

Cool, Clear, Water

Grades: 4-6

Subjects: Math, Science, Communication Arts

Approximate Time: 1 week

Montana Standards: Math 1,2,4; Science 1,2,3; Communication Arts 5.

Objectives: Students will

- Learn the water cycle and about precipitation

Materials:

- Flower pots
- Potted flower
- Potting soil
- Scale

Keywords:

Water Cycle: an endless process of water circulation going on throughout the world.

Evaporation: The process by which any substance is converted from a liquid state into, and carried off in, vapor.

Transpiration: the passage of water through a plant from the roots through the vascular system to the atmosphere.

Precipitation: falling products of condensation in the atmosphere, as rain, snow, or hail.

Water table:

Percolation:

Brief Description: Water is the most abundant substance on Earth. It covers more than 70% of the Earth's surface. It fills the oceans, rivers, and lakes and is in the ground and in the air we breathe. The water cycle is an endless process of water circulation going on throughout the world. The sun's energy transfers water from the sea and earth to the atmosphere in the form of water vapor. The soil and inland water bodies through evaporation and plants through transpiration add large amounts of water vapor to the atmosphere, but most of it comes from the oceans. Man, animals, and machines add small amount by means of respiration and combustion. Air masses carry the water vapor across the earth, and the water vapor condenses into precipitation.

Precipitation falls as rain, sleet, snow, and hail. Some evaporates while falling and returns to the atmosphere. A small amount is intercepted and held by plants or by buildings, automobiles, and other structures and machines until it evaporates back into the atmosphere.

Most of the precipitation soaks into the soil; the part that doesn't runs to the sea by way of streams and rivers. Ground water gets there more slowly.

Misuse and poor management of the soil will decrease the amount of water that soaks into the soil and increase the amount that runs off over the surface. Runoff on bare land leads to erosion.

Grass, trees, and other plants hold the soil in place and slow the runoff, allowing more water to soak into the soil.

Some of the water that soaks into the soil is used by plants. Part of it percolates beyond the reach of plant roots to the water table, to underground reservoirs, and to springs and artesian wells. Runoff on its way to the sea can be intercepted and stored for industrial or household use, and it can be diverted for irrigation.

Little water has been added or lost through the ages. The water cycle prevails in all places and at all times with neither beginning nor end.

Lesson:

1. **Keep a record (by cups, quarts, or gallons) of water used for all purposes in any one day by any one person or family.** Change the total amount used to pounds of water and compare the result with the weights of the individuals to indicate the importance of water in our daily lives
2. **Find the combined weights of class members.** Compute how many pounds of this weight is water. (The human body averages 70% water).
3. **To show how much water plants use.** Fill some flowerpots with soil that has first been oven-dried and weighed. Also weigh the pots plant flowers (not seeds). Fill the pots with measured (weighed) quantities of water- all the water the pots can hold. After this first watering of the soil, add no more. Use a dish to catch excess water that moves down through large pores in the soil and out the pot weigh this water daily until no more comes out. Weigh pots including the soil, plants and water. Weigh again every day. To eliminate evaporation, slit a piece of waxed paper, place the stem of the plant through the slit in the paper, and bind the paper around the top edge of the pot.
 - a. Note: When the plants wilt, weigh the pots including soils and plants. Subtract this amount from the weight of the water put into the pot plus pot and soil, less the amount drained out. The difference will indicate how much water was left when the plant wilted, and also how much it used in its life processes.
4. **To show the water loss from leaves.** Insert the stem of a fresh, green leaf through a small hole in a piece of waxed paper. Put the paper over a glass of water so that the stem of the leaf reaches into the water. Invert a dry, empty glass over the leaf. Invert another dry, empty glass over the glass containing only water. What appears on the inside of the inverted glasses?
5. **To show where transpiration in leaves is more rapid.** Apply Vaseline or other petroleum jelly evenly over the entire undersides of some fresh, green leaves and over the entire upper sides of other similar leaves. Expose all leaves to the classroom air. Which leaves wilt more quickly? Can you explain why this happens?
6. **Use any posters or visuals that your school has to explain the water cycle, or have your students make their own.**

Assessment:

Students will write a ½ to full page summary of the processes used in the experiments. They will also include information on the results of these experiments.