# **Matter and How It Changes Discussion Guide (for use during or after reading)**

1. What is matter? (Changing Matter, p. 4-5)
   1. Matter makes up everything in the universe. It is made of atoms and molecules (two or more atoms chemically bonded together).
2. Describe the three main states of matter. How do molecules move in each state? (States of Matter)
   1. There are three main states of matter: solid, liquid, and gas. The molecules in a solid vibrate and arrange themselves in a repeating, rowlike pattern. The molecules in a liquid move more freely than those in a solid. The molecules in a gas move even faster and more freely than those in a liquid.
3. Describe how heating matter can cause it to change state. (Heating Matter, p. 10-11)
   1. Solids can be heated and melted into liquids. Liquids can also be heated until they evaporate and change into gasses.
4. Provide an example to illustrate how matter can change states. (…And Back and Forth, p. 14-15)
   1. Matter can change back and forth between states naturally. For example, the sun heats a body of water (a liquid) causing it to evaporate into water vapor (a gas). Sometimes tiny droplets in clouds fall as rain (a liquid) and other times they can freeze and fall as snow (a solid).
5. What is a physical change? Provide an example of a physical change. (Physical Changes, p. 16-17)
   1. A physical change occurs when something changes state. The matter itself may look different but its properties are still the same. For example, a tree can undergo a physical change and be chopped into logs and sawdust. These materials can undergo more physical changes and be made into toothpicks. All of these materials have undergone physical changes but are all still wood, just in different forms.
6. Describe the difference between a suspension and a solution. (Mixing and Separating Matter, p. 18-21).
   1. We can mix matter together in different ways. One type of mixture is a suspension. A suspension is an uneven mixture of a liquid and a solid in which the solid settles to the bottom if it is left undisturbed. A solution, on the other hand, is a mixture in which one substance is dissolved or mixed completely into another.
7. How do mixing and separating matter relate to physical changes? (Mixing and Separating Matter, p. 18-21).
   1. Creating a mixture or separating matter can cause physical changes in substances. A mixture is a physical combination of substances and can include gasses, solids, or liquids.
8. What is a chemical change? Provide an example of a chemical change. (Chemical Changes, p. 22-25)
   1. A chemical change is one in which one substance is converted into one or more substances with different properties. A chemical change causes a different type of matter to form. For example, wood undergoes a chemical change when it is burned and turns into smoke and ask.
9. What are super fluids? What is plasma? (Super States, p. 28-29)
   1. Scientists have discovered other states of matter. Superfluids are created by cooling atoms to extremely low temperatures. They are liquids, but they behave like gasses. Plasma is another state of matter. It is created by heating substances to super hot temperatures.
10. Which fun fact stood out to you and why? (Can You Believe It?!, p. 34-35)
    1. Students’ answers will vary.