

Water Cycle in a Jar

Description: ‘Water Cycle in a Jar’ is a hands-on activity in which students construct their own model of a natural system and observe its cycles. Alternatively, a teacher may construct just one large model for the class. Students may observe the water cycle, or use it to learn about needs of plants and/or animals, experiment with changing one variable such as sunlight or water amount, etc. See AKS and extensions for how this model can be used.



Essential Questions:

1. What are the components of the water cycle?
2. How does the water cycle work?
3. Extensions: How does varying _____ affect the water cycle and thus ecosystems?

AKS, K-5: See page 3

Things you will need:

1. A clean jar and lid
2. Small rocks such as gravel
3. Sand (play sand or aquarium sand)
4. Potting soil
5. Small plant such as moss, or grass seed or small beans
6. Small bottle cap or shell.

(Amounts needed depend on size of jar. It is recommended to use a larger jar, such as 8 ounces, rather than a baby-food sized jar. If no lid is available, you can use plastic wrap with a rubber band. Large glass containers, fish tanks, or aquariums with lids may also be used as a class project.)

Procedure:

1. In the jar, layer the small rocks/gravel, sand, then soil on top. Use relatively thin layers of gravel and sand, with the soil being about twice as deep.
2. Add a small plant, seeds, or beans.
3. Water gently.
4. Add shell or cap with water, and close lid.
5. Place in a sunny spot and watch the water cycle.

[See pages 4-6 for instructions with photos.]

Note: Condensation should form on lid and/or glass. If condensation is so thick that the plant/soil cannot be seen, or plant is molding or rotting, vent lid slightly until much of the liquid evaporates; close lid when just a small amount of condensation remains. Water may need to be added if soil is drying out or no condensation seen. Some water should remain in shell/cap which represents a pond or water body. It may take a while of adding/evaporating to get the water ‘balanced.’ (This is a good example for students of the narrow margins within which life functions.)

Extensions:

- 1) Students draw a concept map or diagram of the water cycle within the jar.
- 2) Set up various jars in which components vary- for example, use the same plant but differing amounts of gravel, sand, soil, water, or use the same amounts of gravel, sand, and soil, but vary the types of plants used (such as moss which requires a lot of moisture and tiny succulents which do not), amounts of sunlight they receive, amounts of water used initially (can simulate drought or excessive rainfall and floods), etc. Number jars and note experimental setup criteria for each. Have students make hypotheses about what they think will happen in each jar; record observations in a lab notebook or a computer database; draw conclusions at the end of the specified time period. An observation concept map may be used instead of a lab notebook.
- 3) Alter the environment of a set of identical jars (same levels of gravel, sand, soil, same plant and amount of plant) by adding a little vinegar to water and spraying it in the jar as acid rain; add some oil to the soil of one jar (cooking oil, sewing machine oil); add a small amount of fertilizer to another jar (water from a freshwater fish tank may be used), and spray a small amount of household cleaner onto the soil or into the shell/cap. Students complete observations as in #2.
- 4) Vary jar sizes to see how much more life a jar 2x or 3x can support as compared to original size. Students can compute volume or surface area of jar or 'ground' then estimate volume of plant life for a comparison chart.
- 5) Vary jar sizes but use the same amount of gravel, sand, soil, and/or water to show how reduction of a natural resource such as topsoil or water affects an ecosystem.
- 6) In larger jars or terrariums, add small organisms such as worms, bugs, frogs, etc. Live animals should be used for only a short time, then returned to where they were found. Ensure that no endangered or harmful species are used.
- 7) Students write a story of what happened in the jar from the point of view of one component- the plant, water, etc.
- 8) Students write a brief play and then act out the parts of each jar component.
- 9) Students write poems, using different poetry forms such a haiku, concrete poems, limericks, etc., to explain the water cycle.
- 10) Take a walk in a natural area to explore the parts of nature that correlate with jar components; this is especially effective after a rain.

AKS:KINDERGARTEN-

(KSC_A2007-5) Use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS)

5a - use a model such as a toy or picture to describe the features of an object

(KSC_D2007-13) compare and contrast groups of organisms (GPS)

13b - compare common needs between a plant and animal (sunlight, air, food, water)

13h - Extension: observe living plants and animals in the classroom and keep a record of changes that occur over time

1ST GRADE-

(1SC_A2007-5) Use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS)

5a - use a model such as a toy or picture to describe the features of an object

(1SC_B2007-8) Observe and record changes in water as it relates to weather (GPS)

8d - determine that water in an open container evaporates over time, but water in a closed container does not

(1SC_D2007-12) Compare and contrast the characteristics and basic needs of plants and animals (GPS)

12a - identify the basic needs of a plant (air, water, light, nutrients)

12b - identify the basic needs of an animal (air, water, food, shelter, space)

12c - identify and explain the functions of the basic parts of a plant (root, stem, leaf, flower)

2ND GRADE-

(2SC_A2007-5) Use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS)

5b - use a model such as a toy or picture to describe the features of an object

3RD GRADE-

(3SC_A2006-5) Use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS, ITBS)

5a - observe and describe how parts influence one another in objects that have many parts (GPS)

5c - identify and explain ways in which representations or models do not match the original object (GPS)

4TH GRADE-

(4SC_A2006-5) Use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS, ITBS)

5a - observe and describe how parts influence one another in objects that have many parts (GPS)

5c - identify and explain ways in which representations or models do not match the original object (GPS)

(4SC_B2006-10) Differentiate between the states of water and how they relate to the water cycle and weather (GPS, ITBS)

10c - identify cloud types and formation and how clouds relate to the water cycle (GPS)

10d - demonstrate and explain the water cycle and the role of evaporation, precipitation and condensation (GPS)

5TH GRADE-

(5SC_A2006-5) use the concepts of system, model, change and scale when exploring scientific and technological matters (GPS, ITBS)

5a - observe and describe how parts influence one another in objects that have many parts (GPS)

5c - identify and explain ways in which representations or models do not match the original object (GPS)

‘Water Cycle in a Jar’ Photo Instructions

Things you will need:

1. A clean jar and lid
2. Small rocks such as gravel
3. Sand (play sand or aquarium sand)
4. Potting soil
5. Small plant such as moss, or grass seed or small beans
6. Small bottle cap or shell.
7. Water



Amounts needed depend on size of jar. It is recommended to use a larger jar, such as 8 ounces, rather than a baby-food sized jar. If no lid is available, you can use plastic wrap with a rubber band. Large glass containers, fish tanks, or aquariums with lids may also be used as a class project. Using plants will show effect fastest, but seeds may also be used.

Procedure:

1. In a clean jar, layer the small rocks/gravel. Use a relatively thin layer of gravel. A funnel can be made by cutting off the top of a plastic water bottle for students with decreased manual dexterity or for jars with narrow openings.





2. Add sand. Use a relatively thin layer of sand, approximately as thick as the gravel. Sand will fill in around the small gravel, so layers may not be visible.

3. Gently pour soil on top of sand. Depth of soil should be approximately the same as the gravel plus the sand.





4. Add a small plant, seeds, or beans. (Seeds or beans may take a number of days or even weeks to germinate.)

5. Water gently.

6. Add shell or cap with water.



7. Put lid on tightly

8. Place in a sunny spot and watch the water cycle!