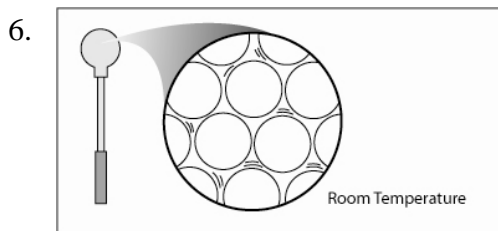


## Chapter 1, Lesson 4 Activity Sheet Answers

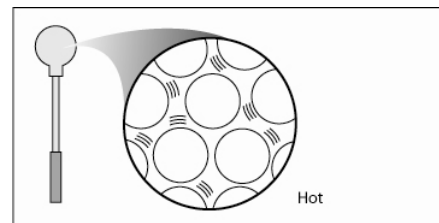
1. The atoms in solid metal vibrate back and forth but do not move past one another like the water molecules in liquid water.
2. The atoms or molecules that make up liquids and solids are kept near each other by the attraction between molecules or the attraction between atoms.

### DEMONSTRATION

3. When the ball was heated it did not fit through the ring.
4. Heating makes the atoms in the metal move faster. The extra speed of the atoms competes with their attractions for one another and causes them to move slightly further apart. Since the atoms move further apart, the size (volume) of the metal ball increases a little and will not fit through the ring.
5. Cooling makes the atoms in the metal move more slowly. When they move more slowly, their attractions for one another are able to bring them slightly closer together. Since the atoms come closer together, the size (volume) of the metal ball decreases a little and will fit through the ring again.



Atoms slower and closer together



Atoms faster and further apart

7. If it gets cold enough, the bridge shrinks or contracts a little. If it gets hot enough, the bridge grows or expands a little. The flexible material allows the road to shrink a little in the cold or expand a little in the heat without weakening or cracking the road material.