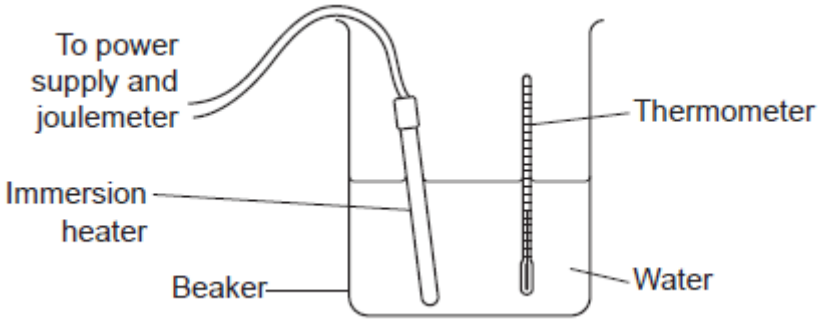
OCR
Oxford Cambridge and RSA

GCSE Physics A (Gateway)

J249/01 Physics A P1-P4 and P9 (Foundation Tier)

Question Set 3

1 A student completes an experiment to find the specific heat capacity of water.



He heats up 1 kg of water, using an immersion heater. He measures the temperature rise andcalculates the specific heat capacity of the water.

Attempt	Energy supplied (J)	Temperature rise (°C)	Specific heat capacity (J / kg °C)
1	10 000	2	5000
2	21 000	4	5250
3	44 000	8	5500

(a) (i) Calculate the **mean** specific heat capacity.

$\frac{5000 + 5250 + 5500}{3} = \frac{15750}{3} = 5250$

Answer = 5250 J / kg °C **[1]**

(ii) Describe the conclusions that can be drawn from the data **[3]**

1. As temperature rise increases so does specific heat capacity (proportionally)
2. as the energy supplied increases so does the temperature rise
3. as energy increases so does the specific heat capacity.

(b) The actual value for the specific heat capacity of water is 4200 J / kg °C.

(i) Explain why the mean specific heat capacity calculated in **(a)(i)** is higher than the actualvalue.

It is higher than the actual value as there may have been energy losses where some of the energy was transferred to the environment instead of the water. **[2]**

$Q = mc\Delta T$ c is the specific heat capacity
Q is energy supplied and ΔT is temperature rise

since temperature did not rise as much as expected, c is higher than actual value.

(ii) Write down **two** problems with this experiment **and** suggest how they could be solved.

Use the diagram and results table to help you.

Problem 1 There is nothing covering the beaker

Solution Use polystyrene cup instead of the beaker and use lid.

Problem 2 The immersion heater is not fully submerged in water - thus heat lost through air

Solution Ensure the water level is above the immersion heater **[4]**

Total Marks for Question Set 3: 10