

Water Cycle

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About **Water Cycle**

DeltaScienceModules, THIRD EDITION

Students build a comprehensive, pictorial chart that shows the continuous movement of water between Earth and the atmosphere known as the water cycle. Each addition to the chart is based on inquiry and investigation, as students explore evaporation, condensation, and precipitation. They create rainbows, measure humidity, and model clouds. In classroom terrariums, students observe that soil, plants, and a mini-pond are the sources of water vapor. Teams even assemble closed water chambers in which rain falls and rivers flow.

In the Delta Science Reader *Water Cycle*, students read about why Earth is called the water planet. They find out about salt water and fresh water and where each kind of water is found. They observe how water changes form by freezing, melting, evaporating, and condensing. They trace the water cycle and find out how heat energy from the sun is related to the water cycle. They learn how Earth's weather is affected by the water cycle. They also read about Luke Howard, the scientist who first classified clouds. Finally, students investigate water as a natural resource.

Overview Chart for Hands-on Activities

| Hands-on Activity | Student Objectives |
|--|---|
| 1 Where Is Water? <i>page 13</i> | <ul style="list-style-type: none"> • make a list of bodies of water on Earth • freeze water and observe that ice floats on water • map some locations of water and ice on Earth • begin a chart to illustrate the water cycle |
| 2 Water in Soil <i>page 23</i> | <ul style="list-style-type: none"> • operationally define the term <i>absorb</i> • investigate the ability of soil to hold water • infer that water is also stored in soil on Earth • add the presence of water in soil to the Water Cycle chart |
| 3 Water in Plants <i>page 31</i> | <ul style="list-style-type: none"> • observe that pieces of fruits and vegetables dry out when exposed to air • infer that living things contain water • speculate as to where the water from the plants goes when they dry out • add the presence of water in plants to the Water Cycle chart |
| 4 Evaporating Water <i>page 39</i> | <ul style="list-style-type: none"> • observe changes in water level due to evaporation • infer where water goes when it evaporates • determine the effect of temperature on evaporation rate |
| 5 Puddle Watching <i>page 45</i> | <ul style="list-style-type: none"> • predict what happens to the water in a puddle over the course of a day • design and carry out an experiment to measure the evaporation of water from a puddle • add evaporation of water from bodies of water to the Water Cycle chart |
| 6 More Water into the Air <i>page 53</i> | <ul style="list-style-type: none"> • observe that plants and soil give off water • infer that water loss occurs through the leaves of plants • add evaporation of water from soil and transpiration to the Water Cycle chart |
| 7 How Much Water? <i>page 61</i> | <ul style="list-style-type: none"> • observe the reaction of cobalt paper to moisture • use cobalt paper to compare the level of humidity in various locations • use cobalt paper to compare the change in air humidity over time |
| 8 Condensing Water <i>page 69</i> | <ul style="list-style-type: none"> • observe moisture collecting on cold tumblers • infer that water that forms during condensation comes from the air • describe the conditions under which condensation occurs • add condensation on plants to the Water Cycle chart |
| 9 A Model Cloud <i>page 77</i> | <ul style="list-style-type: none"> • make a model cloud • describe how clouds are created • list places where clouds form • add a cloud to the Water Cycle chart |
| 10 Making a Rainbow <i>page 85</i> | <ul style="list-style-type: none"> • create a model rainbow using sunlight and a spray mister • infer that a rainbow occurs naturally when light passes through water droplets in the sky |
| 11 A Terrarium <i>page 91</i> | <ul style="list-style-type: none"> • build a terrarium • observe the stages of the water cycle in the terrarium • compare the water cycle in the terrarium to the water cycle in nature • discuss the importance of preserving and conserving water |
| 12 Evaporation and Condensation <i>page 99</i> | <ul style="list-style-type: none"> • design an experiment to model evaporation and condensation • observe evaporation and condensation in a closed system • compare their water cycle chamber to the natural environment • add precipitation to the Water Cycle chart |
| 13 The Water Cycle <i>page 107</i> | <ul style="list-style-type: none"> • predict what happens to precipitation after it falls • model the process by which water and melting snow flow into lakes and oceans • diagram the movement of water in a water cycle chamber • compare their simulated water cycle with the water cycle in the environment |
| Assessment <i>page 115</i> | <ul style="list-style-type: none"> • See page 115. |

| Process Skills | Vocabulary | Delta Science Reader |
|--|-----------------------------------|------------------------|
| communicate, experiment, make and use models | freeze, glacier, melt | pages 2, 3, 4 |
| define based on observations, infer, make and use models | absorb | page 5 |
| observe, infer, make and use models | | page 6 |
| observe, infer, measure | evaporation, water vapor | pages 7, 8–9 |
| predict, experiment, make and use models | | pages 7, 8–9 |
| observe, infer, make and use models | transpiration | pages 6, 7 |
| observe, compare, measure | humid, humidity | page 7 |
| observe, infer, communicate, make and use models | condensation, dew | pages 8–9, 10–11 |
| make and use models, communicate, define based on observations | cloud, model | pages 7, 10–11, 12, 13 |
| make and use models, infer | rainbow | pages 7, 12 |
| observe, compare, communicate | polluted, terrarium | pages 10–11, 14–15 |
| experiment, observe, compare, make and use models | precipitation, water cycle | pages 8–9, 10–11, 12 |
| predict; collect, record, display, or interpret data; compare | | pages 4, 10–11, 12 |

See the following page for the Delta Science Reader Overview Chart.

Overview Chart for Delta Science Reader

Water Cycle

| Selections | Vocabulary | Related Activity |
|---|---|--|
| Think About... | | |
| <p>Why Is Earth Called the Water Planet? <i>page 2</i></p> <ul style="list-style-type: none"> • Salt Water <i>page 3</i> • Fresh Water on Earth’s Surface <i>page 4</i> • Fresh Water in the Ground <i>page 5</i> • Fresh Water in Plants <i>page 6</i> • Fresh Water in the Atmosphere <i>page 7</i> | <p>estuary, lake, ocean, river</p> <p>glacier, iceberg, ice cap, surface water</p> <p>absorb, groundwater, porous, water table</p> <p>photosynthesis, transpiration</p> <p>atmosphere, cloud, humidity, water vapor</p> | <p>Activity 1</p> <p>Activity 1</p> <p>Activities 1, 13</p> <p>Activity 2</p> <p>Activities 3, 6</p> <p>Activities 4, 5, 6, 7, 9</p> |
| <p>How Water Changes Form <i>page 8</i></p> | <p>condensation, evaporation, freeze, melt</p> | <p>Activities 4, 5, 8, 12</p> |
| <p>What Is the Water Cycle? <i>page 10</i></p> <ul style="list-style-type: none"> • Earth’s Weather <i>page 12</i> | <p>precipitation, runoff, water cycle</p> <p>weather</p> | <p>Activities 4, 8, 9, 10, 11, 12, 13</p> <p>Activities 9, 10, 12, 13</p> |
| People in Science | | |
| <ul style="list-style-type: none"> • Luke Howard <i>page 13</i> | | <p>Activity 9</p> |
| Did You Know? | | |
| <ul style="list-style-type: none"> • Water Is a Resource <i>page 14</i> | <p>desalination, irrigation, resource, water conservation, water treatment plant</p> <p><i>optional:</i> nonrenewable resource, renewable resource</p> | <p>Activity 11</p> |

See pages 123–131 for teaching suggestions for the Delta Science Reader.

MATERIALS LIST

Water Cycle

| Quantity | Description | Quantity | Description |
|----------|--|-------------------------------|--------------------------------------|
| 2 | bags, plastic, with ties, p/12 | 1 | spoon, plastic |
| 1 | baster | 2 | tape, masking* |
| 2 | batteries, C-cell* | 16 | thermometers |
| 8 | bottles, spray, p/2 | 16 | tumblers, graduated |
| 2 | chalk, p/12* | 32 | tumblers, plain |
| 16 | clay, modeling, 0.25 lb* | | |
| 11 | cobalt paper, p/3* | 1 | Teacher's Guide |
| 48 | containers, plastic, 1-pt | 8 | Delta Science Readers |
| 16 | containers, plastic, round | | |
| 32 | cups, paper, 6-oz* | TEACHER-PROVIDED ITEMS | |
| 16 | cups, paper, 8-oz* | 1 | bag, plastic, large |
| 16 | cups, plastic, 1-oz | – | books, plastic-covered |
| 2 | dots, blue, large, p/28* | 1 | chart paper* |
| 1 | dots, blue, medium, p/200* | – | crayons or markers |
| 1 | dots, blue, small, p/96* | – | fruits and vegetables* |
| 1 | flashlight | 1 | globe, or map of the world |
| 1 | food coloring, red, 1 oz* | – | ice, crushed* |
| 1 | glue, 4 oz* | – | ice, cubes* |
| 16 | lids, for tumblers | 1 | ice cube tray |
| 2 | light bulbs | 1 | knife, sharp |
| 2 | light sources | 8 | markers, felt-tip |
| 1 | matches, wooden* | – | newspaper* |
| 2 | paper, construction, black, 45 cm × 60 cm* | – | paper towels* |
| 1 | paper, construction, blue, 45 cm × 60 cm* | – | paper, white* |
| 1 | paper, construction, brown, 45 cm × 60 cm* | 16 | pencils |
| 1 | paper, construction, green, 45 cm × 60 cm* | – | pictures of terrariums (optional) |
| 1 | paper, construction, white, 45 cm × 60 cm* | 2 | pitchers |
| 1 | paper, construction, yellow, 45 cm × 60 cm* | 1 | plant, potted |
| 1 | pictures, Water Cycle | – | rocks, small |
| 1 | seeds, alfalfa* | 1 | scale (optional) |
| 1 | seeds, clover* | 1 | scissors |
| 2 | soil, potting* | – | water, tap* |
| 1 | sponge, 5 cm × 6.5 cm | | |
| 16 | sponge cubes | | |

* = consumable item

† = in separate box

ACTIVITY SUMMARY

In this Delta Science Module, students are introduced to the abundance of water on Earth and the processes by which water, in its various states, constantly moves between Earth and its atmosphere.

ACTIVITY 1 Students investigate water in its liquid and solid forms and observe that ice floats on water. They identify major locations of water and ice on Earth and color them in on a world map. The class also begins a chart that will eventually illustrate the major components of the water cycle.

ACTIVITY 2 Students investigate the ability of soil to hold water. They observe what happens when soil dries out and infer that water is stored in soil. The students add the presence of water in soil to the Water Cycle chart begun in Activity 1.

ACTIVITY 3 Students observe that pieces of fruits and vegetables dry out when exposed to air. They infer that plants contain water and speculate what happens to the water when plants dry out. The students add the presence of water in plants to the Water Cycle chart.

ACTIVITY 4 Students observe evaporation by noting a change in the water level in an open tumbler. They compare evaporation at two different temperatures and conclude that heat speeds up evaporation.

ACTIVITY 5 Students predict what will happen to the water in a puddle on a sunny day and then design and carry out an experiment to check their predictions. Students infer that evaporation occurs from all bodies of water and add evaporation from bodies of water to the Water Cycle chart.

ACTIVITY 6 Through separate experiments, students observe that plants and soil give off water vapor. They infer that water evaporates

from the soil and that water loss occurs through the leaves of plants. The class adds evaporation of water from soil and plants to the Water Cycle chart.

ACTIVITY 7 Students are introduced to the concept of humidity. They use cobalt paper to determine whether the air is dry or humid and to track the humidity over a period of days.

ACTIVITY 8 Students observe condensation of water vapor on the outside of cold tumblers and on warm tumblers filled with ice water. They infer that water condenses from water vapor in the air and describe the conditions under which condensation occurs. They add the formation of dew to the Water Cycle chart.

ACTIVITY 9 Students continue to explore condensation. They make a model cloud and add a cloud to the Water Cycle chart.

ACTIVITY 10 Students create and observe a rainbow. They discuss the conditions under which a rainbow can occur.

ACTIVITY 11 Students set up a terrarium. While observing the water cycle in the terrarium over time, they continue with Activities 12 and 13.

ACTIVITY 12 Students set up a closed chamber in which to observe the cycling of water through evaporation and condensation. They compare what happens in the water cycle chamber to the natural environment and add precipitation to the Water Cycle chart.

ACTIVITY 13 Students make water cycle chambers again, but this time they add mountains and riverbeds in order to observe the flow of precipitation into bodies of water. Then, students return to Activity 11. They compare the water cycle in the terrarium to the water cycle in nature and complete the Water Cycle chart.