Name _____ Date _____

Particle Motion and the States of Matter: Solids, Liquids, Gases and Melting Ice

Directions: Choose the best answer to each question.

1. An ice cube has been sitting in a freezer at -18 °C for several hours and is frozen completely solid. Which statement correctly describes the water particles inside the ice?

A. They slide past one another, the way particles in liquid water do.

B. They fly around far apart from one another.

C. They are completely still, because the ice is frozen solid.

D. They vibrate in place, held close together in fixed positions.

2. Two identical cups contain the same amount of water. The water in one cup is at 80 °C, and the water in the other cup is at 20 °C. How do the water particles in the two cups compare?

A. The particles in both cups move at the same speed, because both cups hold water.

B. The particles in the 20 °C water move faster, because cold particles are lighter.

C. The particles in the 80 °C water are bigger.

D. On average, the particles in the 80 °C water move faster, so they have more motion energy.

3. A bathtub is filled to the top with water at 40 °C, while a small coffee mug holds water at 80 °C. Which statement about the temperature and the thermal energy of the water is true?

A. The mug's water has the higher temperature, but the bathtub holds more thermal energy in all, because it has so many more particles.

B. The mug holds more thermal energy in all, because temperature measures the total energy of all the particles.

C. The bathtub has the higher temperature, because it holds more water.

D. They hold the same thermal energy, because temperature and thermal energy are the same thing.

4. At sea-level air pressure, Maya stirs a beaker of crushed ice and water on a hot plate and checks a thermometer in the mix every minute. What does the thermometer most likely show while some ice is still melting?

A. The temperature jumps straight to 100 °C, because the hot plate is on.

B. The temperature falls below 0 °C, because melting ice pulls the cold out of the water.

C. The temperature rises steadily, because energy keeps going in.

D. The temperature stays at about 0 °C, because the energy going in frees particles from their fixed places in the ice.

5. On a warm, humid afternoon, tiny drops of water appear on the outside of a glass filled with ice water. The glass has no cracks or holes, and its outside was wiped dry. Where does the water on the outside of the glass come from?

A. Water vapor in the air touches the cold glass, slows down and condenses into liquid drops.

B. The cold glass changes the oxygen in the air into water.

C. Water seeps out through tiny holes in the glass.

D. The ice melts through the glass wall.

6. A metal lid is stuck tightly on a glass jar, but running hot water over the lid makes it much easier to twist open. What happens to the particles in the metal lid?

A. The particles move faster and push slightly farther apart, so the lid expands a little.

B. The particles melt, so the lid turns partly to liquid.

C. The hot water adds new metal particles to the lid.

D. Each particle swells up and gets bigger.

7. A tied balloon is left inside a closed car parked in the sun on a hot afternoon, and it slowly gets a little bigger. What explains this change?

A. The air particles inside grow larger in the heat.

B. The air particles inside move faster and hit the inside of the balloon harder and more often, pushing it outward.

C. Heat is a substance that flows into the balloon and fills it.

D. The air particles stop moving and pile up against the rubber.

8. Water boils in a pot on the stove. What happens to the water particles as liquid water becomes water vapor?

A. Each water particle splits into hydrogen gas and oxygen gas.

B. They gain enough energy to break away from one another and spread far apart, but each one is still a water particle.

C. They shrink so they can fit inside the bubbles.

D. They stop moving once they become a gas.