Teacher Answer Key

Case Study

1. Jalen changed the water temperature, the amount of stirring, and the time before drinking. Very hot water plus thorough stirring dissolved more cocoa and sugar, leaving less residue, while cooler water and little stirring left clumps, and long sitting time allowed crystals to form again.

2. As the drink cooled, the solution could no longer hold as much dissolved solid at the lower temperature. The extra solute came out of solution and formed a gritty layer, showing the drink had become saturated and then supersaturated before solids settled out.

Multiple Choice

1. C

2. B

3. D

Matching

1-D, 2-A, 3-B, 4-E, 5-C

Fill-in-the-Blank

1) solvent, 2) solubility, 3) conduction

Short Answer (Sample Responses)

Q1: Hotter water gives molecules more kinetic energy, increasing collisions with cocoa and sugar particles and helping them dissolve. Stirring moves fresh solvent into contact with undissolved solids and breaks up clumps, so the drink reaches its solubility limit faster and more evenly.

Q2: Conduction: heat flows from the hot liquid into the mug walls and then into your hands. Convection: warmer liquid near the bottom or sides rises while cooler liquid sinks, creating circulating currents that distribute heat and particles inside the drink.

Q3: Use an insulated or thick-walled container to reduce conduction of heat to the air, and keep a tight lid on to cut down on heat loss by convection and evaporation from the surface. Minimizing exposed surface area and drafts will help the cider stay close to its original temperature longer.