**Name** _____

## Matter Matters: Exploring Solids, Liquids, and Gases

### Open-Ended Response Answer Key

1. When you have a glass of ice water on a warm day, the ice undergoes a phase change from a solid to a liquid as it melts. As the temperature rises, the heat energy from the surroundings is transferred to the ice, increasing the kinetic energy of its particles. This extra energy causes the ice particles to break free from their fixed positions and become more mobile, turning into a liquid (water). This phase change occurs because the temperature exceeds the melting point of ice, allowing the solid ice to transform into a liquid state while maintaining its volume.
2. Particles in solids are tightly packed and vibrate in place. In liquids, particles are less tightly packed and can slide past each other, giving liquids their ability to flow. Gases have widely spaced particles that move freely and independently, leading to their ability to fill the entire space of their container. The arrangement of particles affects properties such as shape, volume, and density. Solids have a definite shape and volume, liquids have a definite volume but take the shape of their container, and gases have neither a definite shape nor volume.
3. In the water cycle on Earth, phase changes play a vital role. When the Sun's energy heats the Earth's surface, water in bodies of water, such as rivers and oceans, evaporates and turns into water vapor (gas). This water vapor rises into the atmosphere. As it ascends to higher, cooler altitudes, it undergoes condensation, transitioning back into tiny water droplets or ice crystals (liquid or solid) to form clouds. When these clouds become heavy and saturated, the water droplets combine and fall as precipitation (liquid or solid) to the Earth's surface. This cycle involves phase changes between gas, liquid, and solid states and plays a crucial role in maintaining Earth's water supply.
4. To explain states of matter to a younger sibling, you can use simple terms and examples:
    - **Solids:** Solids are things that stay in one shape, like a toy block. They can't change shape or move around easily.
    - **Liquids:** Liquids are things that can change shape but still stay together, like water in a glass. You can pour them, and they can take the shape of their container.
    - **Gases:** Gases are things we can't see, like the air we breathe. They can fill any space, and they don't have a shape of their own. Imagine blowing up a balloon; the air inside is a gas, and it can be squished and moved around.