Weathering Instructional Case: A series of 5 student-centered science lessons

Glossary

Abrade/Abrasion

- *From a Scientist:* The mechanical scraping of a rock surface by friction between rocks and moving particles during their transport by wind, glacier, waves, gravity, running water or erosion. The intensity of abrasion depends on the hardness, concentration, velocity, and mass of moving particles.
- *From a Student:* The work that sediment particles do against each other, mostly in rivers and at the beach.

Acid rain

- *From a Scientist:* Rain or any other form of precipitation that is unusually acidic, meaning that it contains elevated levels of hydrogen ions and has a low pH. It is caused by emissions of sulfur dioxide and nitrogen oxide, which reacts with the water molecules in the atmosphere to produce acids.
- *From a Student:* Rain that is more acidic than normal rainwater. Acid rain describes any form of precipitation with high levels of nitric and sulfuric acids. It can also occur in the form of snow, fog, and tiny bits of dry material that settle to Earth.

Carbon dioxide

- *From a Scientist:* A naturally-occurring chemical compound composed of 2 oxygen atoms each covalently double bonded to a single carbon atom. It is a gas at standard temperature and pressure.
- *From a Student:* A colorless odorless, incombustible gas present in the atmosphere and is heavier than air and soluble in water.

Chemical Weathering

- *From a Scientist:* Process by which the internal structure of a mineral is altered by the addition or removal of elements. The most common types of chemical weathering are oxidation, hydrolysis, and carbonation. Change in phase (mineral type) and composition are due to the action of chemical agents. Smaller particle sizes weather by chemical means more rapidly than large particles due to an increase of surface area.
- *From a Student:* Chemical reactions that breakdown the bonds that hold the rocks together, causing them to fall apart, forming smaller and smaller pieces. Chemical weathering is more common in locations where there is a lot of water.

Dissolve

- *From a Scientist:* The process of attraction and association of molecules of a solvent with molecules or ions of a solute. As ions dissolve in a solvent, they spread out and become surrounded by solvent molecules.
- *From a Student:* The process of dissolving a solid substance into a solvent to make a solution.

Freezing

- To become hardened into ice or into a solid body; change from the liquid to the solid state by loss of heat. When water continually seeps into cracks of rocks, freezes, and then expands, thus eventually breaking the rock apart.

Mechanical Weathering

- *From a Scientist:* Physical disintegration of a rock into smaller fragments, each with the same properties as the original. Occurs mainly by temperature and pressure changes.
- *From a Student:* Takes place when rocks are broken down without any change in the chemical nature of the rocks. The rocks are essentially torn apart by physical foce, rather than by chemical breakdown.

Organisms

- *From a Scientist:* Any contiguous living system such as a vertebrate, insect, plant, fungus, protistan, moneran, or bacterium.
- *From a Student:* A form of life composed of mutually interdependent parts that maintain various vital processes.

Oxygen

- *From a Scientist:* A chemical element that is a highly reactive nonmetallic element and oxidizing agent that readily forms compounds (oxides) with most elements.
- *From a Student:* An element in the atmosphere that is necessary to sustain most terrestrial life as it is used in respiration. It is a colorless and odorless gas.

Particles

- *From a Scientist:* A small localized object to which can be ascribed several physical or chemical properties such as volume or mass.
- *From a Student:* A relatively small or the smallest discrete portion or amount of something.

Prediction

- *From a Scientist:* A rigorous statement forecasting what will happen under specific conditions. Students can test predictions through the use of experiments and models.
- *From a Student:* A general statement of how one thinks the scientific phenomenon in question works. The experiment or model that is designed is developed to test the prediction.

Pressure

- *From a Scientist:* The force per unit area applied in a direction perpendicular to the surface of an object. It is measured in any unit of force divided by any unit of area.
- *From a Student:* The force exerted on a surface divided by the total area over which the force is exerted.

Procedure

- A clear description of how the experiment will be conducted.

Sediment

- *From a Scientist:* Eroded soil and debris from the surrounding landscape that include rocks as small as tiny clay particles and as large as boulders moved by water.
- *From a Student:* Naturally occurring material that is broken down by processes of weathering and erosion and is subsequently transported by the action of wind, water, or ice and/or by the force of gravity acting on the particle itself.

Thawing

- To change from a frozen solid to a liquid by gradual warming. The ice will melt when the temperature rises above freezing and with the process happening repeatedly, the rock will weaken and eventually shatter into angular fragments.

Weathering

- *From a Scientist:* The breaking down of rocks, soil, and minerals as well as artificial materials through contact with the Earth's atmosphere, biota, and waters. Weathering occurs with no movement, unlike erosion.
- *From a Student:* The breaking up of surfaces by forces such as the air and water of the atmosphere. These processes cause the breakup of rock materials in the Earth's uppermost later.