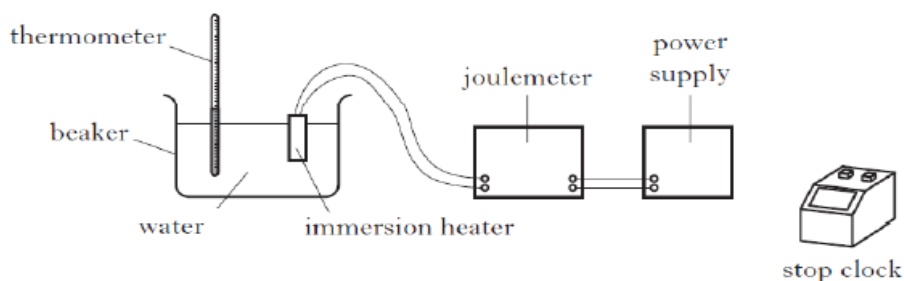


2.6 Heat Past Paper Questions

- Q1.** An experiment was carried out to determine the specific heat capacity of water. The energy supplied to the water was measured by a joulemeter.



The following data was recorded.

Initial temperature of the water = 21 °C.

Final temperature of the water = 33 °C.

Initial reading on the joulemeter = 12 kJ.

Final reading on the joulemeter = 120 kJ.

Mass of water = 2.0 kg.

Time = 5 minutes.

- (a) (i) Calculate the change in temperature of the water. 1
- (ii) Calculate the energy supplied by the immersion heater. 1
- (iii) Calculate the value for the specific heat capacity of water obtained from this experiment. 3
- (b) (i) The accepted value for the specific heat capacity of water is quoted in the table in the Data Sheet. Explain the difference between the accepted value and the value obtained in the experiment. 2
- (ii) How could the experiment be improved to reduce this difference? 1
- (c) Calculate the power rating of the immersion heater. 3

- Q2.** On the planet Mercury the surface temperature at night is -173°C . The surface temperature during the day is 307°C . A rock lying on the surface of the planet has a mass of 60 kg.



- (a) The rock absorbs $2.59 \times 10^7 \text{ J}$ of heat energy from the Sun during the day.
Calculate the specific heat capacity of the rock. 3
- (b) Heat is released at a steady rate of 1440 J/s at night.
Calculate the time taken for the rock to release $2.59 \times 10^7 \text{ J}$ of heat. 3
- (c) Energy from these rocks could be used to heat a base on the surface of Mercury.
How many 60 kg rocks would be needed to supply a 288 kW heating system? 3
- (d) Using information from the data sheet, would it be **easier**, **the same** or **more difficult** to lift rocks on Mercury compared to Earth?
You **must** explain your answer. 2

Q3

A science technician removes two metal blocks from an oven. Immediately after the blocks are removed from the oven the technician measures the temperature of each block, using an infrared thermometer. The temperature of each block is 230°C .

After several minutes the temperature of each block is measured again. One block is now at a temperature of 123°C and the other block is at a temperature of 187°C .

Using your knowledge of physics, comment on possible explanations for this difference in temperature. 3

Total Marks Available = 25