

**Q1.** 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.

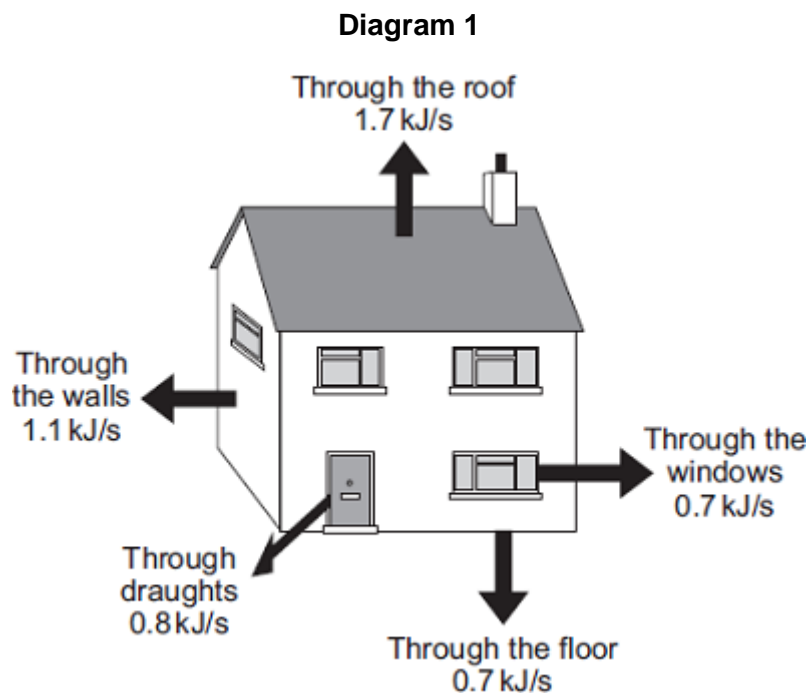
.....(1)

(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)**

**Q2.** **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.

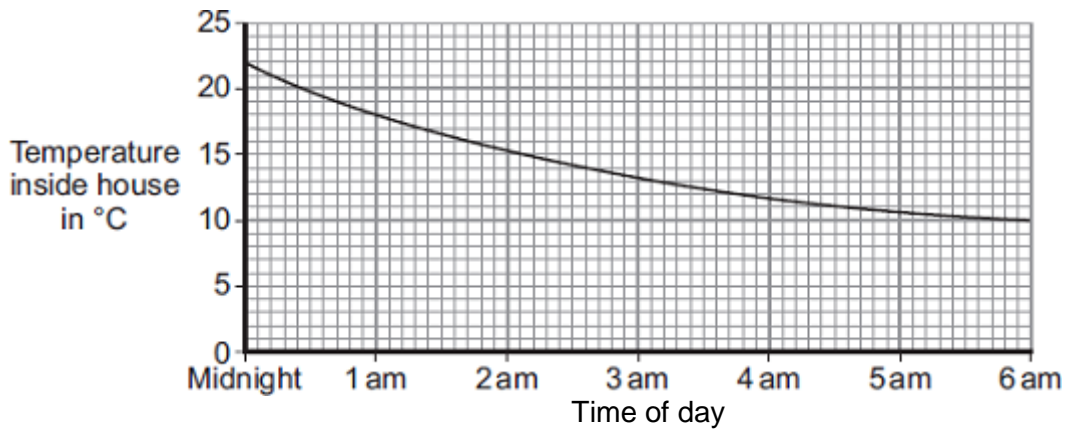
1 kilowatt (kW) = 1 kilojoule per second (kJ/s)

.....  
 Power of the heating system = ..... kW

(1)

(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)

**M1.** (a) (i) (insulate it) with **fibre** glass **or** foam  
**or** felt **or** polystyrene beads **or**  
rockwool **or** (aluminium) foil  
*an example must be included*  
*do not credit loft insulation*

1

(ii) fill the cavity with fibre glass **or** foam  
**or** mineral wool **or** polystyrene **or**  
named liner inside wall **or** making  
walls thicker  
*an example must be included*  
*do not credit cavity wall insulation*

1

(iii) double glaze **or** draw the curtains **or**  
blinds **or** thicker glass **or** secondary  
glazing described  
*do not credit fit smaller windows*

1

(iv) put in draught excluder (or described)  
**or** strip **or** description of filling gaps  
**or** seal gaps **or** double glazed doors  
**or** build porch **or** curtains inside door  
**or** mat under door  
*do not credit just carpet*  
*accept buy new doors*  
*accept premise that gap is between frame and wall as well as*  
*between frame and door*

1

- (b) windy **or** stormy **or** wet **or** snow **or**  
rain **or** sleet **or** hail **or** fog **or** mist  
*do not credit frosty*

1

[5]

**M2.**(a) (i) 5(.0)

1

- (ii) 35 **or** their (a)(i)  $\times 7$  correctly calculated

*allow 1 mark for correct substitution, ie 5 **or** their (a)(i)  $\times 7$  provided  
no subsequent step shown*

2

- (iii) 525(p)

**or**

(£) 5.25

**or**

their (a)(ii)  $\times 15$  correctly calculated

*if unit p or £ given they must be consistent with the numerical  
answer*

1

- (iv) decreases

1

temperature difference (between inside and outside) decreases

*accept gradient (of line) decreases*

*do **not** accept temperature (inside) decreases*

*do **not** accept graph goes down*

1

- (b) (i) air (bubbles are) trapped (in the foam)

*do **not** accept air traps heat*

*foam has air pockets is insufficient*

1

(and so the) air cannot circulate / move / form convection current

*air is a good insulator is insufficient*

*no convection current is insufficient*

*answers in terms of warm air from the room being trapped are  
incorrect and score no marks*

1

**M3.** (a) (i) 20

1

- (ii) convection

- 1
- (iii) fit draughtproof strips
- 1
- accept lay carpet*  
*accept fit curtains*  
*accept close doors / windows / curtains*  
*accept any reasonable suggestion for reducing a draught*  
*'double glazing' alone is insufficient*
- (b) air is (a good) insulator
- 1
- or** air is a poor conductor
- accept air cavity / 'it' for air*
- reducing heat transfer by conduction
- accept stops for reduces*  
*ignore convection*  
*do **not** accept radiation*  
*do **not** accept answers in terms of heat being trapped*
- 1
- (c) (i) most cost effective
- accept it is cheaper or lowest cost*  
*accept shortest payback time*  
*accept in terms of reducing heat loss by the largest amount*  
*do **not** accept it is easier*  
*ignore most heat is lost through the roof*
- 1
- (ii) 4
- 1