California Science Standards linked with Generation Earth Service Learning Projects:

8th Grade Science

Waste Reduction & Recycling

Structure of Matter

3. Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for understanding this concept:
   b. Students know that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.
   c. Students know atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.
   d. Students know the states of matter (solid, liquid, gas) depend on molecular motion.
   e. Students know that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently.
   f. Students know how to use the periodic table to identify elements in simple compounds.

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:
   a. Students know reactant atoms and molecules interact to form products with different chemical properties.
   b. Students know the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
   c. Students know chemical reactions usually liberate heat or absorb heat.
   d. Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
   e. Students know how to determine whether a solution is acidic, basic, or neutral.

Periodic Table

7. The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:
   c. Students know substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

Composting

Chemistry of Living Systems (Life Sciences)

6. Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:
   a. Students know that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms.
   b. Students know that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.
   c. Students know that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA.

Stormwater Urban Runoff

Motion

1. The velocity of an object is the rate of change of its position. As a basis for understanding this concept:
   b. Students know that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary.
   c. Students know how to solve problems involving distance, time, and average speed.
   d. Students know the velocity of an object must be described by specifying both the direction and the speed of the object.
   e. Students know changes in velocity may be due to changes in speed, direction, or both.
   f. Students know how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction.

Density and Buoyancy

8. All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept:
   c. Students know the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
   d. Students know how to predict whether an object will float or sink.

Household Hazardous Waste

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:
   a. Students know reactant atoms and molecules interact to form products with different chemical properties.
   b. Students know the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
   c. Students know chemical reactions usually liberate heat or absorb heat.
   d. Students know physical processes include freezing and boiling, in which a material changes form with no chemical reaction.
   e. Students know how to determine whether a solution is acidic, basic, or neutral.

ALL GENERATION EARTH PROJECTS CAN ALSO BE LINKED TO THE GRADE 8 INVESTIGATION AND EXPERIMENTATION SCIENCE STANDARDS (Section 9).

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
   a. Plan and conduct a scientific investigation to test a hypothesis.
   b. Evaluate the accuracy and reproducibility of data.
   c. Distinguish between variable and controlled parameters in a test.
   d. Recognize the slope of the linear graph as the constant in the relationship y=kx and apply this principle in interpreting graphs constructed from data.
   e. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.
   f. Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed = distance/time, density = mass/volume, force = pressure × area, volume = area × height).
   g. Distinguish between linear and nonlinear relationships on a graph of data.