**Learner Outcomes**

**Unit: Chemical Interactions**

**Subunit: Substances**

* The student will be able to define chemical reaction. (Memory)
* The students will be able to define chemical reaction in their own words. (Comprehension)
* The student will use their definition of chemical reaction to explain how they know a chemical reaction occurred when water was added to the mystery mixture. (Application)
* The student will compare several mixtures with water added to narrow the possibility of what the mystery mixture is based on previous observations. (Analysis)
* The student will create a lab to determine exactly what the mystery mixture is. (Synthesis)
* The student will defend their findings about what they mystery mixture is using evidence from their labs. (Evaluation)

**Subunit: Elements**

* The students will be able to define element. (Memory)
* The students will be able to describe how the periodic table organizes the elements. (Comprehension)
* The students will list elements found on product labels. (Application)
* The students will use the periodic table to analyze the elemental composition of substances seen in the experiences of the substances subunit. (Analysis)

**Subunit: Particles**

* The students will be able to define particles. (Memory)
* The students will measure the volume of gas produced when the mystery mixture is added to water. (Analysis)
* The students will explain compression and expansion. (Comprehension)
* The students will design an experiment to demonstrate to the class what they believe happens when air is captured, compressed, and expanded. (Synthesis)
* The students will evaluate their own pre-assessment of how the particles of gas look and move when air is captured, compressed, and expanded and make any changes necessary. (Evaluation)

**Subunit: Kinetic Energy**

* The students will define kinetic energy. (Memory)
* The students will design a demonstration for younger students to show what happens when air is heated and cooled. (Synthesis)
* The students will explain contraction and expansion of air and liquids. (Comprehension)
* The students will use the concepts learned to create their own thermometer replications. (Synthesis)
* The students will explain the relationship between kinetic energy and contraction and expansion of a liquid. (Comprehension)
* The students will explain expansion and contraction of a solid based on teacher demonstration. (Comprehension)

**Subunit: Energy Transfer**

* The students will design an experiment to determine what happens when warmer and cooler water are mixed. (Synthesis)
* Students will analyze data and create an explanation as a class about what happens when warmer and cooler water is mixed using results from their experiments. (Analysis).
* The students will explain energy transfer in terms of the change of particle kinetic energy as a result of particle collisions. (Comprehension)

**Subunit: Phase Change**

* The students will explain phases in terms of the relationship of particles to one another in a substance. (Memory)
* The students will use observations of m&m’s in hot/cold air/water to distinguish the difference between melting and dissolving. (Analysis)
* The students will design an experiment to determine the melting temperature of different substances. (Synthesis)
* Students will calculate the freezing point of water through a lab experiment and data collection. (Analysis)
* The students will discuss phase changes in terms of kinetic energy and energy transfer. (Application)

**Subunit: Solutions**

* The students will compare mixtures and solutions and describe ways to separate each. (Comprehension)
* The students will show what happens when different substances are combined with water and demonstrate how to separate each mixture. (Application)
* The students will design an experiment to show if there is a limit to how much solute can be dissolved in a solvent and if this varies for different substances. (Synthesis/Analysis)
* The students will define saturation. (Memory)

**Subunit: Reaction**

* The students will define atom. (Memory)
* The students will illustrate the arrangement of atoms in a substance and use the models to determine number of elements and atoms. (Application)
* The students will use atom tiles to model the rearrangement of atoms to form new substances during reactions. (Application)
* The students will define chemical reaction. (Memory)