# **Matter and Its Properties Discussion Guide (for use during or after reading)**

1. What is matter? (What Is Matter?, p. 4-5)
   1. Matter makes up everything in the universe. It includes anything that has mass and volume.
2. What is density? (Measuring Matter, p. 6-7)
   1. Density describes the amount of matter in a particular volume of a substance. Density can explain why a bowling ball and a balloon that are the same size have different masses.
3. What are properties of matter? (Properties of Matter, p. 8-11)
   1. Matter can be described by its properties. Properties of matter include mass, volume, and density. In addition, matter can also be described by other properties, such as whether something floats or sinks, if it is magnetic, if it dissolves, and how easily something changes state.
4. Use academic vocabulary to describe what matter contains. (A Look Inside, p. 12-13)
   1. All matter is made of molecules, which are in turn made of tiny particles called atoms. Atoms have a nucleus that contains protons and neutrons. Electrons are even smaller and move around the nucleus. Electrons carry a negative electric charge.
5. Describe the difference between elements and compounds. (Elements and Compounds, p. 14-15)
   1. An element is a substance with only one type of atom. Elements are like ingredients. They cannot be broken down into other substances. A compound is a molecule with two or more different types of atoms.
6. Provide an example to explain how energy can change matter from a solid to a liquid to a gas. (States of Matter, p. 16-19)
   1. Energy has the ability to change the state of matter. Heat is a form of energy. When heated enough, solid rock can melt into liquid lava. When the liquid gets hot enough, the molecules break free from one another and turn into gas. Cooling matter can also cause it to change state.
7. Describe the difference between metals and nonmetals. (Grouping Matter, p. 20-23)
   1. Scientists decided to organize and group matter into two main categories: metals and nonmetals.
   2. Metals are the biggest group of elements. They are shiny and reflect light well. All metals are solid at room temperature (except mercury) and have atoms that are close together, causing them to be dense. Metals are useful because they can be used to create tools. Metals make good conductors of heat and electricity, and some are magnetic.
   3. Nonmetals can include solids, liquids, or gasses at room temperature. They usually do not conduct heat or electricity well, are brittle and break easily, and appear dull in color. However, nonmetals have a wider range of colors than metals. People have found many uses for nonmetals, too! For example, plastic makes a great insulator of electricity.
8. What is the periodic table and how is it generally organized? (The Periodic Table, p. 24-25)
   1. The periodic table lists all the elements scientists have discovered so far. Metals are listed on one side of the table and nonmetals (with the exception of hydrogen) are found on the other. Each element has its own atomic symbol, atomic number, and atomic name.
9. Why should scientists study matter? (Matter at Work, p. 26-27)
   1. Scientists should study matter and its properties because matter makes up our entire universe! It is important to understand it so we can use it efficiently and to our benefit.
10. Who was Dmitri Mendeleev and what was his claim to fame? (Who’s Who, p. 32-33).
    1. Dmitri Mendeleev was a Russian chemist who had a dream that led him to organize the elements by atomic mass. His dream allowed him to create what we know now as the periodic table!