Comparing Melt Times at Two Heater Powers

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A classroom simulation heats two equal portions of the same solid. Both portions start below the melting point. Heat loss is negligible, and each heater transfers energy to its sample at the constant rate listed. One watt means one joule per second.

Run	Energy transfer rate (W)	Melting begins (s)	Melting ends (s)	Temperature during melting (°C)
P	20	30	150	35
Q	30	20	100	35

1 Which interval should be used to find the energy transferred during melting in Q?

(1) 0–20 s

(2) 0–100 s

(3) 20–100 s

(4) 30–150 s

2 Calculate the energy transferred to each sample during melting. Show how the two times are used for each calculation. [1]

Answer and work

3 A student says Q needed less energy to melt because the melting interval was shorter. Evaluate the claim using the two rates. [1]

Answer and work

The class repeats Q with twice as much of the same solid, at the same starting temperature. It uses the same 30 W heater. No energy is lost.

4 Predict the duration of the new melting interval. Explain how the mass changes the energy needed. [1]

Answer and work