Lesson D1
The Water Cycle

Guiding Question

How is water transferred around the planet?

Key Concept

- Water is continuously circulated around the Earth by a process known as the water cycle.

Objective

For students to understand what the water cycle is and how it allows water to circulate around the Earth.

Introducing the Lesson

Open a discussion with your students about their daily activities. Wake up, brush teeth, take a shower, eat breakfast, get dressed, go to school, etcetera. Now have students imagine all of those activities without water. Waking up wouldn't be hard, but how can they brush their teeth? Take a shower? Wash the clothes they wear? Rinse the food they eat? Hopefully, students will start to realize how absolutely essential water is to everyday life on Earth. But how does all the water travel around? Where does the rain come from? What are clouds made of? And why are some areas very dry and others very wet?

Ask students what they know about the water cycle. What do they know about evaporation and condensation? What does precipitation mean and what are its forms?

In this lesson, students will learn the answers to these questions.

Science Background

Water is essential for all life on this planet. The process by which water moves around the Earth is known as the water cycle. The water cycle is the continuous movement of water from the Earth's surface, up into the atmosphere, and back down again to the Earth's surface.

The water cycle consists of many components. The table below lists the major steps in the water cycle.

The Water Cycle

Process	Description
evaporation	the change of state from liquid (i.e. water) to gas (i.e. water vapor)
transpiration	the evaporation of water from plants into the atmosphere
condensation	the change of state from gas (i.e. water vapor) to liquid (i.e. water droplets)
precipitation	when water falls from the clouds down to the Earth as rain, snow, sleet, or hail
run-off	water flowing over the surface of the ground (i.e. in streams, rivers)
infiltration	the flow of water from the Earth's surface into the ground (i.e. groundwater)

The Earth's atmosphere gains its moisture content as a result of evaporation.

Time Required
Approximately 40 minutes

Vocabulary
Condensation
Evaporation
Infiltration
Precipitation
Run-off
Transpiration
Water cycle

Assessment

Pretest: Contents Brainstorming, on page 262

Posttest: Three-Level Study Guide on page 271

Clouds form when water vapor condenses around microscopic particles in the atmosphere such as dust and salt particles. These condensed droplets of water are so small that they can remain suspended in the atmosphere.

It takes billions of these condensed water droplets to form a cloud. Clouds represent a major reservoir of stored moisture in the atmosphere.

Cloud droplets fall to the ground as precipitation when they become too heavy. This precipitation can take several forms such as rain, snow, sleet, or hail.

Learning Activities

Try This are interactive activities that require students to observe, measure, and manipulate various aspects of the 3D globe in a data-rich environment.

- Exploring the Water Cycle: Evaporation
- Exploring the Water Cycle: Condensation
- Exploring the Water Cycle: Precipitation

Did You Know? 1

The water cycle circulates approximately 577,000 km^3 (1.52×10^{17} gallons) of water around the Earth each year. This is 47 and a half times the volume of Lake Superior, the largest freshwater lake in the world.

Did You Know? 2

Water vapor only stays in the air for an average of 10 days before condensing into clouds or falling as rain or snow.

Did You Know? 3

At any given moment, approximately 12,900 km^3 (3,100 mi^3) of water are in the atmosphere in the form of clouds or humidity.

Did You Know? 4

The maximum size of raindrops ranges between 2 and 3 mm (0.08 and 0.12 in). Air resistance would cause any bigger drops to break into smaller drops.

Evidence of Learning

Upon completion of this lesson, you should have evidence that students can:

- Explain how the water cycle works.
- Describe each the major components of the water cycle (evaporation, transpiration, condensation, precipitation, run-off, and infiltration).

Review Questions and Answers

1) What is meant by the term *water cycle*?

The water cycle is the continuous circulation of water around the planet between the Earth's surface and the atmosphere.

2) What processes are responsible for putting water into the atmosphere?

Evaporation and transpiration are the two processes responsible for putting water into the atmosphere.

3) Label the lettered areas of this diagram describing the water cycle.

Letter	Process
A	*evaporation*
B	*transpiration*
C	*condensation*
D	*precipitation*
E	*run-off*
F	*infiltration*

4) Do areas of high cloud water content also correspond to areas of high rainfall? Explain.

Yes, areas of high cloud water content also correspond to area of high rainfall. Rainfall is formed as a result of water droplets falling out of clouds, therefore, clouds with a high water content would have more raindrops forming than clouds with a low water content.