

OIMB GK12 CURRICULUM

3rd Grade

45 minutes plus follow-up
over a few weeks

WATER CYCLE BAG: STATES OF MATTER & WINDOW EXPERIMENT

Oregon Science Content Standards:

- 3.1 Structure and Function: Living and non-living things vary in their characteristics and properties.
- 3.1P.1 Compare and contrast the properties of states of matter.
- 3.2 Interaction and Change: Living and non-living things interact with energy and forces.
- 3.2E.1 Identify Earth as a planet and describe its seasonal weather patterns of precipitation and temperature.
- 3.3 Scientific Inquiry: Scientific inquiry is a process used to explore the natural world using evidence from observations and investigations.
- 3.3S.1 Plan a simple investigation based on a testable question, match measuring tools to their uses, and collect and record data from a scientific investigation.
- 3.3S.2 Use the data collected from a scientific investigation to explain the results and draw conclusions.
- 3.3S.3 Explain why when a scientific investigation is repeated, similar results are expected.

Ocean Literacy Principles:

- 3. The ocean is a major influence on weather and climate.

Goals: To expand students' knowledge of water cycle processes and have students practice making predictions and observations.

Concepts:

- Evaporation
- Condensation
- Molecules
- Predictions
- States of matter: solid, liquid, and gas

Materials:

- 3 heat-resistant glass containers
- Ice
- Tea kettle to heat up water
- Ziplock-type bag (one for class experiment, individual bags if desired)
- Small plastic cup (one for class experiment, individual cups if desired) note: paper cups dissolve so should not be used
- Food coloring
- Tape – duct tape works best
- Water Cycle Bag Worksheets

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Lesson Plan:

1. This lesson should follow a brief introduction to the water cycle.
2. States of matter
 - In front of the class, show students three clear containers with: water, ice and near-boiling water
 - Have students describe which is the warmest and which is the coldest
 - Point out the steam rising from the near-boiling water. Ask students where the steam is coming from. Explain that steam is still water, but in a gas form rather than a liquid.
 - Define the three states of matter: solid, liquid and gas
 - Explain that water can change from state to state.
 - What happens when we put liquid water in a really cold place? It **freezes** – changes from liquid to solid.
 - What happens when we heat up water? It **evaporates** – changes from liquid to a gas.
 - What happens when steam gets colder? It **condenses** – changes from gas back to liquid.
 - Make sure students understand these terms. Use examples from everyday life, such as ice melting, droplets forming on a cold lemonade glass in the summer, or glasses getting foggy.
 - Make sure that students understand that these changes depend on changes in temperature.
3. Molecules and movement
 - Explain that water (and everything) is made up of very small particles called **molecules**
 - Have students get up and pretend to be water molecules at different states. As ice, they stand close together without much movement. Tell the students that the temperature goes up and they **melt** into liquid, where they stand a little farther apart and move around a little. The temperature goes up again and they **evaporate** into gas, where they spread about and can walk around the classroom. The temperature goes back down and they **condense** back into liquid coming closer together and moving only a little.
 - Water can change from one state to another and back again – this is called a cycle.
4. Mini water cycle bag window experiment: What happens to water in a cup left in the sun?
 - Explain that over the next few weeks they are going to run an ongoing science experiment to show that water can change from one state to another. The window, on the sunny side of the classroom, will act as a source of heat.
 - Tip a zip-top bag 90 degrees. Place a half cup of water (colored) in the bottom corner of the bag. Then tape the bag to the window, without disturbing the water.
 - Wait to observe how things change over a few weeks.
 - One bag will be made for the whole class. Students can also make bags for individual or groups of students.
 - Have students draw what the bag and contents look like at the beginning and make a prediction of how it will change over the next few weeks (on their Water Cycle Bay Worksheet)

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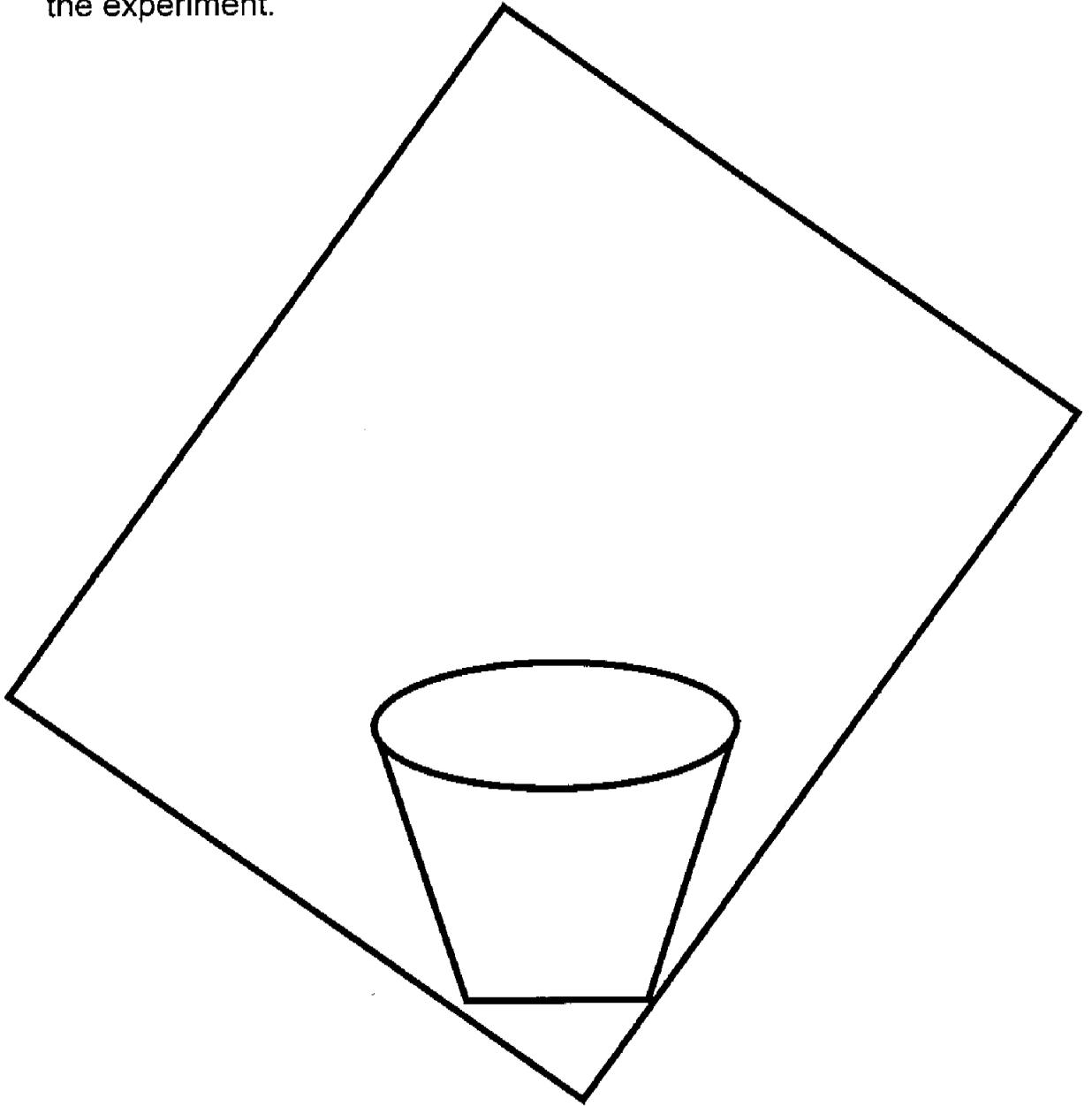
- Have students observe the experiment(s) and draw pictures to record what is happening. It will take anywhere from a week to a couple of months, depending on how sunny it is and the direction the classroom faces.
- At the end, have the students record the results on the worksheet. In the end, the water should have evaporated out of the cup and condensed on the side of the bag and dripped in the bottom of the bag (outside of the cup). The food coloring, however, doesn't evaporate and stays in the cup. Make sure that students have time to try to figure out what went on and help them by reminding them about evaporation and condensation.
- Review the steps of their experiment (question, hypothesis/prediction, experiment, collect observations/data, discuss findings).

Source: Adapted from Hillen, J., et. al. 1998. *The Mini Water Cycle*, pp. 23-24, Water Precious Water Book A, Project Aims.

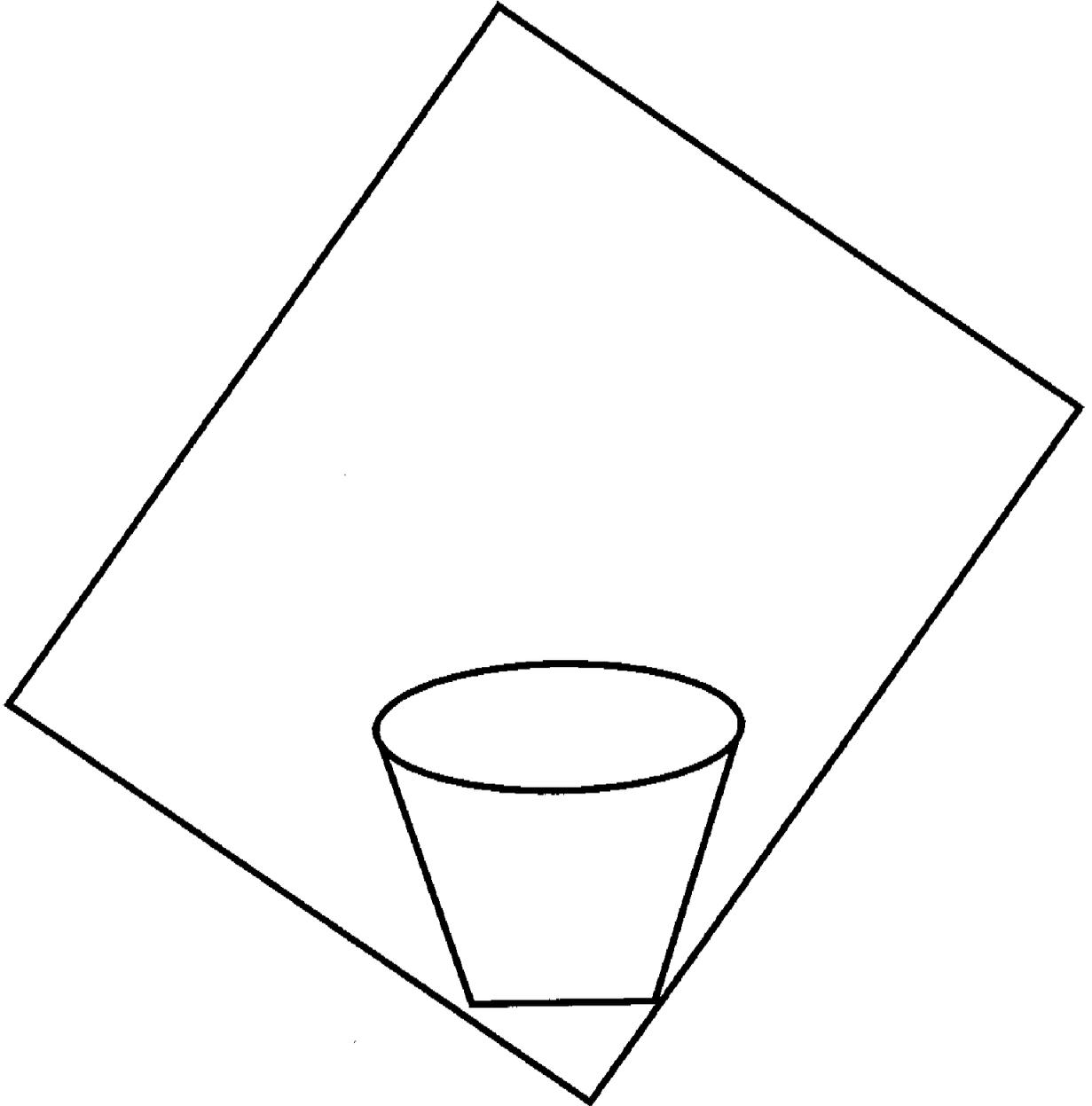
GK12 Fellows: Tracey Smart, Annie Pollard and Laurel Hiebert; teacher Ann Marineau, Madison Elementary

Where Will the Water Wander?

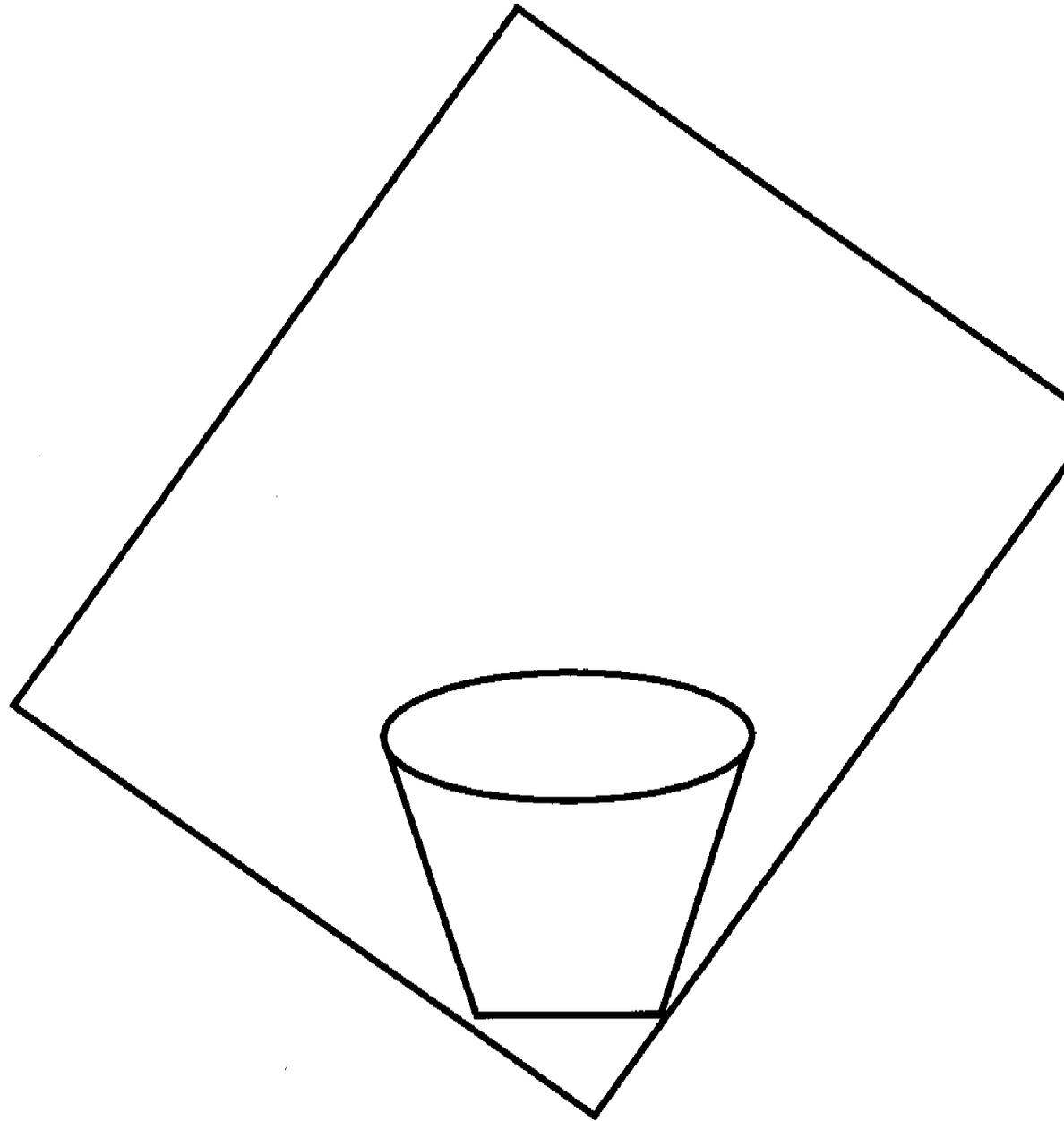
On the picture below, color in where that water is at the beginning of the experiment.



On the picture below, color in where you think the water will be at the end of the experiment. This is your **prediction**.



On the picture below, color in where the water is at the end of the experiment. This is the **result** of the experiment.



Name the two stages of the water cycle that took place during our experiment.