Specific Heat Calculations

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Use $q = mc\Delta T$, where ΔT = final temperature − initial temperature. A positive q means the sample gains heat.

1 A 50.0 g sample has a specific heat capacity of 0.900 J/(g·°C). How much heat does it gain as its temperature rises by 10.0 °C?

(1) 4.50 J

(2) 45.0 J

(3) 450 J

(4) 4,500 J

2 A 25.0 g sample with c = 0.400 J/(g·°C) cools from 60.0 °C to 40.0 °C. Calculate q for the sample, including its sign. [1]

Answer and work

3 Two samples have equal mass and gain the same heat. Sample A has the higher specific heat capacity. What is true of the temperature changes?

(1) A’s temperature rises less than B’s.

(2) A’s temperature rises more than B’s.

(3) A’s temperature falls as B’s rises.

(4) A and B have equal temperature rises.

4 During melting at constant temperature, a solid absorbs energy. Explain why using $q = mc\Delta T$ alone would miss that energy transfer. [1]

Answer and work

Heat-Storage Blocks

Use the information below to answer the questions.

A team compares three solid blocks as possible heat stores. Each block has a mass of 100. g and begins at 20.0 °C. Each absorbs 900. J with negligible heat loss and without a phase change.

Block	Specific heat capacity (J/(g·°C))
A	0.900
B	0.450
C	0.600

5 Calculate the temperature increase of block C. Show your setup. [1]

Answer and work

6 What is the final temperature of block B?

(1) 20.0 °C

(2) 30.0 °C

(3) 35.0 °C

(4) 40.0 °C

7 Choose the block that stays coolest after the same heat input. Justify your choice using its specific heat capacity. [1]

Answer and work

8 If the blocks must all warm by 10.0 °C, which requires the most heat? Explain how $q = mc\Delta T$ supports your answer. [1]

Answer and work