

**GCSE Physics B (Twenty First Century Science)**  
**J259/02** Depth in physics (Foundation Tier)

**Question Set 30**

1 Water is used as a coolant in heating systems because it has a high specific heat capacity.

Nina does an experiment to find the specific heat capacity of water, by heating 1 kg of water in a 2.4 kW kettle.

The kettle takes several minutes to heat the water to its boiling point.

**Nina**

I can use a balance to accurately measure the 1 kg mass of water in the kettle.



(a) State **two** other pieces of equipment that Nina needs to use in her experiment. [2]

(b) The 2.4 kW kettle takes 3 minutes to heat the water from room temperature to boiling point.

Calculate the total energy supplied by the kettle.

Use the equation: energy = power × time

(c) The useful energy transferred to heat the water from room temperature (20°C) to boiling point, 100°C is 345 600 J. Energy = ..... J [4]

(i) Calculate the efficiency of the kettle.

Use your answer to (b).

Use the equation:

efficiency = useful energy transferred ÷ total energy transferred

(ii) Calculate the specific heat capacity of the water from Nina's experiment. Efficiency = ..... [2]

Use the equation:

change in internal energy = mass × specific heat capacity × change in temperature

(d) (i) Suggest why the energy **supplied** by the 2.4kW kettle is more than the energy **transferred** to the 1 kg of water. Specific heat capacity = ..... J/kg°C [2]

(ii) Suggest **one** way in which the experiment to find the specific heat capacity of water could be improved. [1]

**Total Marks for Question Set 30: 12**

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