# IGCSE Physics Worksheet — Heat Capacity

## Reading Passage

When a substance is heated, its temperature rises. The amount of heat energy required depends on two factors: the mass of the substance and the specific heat capacity (c). Heat capacity is the total amount of heat energy needed to raise the temperature of an object by 1°C. Specific heat capacity (SHC) is the amount of heat energy required to raise the temperature of 1 kg of a substance by 1°C.

Formula: $Q = mc\Delta T$

Where Q = heat energy (J), m = mass (kg), c = specific heat capacity (J/(kg·°C)), ΔT = temperature change (°C).

Examples: Water has a high SHC (about 4200 J/(kg·°C)), meaning it takes a lot of energy to heat up. Metals like copper have low SHC, so they heat up and cool down quickly.

## Diagram Section

Heat Energy → Temperature Rise
$Q = mc\Delta T$
Large c (water): needs more energy → slow temperature rise
Small c (metal): needs less energy → quick temperature rise



## Multiple Choice Questions

1. The unit of specific heat capacity is:
   A. J/kg  B. J/(kg·°C)  C. J/°C  D. kg/J

2. Which substance has a high specific heat capacity?
   A. Copper  B. Water  C. Lead  D. Iron

3. If 2 kg of water is heated by 10°C, how much energy is required?
   A. 420 J  B. 4200 J  C. 84,000 J  D. 8,400 J

4. A substance with low SHC will:
   A. Heat up slowly  B. Cool down slowly  C. Heat up quickly  D. Require more energy to heat

5. Why is water used in car radiators?
   A. It evaporates quickly  B. It has a high SHC  C. It is cheap  D. It is a metal

## Structured Questions

6. Define specific heat capacity.

7. Explain why metals are useful for cooking pans.

8. A 3 kg block of copper (c = 390 J/(kg·°C)) is heated from 20°C to 100°C. Calculate the heat energy absorbed.

9. Why does water take longer to heat compared to metals?

10. Describe one everyday application of high specific heat capacity.

## Teacher-Only Answer Key

MCQ Answers: 1. B  2. B  3. C  4. C  5. B

Structured Answers:

6. Specific heat capacity is the amount of heat energy required to raise the temperature of 1 kg of a substance by 1°C.

7. Metals have low SHC, so they heat up quickly and transfer heat efficiently to food.

8. $Q = mc\Delta T = 3 \times 390 \times (100 - 20) = 93,600$ J. The copper block absorbs 93,600 J of heat energy.

9. Water has a high SHC, meaning more energy is needed to increase its temperature. Metals require less energy, so they heat faster.

10. Hot water bottles use water's high SHC to store heat and release it slowly, keeping people warm for hours.