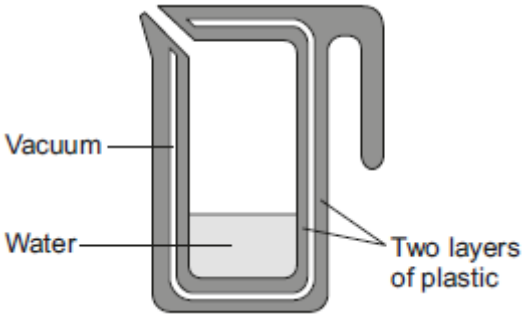
Name of the Student:_____
Max. Marks : 22 Marks **Time : 22 Minutes**

Q1.

A new design for a kettle is made from two layers of plastic separated by a vacuum.
After the water in the kettle has boiled, the water stays hot for at least 2 hours.

The new kettle is shown below.



(a) The energy transferred from the water in the kettle to the surroundings in 2 hours is 46 200 J.

The mass of water in the kettle is 0.50 kg.

The specific heat capacity of water is 4200 J/kg °C.

The initial temperature of the water is 100 °C.

Calculate the temperature of the water in the kettle after 2 hours.

_____

_____

_____

_____

Temperature after 2 hours = _____ °C

(3)

(b) Calculate the average power output from the water in the kettle to the surroundings in 2 hours.

_____

_____

_____

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Average power output = _____ W

(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.**

A householder wants to reduce her energy bills. She collected information about a number of ways of reducing energy used. The information is shown in the table.

Ways of reducing energy used	Cost to buy and install in £	Money saved per year in £
Install an energy-efficient boiler	2 000	320
Insulate the loft	400	200
Install double-glazed windows	12 000	120
Install cavity wall insulation	415	145

Use the information in the table to compare the different ways of reducing the energy used. Your answer should include some calculations.

(6)

(b) Increasing the amount of insulation in a house affects the total U-value of the house.

(i) What is meant by the term ‘U-value’?

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_____

_____

(1)

(ii) How is the U-value affected by increasing the amount of insulation?

_____

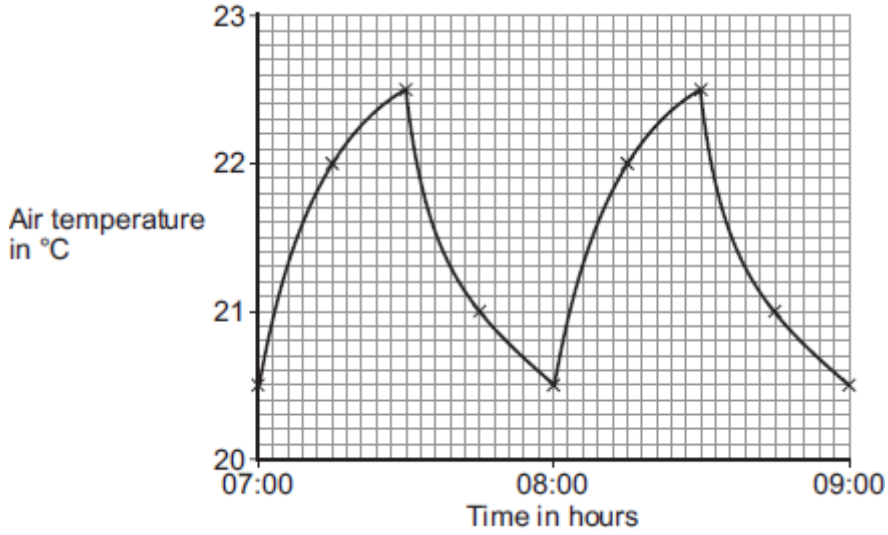
(1)

(Total 8 marks)

Q3.

A householder monitored how the air temperature inside his house changed over a 2-hour period. The householder measured the temperature every 15 minutes.

THe graph shows how the temperature changed with time.



(a) (i) The householder used a digital thermometer to measure the temperature.

What would be an appropriate resolution for the digital thermometer?

Draw a ring around your answer.

0.5 °C **1 °C** **5 °C**

(1)

(ii) The householder's results are shown on the graph above.

Why would it **not** be appropriate to use the results to plot a bar chart?

_____

_____

(1)

(b) The householder's heating is controlled by a thermostat. The thermostat switches the heating on when the temperature decreases below a certain temperature.

(i) At what temperature does the thermostat switch the heating on?

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_____ °C

(1)

(ii) Use the graph to determine the number of minutes that the householder's heating was switched on between 07:00 and 09:00.

_____

_____

Time = _____ minutes

(1)

(c) The householder read the following extract from a newspaper article about reducing energy use in the home.

> . . . decreasing the temperature setting on your thermostat by 1 °C will reduce your heating bill by 10% . . .

On Monday, the householder set his thermostat at 20.0 °C and recorded the energy, in kWh, used to heat his house.

On Tuesday, the householder set his thermostat at 19.0 °C and recorded the energy, in kWh, used to heat his house.

The table shows the results of the householder's investigation.

Thermostat setting in °C	Energy in kWh
20.0	8.0
19.0	7.2

(i) The outside temperature was the same on both days.

Give **one** reason why this was important.

_____

_____

(1)

(ii) Explain how the results shown in the table above support the extract from the newspaper article.

Justify your answer with a calculation.

_____

_____

_____

_____

(2)

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(iii) The statement in the extract is **not** valid for all situations.
Suggest why.

_____

_____

_____

_____

(2)

(Total 9 marks)

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