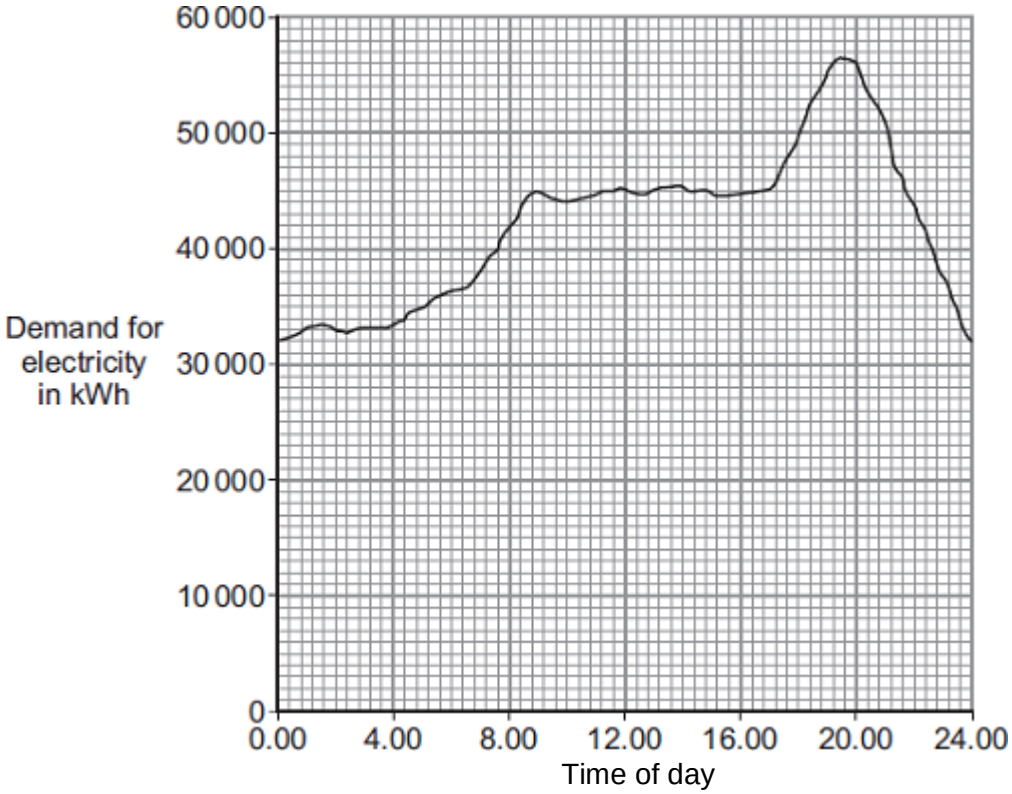
Name of the Student:_____
Max. Marks : 17 Marks **Time :17 Minutes**

Q1.

(a) The graph shows how the demand for electricity in the UK changes during one 24-hour period.



The table gives the start-up times for two types of power station.

Type of power station	Start-up time
Gas	A few minutes
Nuclear	Several days

How would these two types of power station be used to meet the demand for electricity during this 24-hour period?

_____

_____

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(3)

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

A farmer plans to generate all the electricity needed on her farm, using either a biogas generator or a small wind turbine.

The biogas generator would burn methane gas. The methane gas would come from rotting the animal waste produced on the farm. When burnt, methane produces carbon dioxide.

The biogas generator would cost £18 000 to buy and install. The wind turbine would cost £25 000 to buy and install.

The average power output from the wind turbine would be the same as the continuous output from the biogas generator.

Evaluate the advantages and disadvantages of the two methods of generating electricity.

Conclude, with a reason, which system would be better for the farmer to buy and install.

_____

_____

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(6)

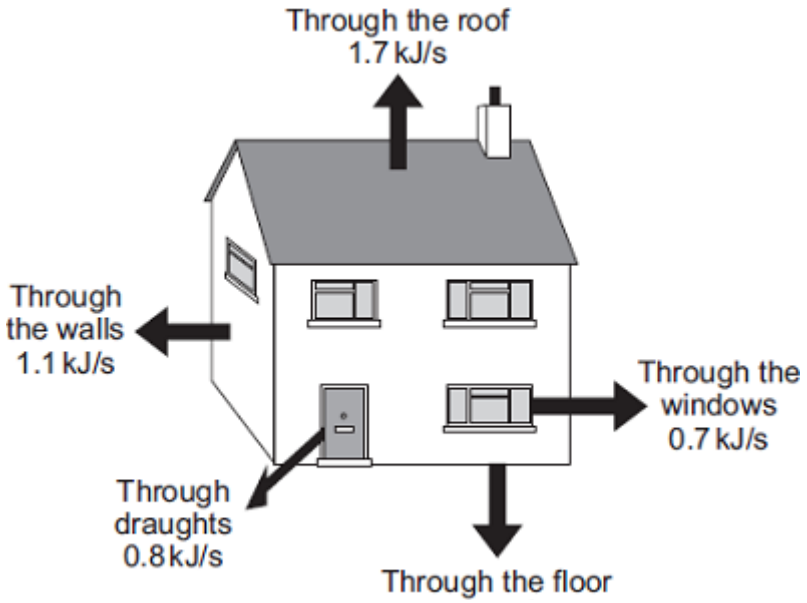
(Total 9 marks)

Q2.

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

Diagram 1

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(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.

_____

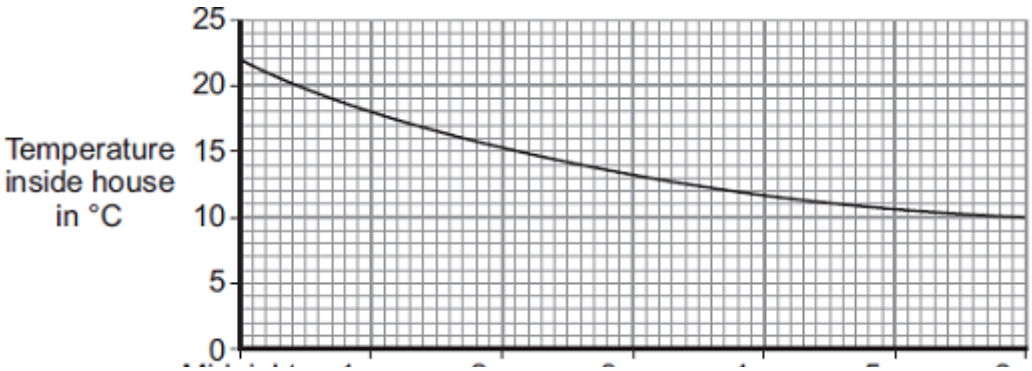
Cost = _____

(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.

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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

the house

decreases.
decreases then stays constant.
increases.

Give the reason for your answer.

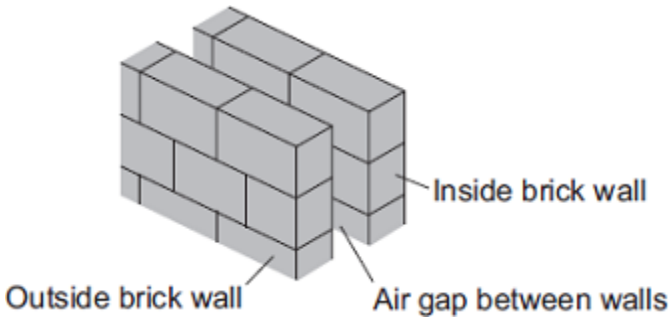
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(2)

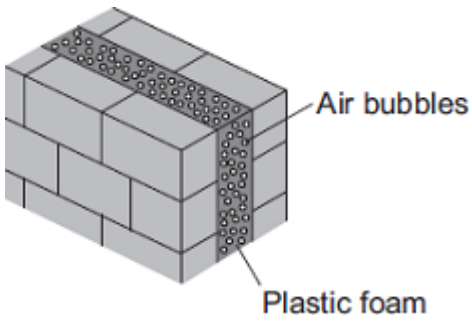
(b) **Diagram 2** shows how the walls of the house are constructed.
Diagram 3 shows how the insulation of the house could be improved by filling the air gap between the two brick walls with plastic foam.

Diagram 2



U-value of the wall = 0.7

Diagram 3



U-value of the wall = 0.3

The plastic foam reduces energy transfer by convection.

Explain why.

_____

_____

_____

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(2)
(Total 8 marks)

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