

Grade 7 Science

Know that all elements and compounds (all substances) are made up of atoms or molecules. Describe some physical and chemical properties of common elements and compounds.

- Classify substances by their chemical properties (flammability, pH, and reactivity). Describe examples of physical and chemical properties of elements and compounds (boiling point, density, color, conductivity, reactivity).
- Describe how the elements within the Periodic Table are organized by similar properties into families (highly reactive metals, less reactive metals, highly reactive nonmetals, and some almost completely non-reactive gases.)
- Identify the smallest component that makes up an element. Illustrate the structure of molecules using models or drawings (water, carbon dioxide, table salt).

Understand that chemical changes only occur in chemical reactions, where new substances with different properties are produced.

- Recognize common examples of chemical reactions (Examples: rusting – oxygen combines with iron to form rust, burning – oxygen combines with fuels, releasing energy and forming carbon dioxide and water, baking soda and vinegar react, releasing carbon dioxide, decomposition of water – water breaks apart into hydrogen and oxygen.)
- Compare and contrast the chemical properties of a new substance after a chemical change with the original substances' properties. Describe the physical properties and chemical properties of the products and reactants in a chemical change.
- Identify evidence of chemical change through color, gas formation, solid formation, and temperature change.
- Explain why mass is conserved in chemical changes.

Demonstrate how waves transfer energy when they interact with matter (for example: tuning fork in water, waves hitting a beach, earthquake knocking over buildings).

- Identify examples of waves (sound waves, seismic waves, waves on water).
- Describe how waves are produced by vibrations in matter. Identify the source of vibrations for various waves.

Explain how characteristics of living things are passed on through generations (from parent to offspring), both asexually and sexually.

- Observe and describe examples of asexual reproduction and explain how characteristics of organisms that reproduce asexually are passed on.
- Explain how characteristics of living things are passed from parent to offspring through sexual reproduction and why offspring are both similar to and different from their parents.
- Compare and contrast the advantages and disadvantages of sexual vs. asexual reproduction.

Explain how all plant and animal systems, organs and tissues are composed of various kinds of cells, which are specialized to carry out the functions of the systems, organs or tissues.

- Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).
- Explain how different body tissues, organs, and organ systems are made of specialized cells. (For example, muscle tissues are made of specific muscle cells, the eye is made of specialized rods and cones that detect light.)
- Recognize that cells function in similar ways in all organisms.
- Know that cells in all organisms take in nutrients (food, vitamins and minerals) which they use to provide energy for the work that cells do and to make materials that a cell or organism needs.

Explain how an organism grows and develops, and maintains and repairs its body parts, through cell division and specialization.

- Know that DNA maintains the code that directs all cell activities including cell specialization and repair.

Explain the role of photosynthesis in ecosystems.

- Explain how photosynthesis is used by plants to make sugar molecules (glucose); include the transformation of light energy to chemical energy.
- Understand that plants use glucose and minerals from the soil to produce the carbohydrates, fats and proteins that make up their tissues.
- Provide evidence that plants either use the glucose, carbohydrates, fats and proteins they make for energy or plant parts, or store them as food sources for themselves or consumers.

Explain how human activities change the Earth's surface, atmosphere and bodies of water and affect the survival of living things.

- Analyze the flow of water between the components of a watershed, including surface features (lakes, streams, rivers, wetlands) and groundwater.
- Describe types of pollution (air, water and ground pollution from car exhaust, industrial emissions, acid rain, etc.) and their effects on humans and other living things.
- Explain how various kinds of human activities change the surface of the Earth and affect the survival of living things.

Explain how the sun (like other stars) produces tremendous amounts of light and heat.

- Know that nuclear reactions take place in the sun, producing heat and light, and that nuclear reactions produce considerably more energy than chemical reactions like burning wood, propane, etc.
- Recognize how only a tiny fraction of light energy from the sun is transformed to heat energy on Earth.

Describe how the sun warms the earth and its atmosphere and influences weather.

- Explain the water cycle, including the importance of the sun, using a model or drawing. Illustrate how some precipitation enters streams, rivers, lakes and oceans and other precipitation filters into the ground to become part of the groundwater supply.
- Recognize that water vapor mixes in the atmosphere with the other gases that make up air, including primarily nitrogen and oxygen, but also carbon dioxide and other trace gases. Know that the atmosphere is less dense and colder (generally) at higher elevations.
- Explain convection in the atmosphere and its role in the formation of clouds, both "summer cumulus" and clouds along frontal boundaries. Identify the source of heat for convection in the atmosphere (the sun).
- Using weather maps that show fronts over several days, describe the movement of major air masses across North America associated with frontal boundaries (cold, warm, stationary, and occluded).
- Describe weather conditions associated with frontal boundaries (cold, warm, stationary, and occluded).
- Explain how the warming of the Earth causes winds.
- Describe the climate in Michigan and other places in the U.S. and explain factors that influence climate, such as large bodies of water, ocean currents, mountain ranges, etc.