Lesson 1

Before You Read
1. Disagree
2. Agree

Read to Learn
1. a nucleus comprised of protons and neutrons, electrons
2. electrons
3. Matter that is made up of one or more atoms in the same combinations; a substance is an element or a compound.
4. 6; the atomic number is the same as the number of protons in the nucleus of the atom.
5. Atoms of different elements contain different numbers of protons.
6. aluminum
7. Because CO₂ contains two elements, carbon and oxygen; H₂ contains only one element.
8. a heterogeneous mixture because each spoonful holds different amounts of the substances in the mixture
9. Students should highlight “not evenly mixed” and “different combinations” on the left side of the table and “evenly mixed” and “same combinations” on the right side of the table.
10. A substance is matter with a composition that is always the same. Mixtures are combinations of two or more substances that are physically blended together but can vary in composition.
11. By whether it is a substance or a mixture; if it is a substance, it can be classified as an element or a compound. A mixture can be classified as homogeneous or heterogeneous.
12. Students should circle “Element” and “Compound.”

After You Read
1. Possible answer: Light is not matter because it does not have mass and does not take up space.
2. Matter:
   substances: elements; compounds
   mixtures: heterogeneous mixtures; solutions
3. One; we know this because there is no subscript after the oxygen symbol in the chemical formula.

Lesson 2

Before You Read
3. Disagree
4. Agree

Read to Learn
1. Possible answer: Water is a clear liquid that can be poured from one container to another.
2. It changes from a gas to a solid.
3. Their differences are determined by how close their particles are to one another and how fast the particles move.
4. No; mass does not vary with location because it is not dependent upon gravity.
5. \[ 12 \text{ g} ÷ 16 \text{ mL} = 0.75 \text{ g/mL} \]
6. Possible answers (students may list any five): state of matter, mass, volume, boiling and melting points, density, conductivity, solubility, magnetism
7. You could use a magnet to remove the iron, or you could dissolve the salt, leaving the iron behind.
8. You can separate the individual substances out of most mixtures by using differences in their physical properties.

After You Read
1. Possible answer: Mass is the amount of matter in an object; weight is the pull of gravity on that matter.
2. Size-dependent definition: Physical properties depend on the size or amount of matter. Examples include mass and volume. Size-independent definition: Physical properties do not depend on the amount of matter. Examples include conductivity, state of matter, density, solubility, and magnetism.
3. Sand is not soluble in water, and sand is more dense than water so it sinks.

Lesson 3

Before You Read
5. Disagree
6. Agree
Read to Learn
1. because thermal energy from your hand is added to the ice, raising the temperature of the ice enough to overcome the attractive forces between particles
2. Students should circle the horizontal areas of the graph line labeled “melting” and “boiling.” It can change a liquid to a solid or a gas to a liquid. For some substances such as water, it can change a gas directly to a solid.
3. It can change a liquid to a solid or a gas to a liquid. For some substances such as water, it can change a gas directly to a solid.
4. One substance breaks into small particles that mix evenly throughout another substance. The identities of the substances do not change.
5. A physical or chemical change does not change the total mass of matter.
6. 230 g – 200 g = 30 g of solute dissolved

After You Read
1. Possible answer: I boiled water for breakfast, which caused some of the water to change state from a liquid to a gas.
2. freezing — melting
   boiling — condensation
   sublimation — deposition
3. Students should write a main point and an example from their outline.

Lesson 4
Before You Read
7. Agree
8. Agree

Read to Learn
1. ability to burn, rust, or rot
2. formation of bubbles or a change in odor, color, or energy
3. They show the chemical formula of each substance in the reaction.
4. the reactants, iron and sulfur
5. $4 \times 2 \text{ H atoms} = 8 \text{ H atoms}$
   $4 \times 1 \text{ O atom} = 4 \text{ O atoms}$
6. In step 1, students should highlight H=4, H=2, O=2, and O=3.
   In step 2, they should highlight O=2 and O=4.
7. The particles move faster and collide with greater force and more frequently.
8. It will slow the reaction.
9. temperature, concentration, surface area

**After You Read**

1. Possible answer: In a chemical change, the substances change into other substances with new properties. In a physical change, the substances remain the same.

2. Left side: $C = 2$, $H = 4$, $O = 6$
Right side: $C = 2$, $H = 4$, $O = 6$
balanced

3. The banana changes color from yellow to black. If left long enough, the banana may take on a certain odor.