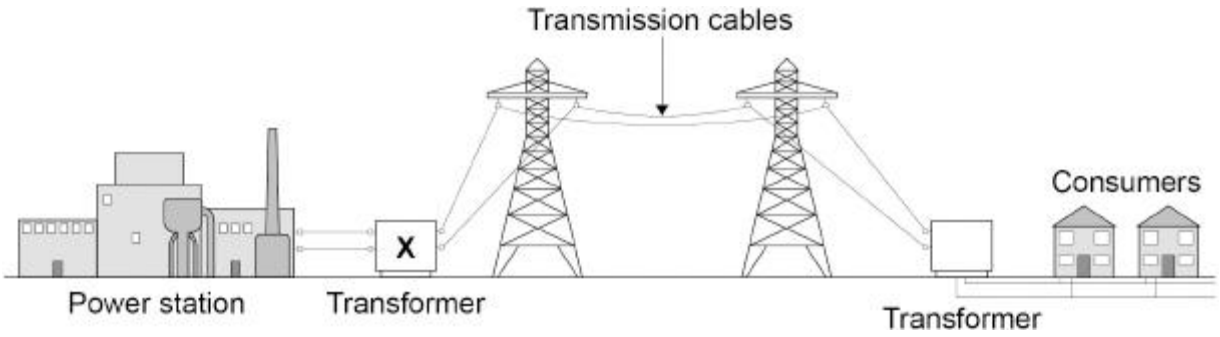
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

The figure below shows how the National Grid connects a power station to consumers.



(a) Complete the sentences.

Transformer **X** causes the potential difference to _____.

Transformer **X** causes the current to _____.

(2)

Use the Physics Equations Sheet to answer parts (b) and (c).

(b) Which equation links current (*I*), power (*P*) and resistance (*R*)?

Tick (✓) **one** box.

$P = \frac{I}{R}$ ☐

$P = \frac{I}{R^2}$ ☐

$P = I^2 R$ ☐

$P = IR$ ☐

(1)

(c) A transmission cable has a power loss of 1.60×10^9 W.

The current in the cable is 2000 A.

Calculate the resistance of the cable.

_____

_____

_____

_____

_____

Resistance = _____ Ω

(3)

Use the Physics Equations Sheet to answer parts (d) and (e).

(d) Write down the equation which links efficiency, total energy input and useful energy output.

_____

(1)

(e) The total energy input to the National Grid from one power station is 34.2 GJ.

The National Grid has an efficiency of 0.992

Calculate the useful energy output from this power station to consumers in GJ.

_____

_____

_____

_____

_____

Useful energy output = _____ GJ

(3)

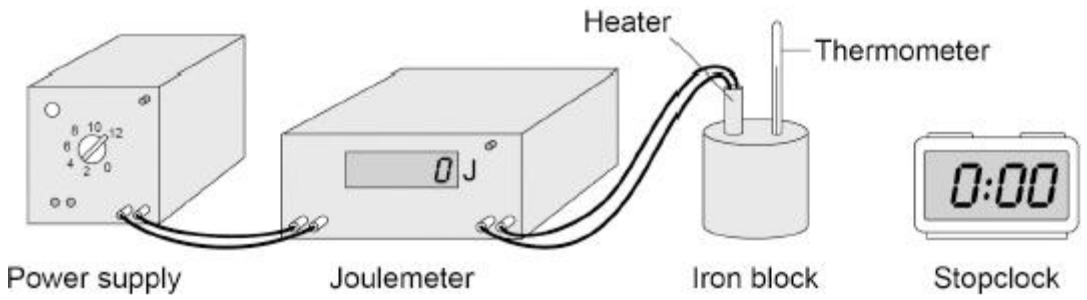
(Total 10 marks)

Q2.

Figure 1 shows the equipment a student used to determine the specific heat capacity of iron.

The iron block the student used has two holes, one for the heater and one for the thermometer.

Figure 1



(a) Before the power supply was switched on, the thermometer was used to measure the temperature of the iron block.

The student left the thermometer in the iron block for a few minutes before recording the initial temperature.

Suggest why.

_____

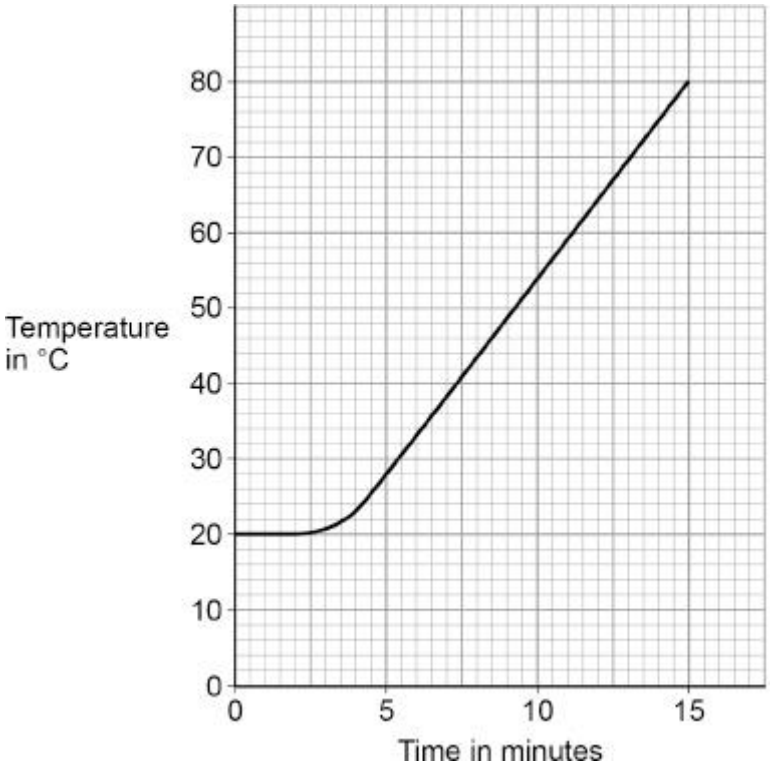
_____

_____

(1)

(b) **Figure 2** shows how the temperature changed after the power supply was switched on.

Figure 2



The energy transferred to the iron block between 5 and 10 minutes was 26 000 J.

The mass of the iron block was 2.0 kg.

Calculate the specific heat capacity of iron.

Use information from **Figure 2** and the Physics Equations Sheet.

_____

_____

_____

_____

_____

_____

_____

Specific heat capacity = _____ J/kg °C

(4)

(c) The student repeated the investigation but wrapped insulation around the iron block.

What effect will adding insulation have had on the investigation?

Tick (✓) **two** boxes.

The calculated specific heat capacity will be more accurate.	☐
The iron block will transfer thermal energy to the surroundings at a lower rate.	☐
The power output of the heater will be lower than expected.	☐
The temperature of the iron block will increase more slowly than expected.	☐
The uncertainty in the temperature measurement will be greater.	☐

(2)

(Total 7 marks)