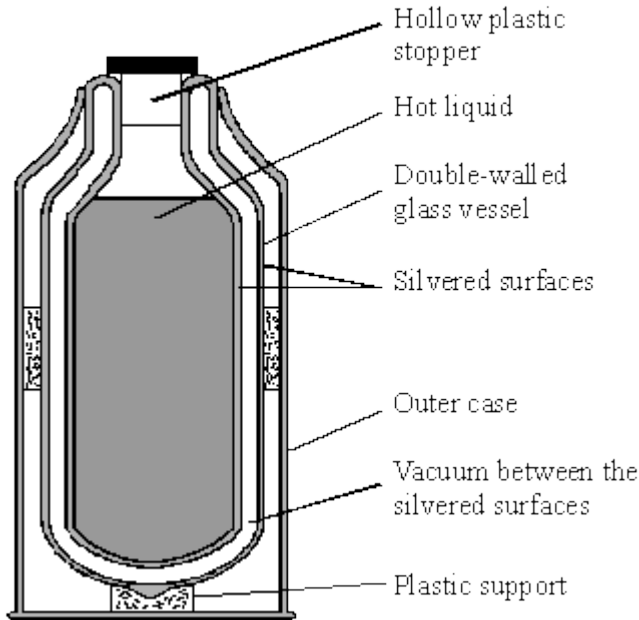
- (b) A house is more difficult to keep warm in cold weather. What other type of weather makes it difficult to keep a house warm?

.....

(1)  
(Total 5 marks)

29

The drawing shows a section of a vacuum flask.



- (a) Heat is slowly "lost" from the hot liquid in the closed flask. It may be transferred by:

conduction	convection	evaporation	radiation
------------	------------	-------------	-----------

Choose from the words above to complete the following sentences. You may use a word once, more than once or not at all.

(i) The vacuum between the glass walls reduces  
..... and .....

(2)

(ii) The silvered surfaces of the glass walls reduce  
.....

(1)

(iii) The stopper in the opening of the flask reduces  
..... and .....

(2)

(iv) Heat is transferred by the air molecules, away from the vacuum flask, by

.....

(1)

(v) The plastic of the plastic stopper is preferred to metal because it cuts down

.....

(1)

(b) Mark **X** on the diagram of the vacuum flask where the liquid in the flask is hottest.

(1)

(c) Explain, in terms of particles, how heat is conducted through a glass wall of the vacuum flask.

.....

.....

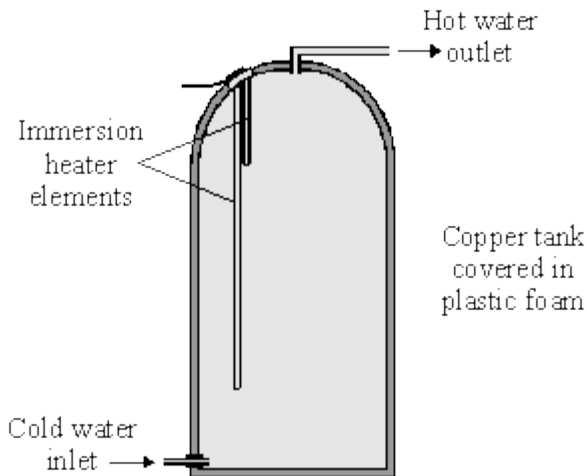
.....

(2)

(Total 10 marks)

30

The diagram shows a type of electric immersion heater in a hot water tank. These hot water tanks are normally found in airing cupboards.



Information on the immersion heater states:

230 V  
10 A

(a) Immersion heaters for hot water tanks often have a switch on them labelled *bath* or *sink*. The *bath* position of the switch has **both** parts of the immersion heater elements in the circuit. The *sink* position has only the short heater element in the circuit.

(i) Explain why the hot water outlet is at the top of the tank, and the cold water inlet is at the bottom of the tank.

.....  
.....  
.....

(2)

(ii) Explain how the *sink* position for the immersion heater is able to save energy.

.....  
.....  
.....

(2)

(b) The copper tank is surrounded by plastic foam to minimise energy loss.

Explain why a pale, shiny surface to the foam also helps to minimise energy loss.

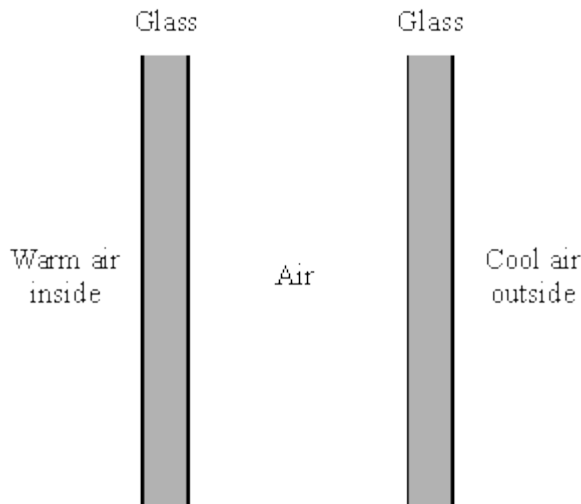
.....  
.....  
.....

(2)

(Total 6 marks)

31

The diagram shows a side view of a double-glazed window.



(a) Use each of the terms in the box to explain how heat is lost from inside a house through the window.

<b>conduction</b>	<b>convection</b>	<b>radiation</b>
-------------------	-------------------	------------------

.....

.....

.....

.....

.....

.....

(3)

(b) Besides heat, state **one other** form of energy that passes through double-glazed windows.

.....

(1)

(c) Explain why plastic foam cavity wall insulation cuts down energy transfer between warm inner walls and cooler outer walls.

.....

.....

.....

.....

(2)

(d) When it rains the walls and windows of a house get wet.

Explain how the drying process can increase the cooling of the house.

.....

.....

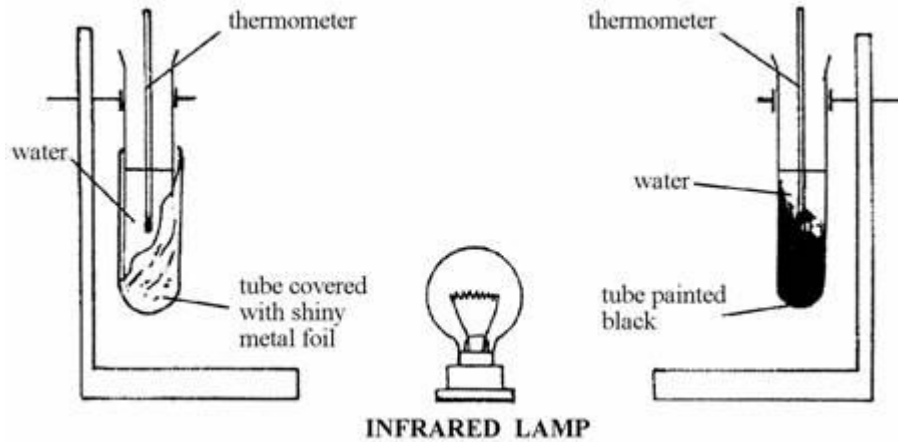
.....

(2)

(Total 8 marks)

32

The diagram shows an experiment to find out what happens to infrared waves when they strike different surfaces.



- (a) The water in the black tube gets hotter than the water in the shiny tube. Choose words from the list to complete the sentences below.

**absorbs    conducts    convects    radiates    reflects**

The infrared lamp ..... energy to the tubes of water.

The black surface ..... most of the energy that reaches it.

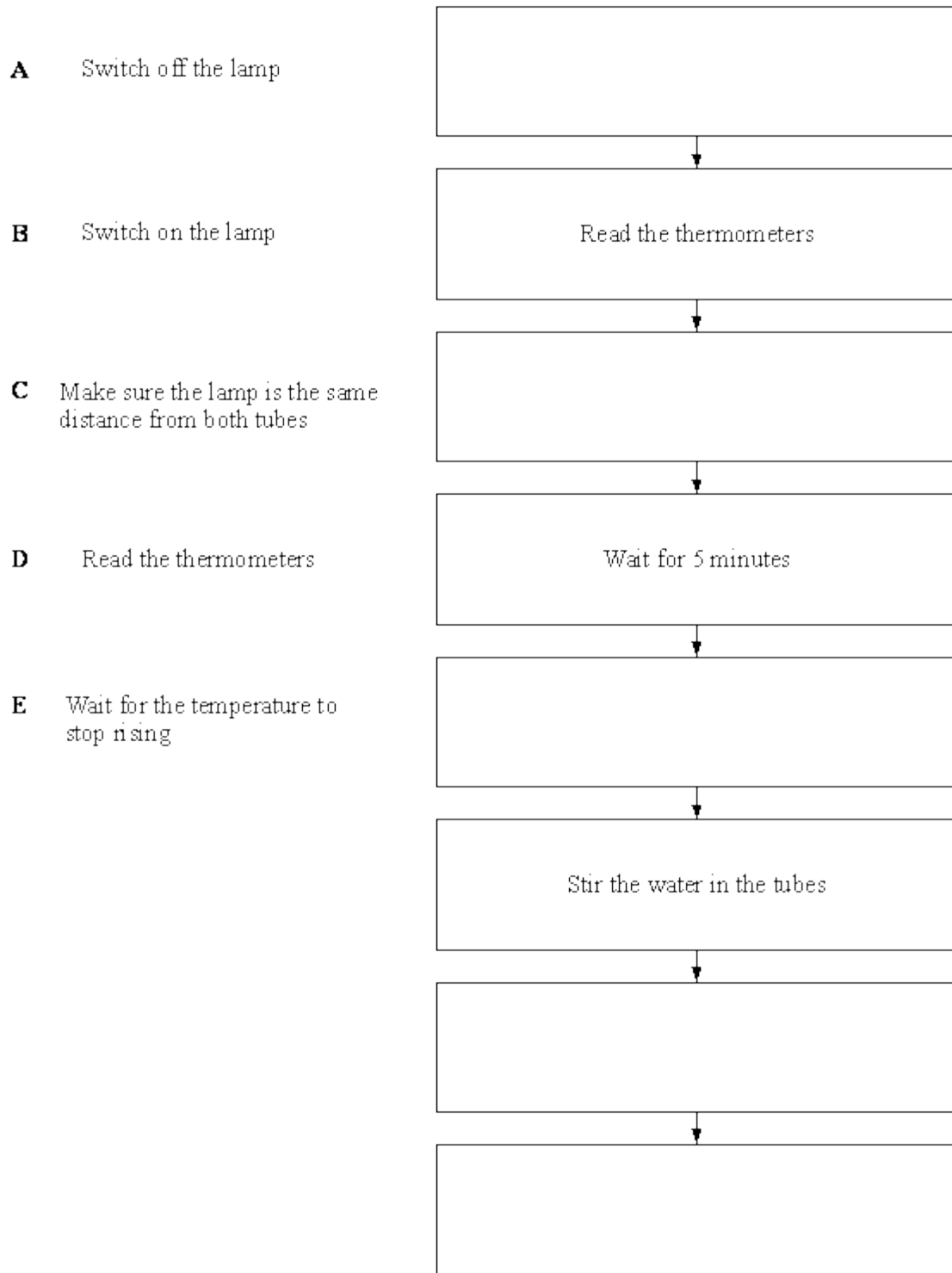
The shiny surface ..... most of the energy that reaches it.

(3)



(b) Put the sentences A- E below into the correct boxes on the flow diagram so that they tell you how to do the experiment

(You may use just the letters if you want to.)



(5)  
(Total 8 marks)