

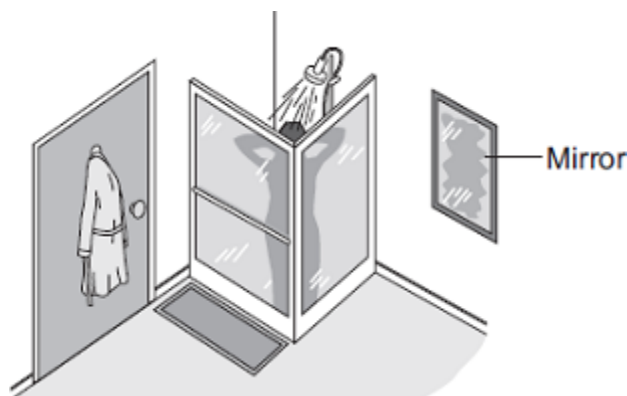
Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

The picture shows a person taking a hot shower.



- (a) When a person uses the shower the mirror gets misty.

Why?

(3)

- (b) The homeowner installs an electrically heated mirror into the shower room.

When a person has a shower, the heated mirror does **not** become misty but stays clear.

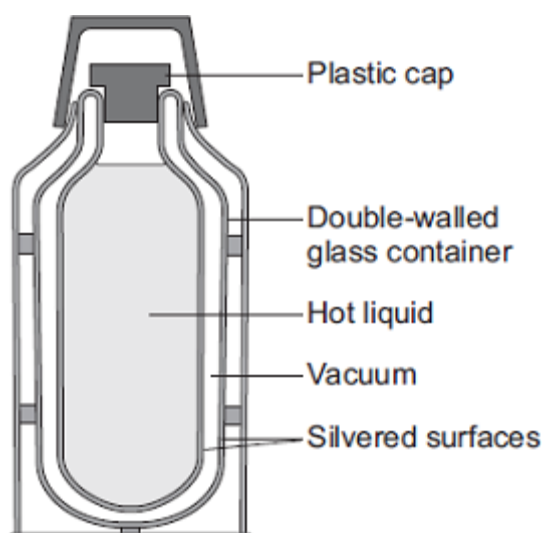
Why does the mirror stay clear?

(2)
(Total 5 marks)

Q2.

- (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The diagram shows the structure of a vacuum flask.



A vacuum flask is designed to reduce the rate of energy transfer by heating processes.

Describe how the design of a vacuum flask keeps the liquid inside hot.

(6)

- (b) Arctic foxes live in a very cold environment.



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Arctic foxes have small ears.

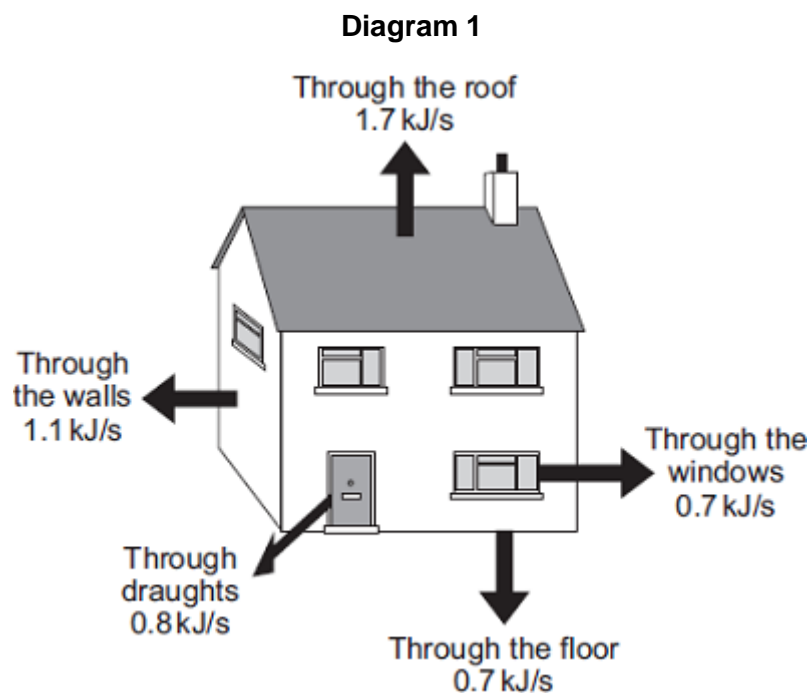
How does the size of the ears help to keep the fox warm in a cold environment?

(2)

(Total 8 marks)

Q3.

Diagram 1 shows the energy transferred per second from a badly insulated house on a cold day in winter.



- (a) (i) When the inside of the house is at a constant temperature, the energy transferred from the heating system to the inside of the house equals the energy transferred from the house to the outside.

Calculate, in kilowatts, the power of the heating system used to keep the inside of the house in **Diagram 1** at a constant temperature.

1 kilowatt (kW) = 1 kilojoule per second (kJ/s)

Power of the heating system = _____ kW

(1)

- (ii) In the winter, the heating system is switched on for a total of 7 hours each day.

Calculate, in kilowatt-hours, the energy transferred each day from the heating system to the inside of the house.

Energy transferred each day = _____ kWh

(2)

- (iii) Energy costs 15 p per kilowatt-hour.

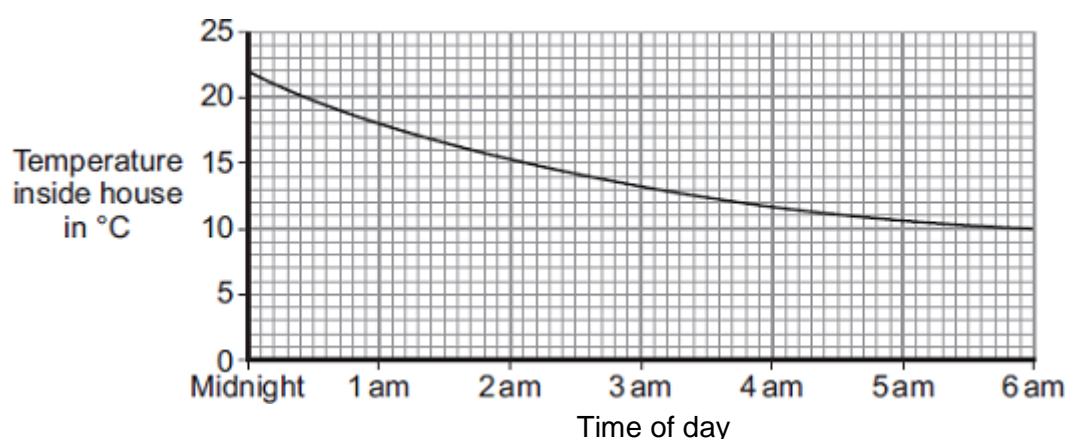
Calculate the cost of heating the house for one day.

Cost = _____

(1)

- (iv) The heating system is switched off at midnight.

The graph shows how the temperature inside the house changes after the heating system has been switched off.



Draw a ring around the correct answer in the box to complete the sentence.

Between midnight and 6 am the rate of energy transfer from

decreases.

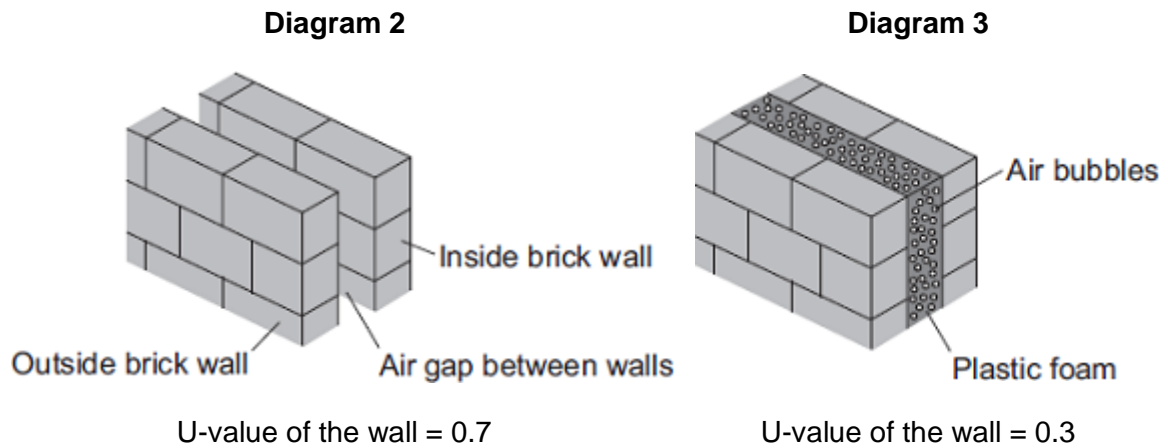
the house

decreases then stays constant.
increases.

Give the reason for your answer.

(2)

- (b) **Diagram 2** shows how the walls of the house are constructed.
Diagram 3 shows how the insulation of the house could be improved by filling the air gap between the two brick walls with plastic foam.



The plastic foam reduces energy transfer by convection.

Explain why.

(2)

(Total 8 marks)