# Freezing a Community Skating Rink

Scoring guide · one credit per question · review written work against each rubric

### Freezing a Community Skating Rink

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### Question 1

Choice (2)

Heat flows from the warmer water to the colder coolant before the phase change starts.

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### Question 2

Using 2.00 kg = 2,000 g, q = (2,000 g)(4.18 J/(g·°C))(0.0 − 8.0 °C) = −66,880 J, or approximately −67 kJ. The sign shows the water loses heat. Accept equivalent rounding.

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### Question 3

Energy leaves as liquid water changes to solid ice. During the phase change at the freezing point, the transfer changes the particles’ arrangement and potential energy while the temperature stays constant.

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### Question 4

Choice (2)

Foam adds 2.8 kg and limits heat entering to 67 kJ. Fiber exceeds the heat limit. Laminate exceeds the added mass limit.

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### Question 5

Convert 67 kJ to 67,000 J. The mass is q/Hf = 67,000 J/(334 J/g) ≈ 201 g, or about 0.20 kg.

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### Question 6

The claim is incorrect under the test conditions. The panel changes heat input from 134 kJ to 67 kJ. That is a reduction of 67 kJ, exactly half of 134 kJ.