



1st Grade: Round and Round the Water Cycle

California Content Standards Addressed

English-Language Arts

Reading:

1.0 Word Analysis, Fluency, and Systematic Vocabulary Development:

1.1, 1.2, 1.3, 1.4, 1.13

Written and Oral Language Conventions: 1.1

Listening and Speaking Strategies: 1.1, 1.2, 1.3, 1.4, 1.5

Science

Physical Sciences: 1a, 1b

Life Sciences: 2b

Earth Sciences: 3a, 3c

Investigation & Experimentation: 4b, 4d, 4e

Suggested Time of Year

This lesson is a good way to introduce the water cycle and the states of matter or reinforce previous instruction on these topics.

Basic Concept

This lesson is about the water cycle and the states of matter. The teacher reads portions of *The Magic School Bus - Wet All Over* and then conducts a simple demonstration of water changing into its three states— ice, water, and vapor. Students construct take-home water cycle bracelets from colored beads that reinforce each stage of the water cycle.

Contents

- Scripted Lesson Plan
- Preparation Checklist
- Student Worksheet

Lesson Plan

Organizational Considerations

Classroom Time: 45 minutes

- 10 minute reading of *The Magic School Bus - Wet All Over*
- 20 minute review of the book on whiteboard and begin “rain” activity
- 10 minute water cycle bracelet activity
- 5 minute closing and assessment

✓ *See the Preparation Checklist (at the end of the Lesson Plan) well in advance, since you will have to obtain materials for the bracelets and may have to borrow “rain machine” equipment from DSRSD.*

Pre-class Set-up

See checklist for list of needed items and set-up suggestions.

The items for the water cycle bracelets (twine + 6 Pony beads) must be organized and put into small plastic packets, one per student (see preparation checklist). An aide is needed during the bracelet activity.

Classroom Organization

Instruction is whole class, usually on the carpet, and then students do the activity on their own at their desks.

Required Student Skills

- Follow verbal instructions on their own
- Have the manual dexterity to work with twine and beads
- Ability to cut out simple squares

Major Objectives

Learning Statement

Students will learn that water exists in three states: solid (ice), liquid (water), and gas (water vapor). They will learn that the water cycle has no beginning or end and that we never “lose” or “gain” water in the process. Through a demonstration, they will learn about the roles of heat and cold in the water cycle.

Behavioral Statement

Students will have learned the lesson if they finish the water cycle bracelet and are able to correctly fill out the student worksheet.

Child Development Statement

Students in first grade are 6-8 years old. They tend to be egocentric and lack reversibility and transformation. They may find it difficult to follow the water cycle as a sequence of events, so repetition and hands-on are desirable. Making a water cycle bracelet provides the hands-on component and reinforces the lesson's concepts effectively. The Student Worksheet determines how well students understood the material.

Vocabulary

Condensation: The process by which a vapor becomes a liquid.

Water Vapor: The name of water when it is a gas.

Precipitation: Water falling, in a liquid or solid state, from the atmosphere to Earth.

Accumulation: Increase or growth by addition. Example: water droplets accumulate into a puddle, then a trickle, then a creek, and then a river.

Evaporation: The conversion of a liquid (e.g., water) into a vapor (gaseous state) usually through the application of heat energy; the opposite of condensation.

Delivery of Instruction

1. Teacher-directed instruction

“Have any of you ever heard of the water cycle?” Some will raise their hands. **“Well, even if you have, I’m sure you’ll learn some more today. Let’s begin by reading, *The Magic School Bus - Wet All Over*. Does anyone want to guess what this book is about?”** Slowly show the cover of the book to the whole class and take about three guesses. At each guess just say, **“Yes it could be about that,”** or **“That’s an interesting guess,”** or **“Yes, this book is about water. Let’s start.”** As you read, show the book to the students at each page or two. This is very important when reading to first graders.

✓ *Skip the one page that describes being sucked into the pipe at the “waterworks.” (It follows the page showing the reservoir and dam.) The explanation is too complicated for first graders to follow and it dilutes the water cycle message.*

“So that’s the water cycle. Now let’s talk about MATTER for a moment. All matter on Earth comes in three states: liquid, gas, and solid.” Hold up the jar labeled “liquid water.” **“Most of the time, we see water in its LIQUID state. We see it in creeks, rivers, and oceans. In the liquid state, water takes the shape of the container it is in. Like now, liquid water is taking the shape of this big jar. But if I put the water in a different shaped bottle, then it would take the shape of that bottle.”**

“SOLID is another state of matter. Can someone tell me what we call water when it is in its solid state?” Take some guesses. If they have trouble, hint: **“You find it in the freezer.”** Eventually someone will say, **“ICE!”** Agree and reach into the gray pan and take out a piece of ice. **“You can always tell a solid because no matter where you put it or how you hold it, it stays in its original shape.”** Put a cube or two on the table while you say the above. Then return

the ice to the cooler. **“I’m going to put the ice cubes up here in this pan where it’s cold and pretend this is high up in the sky. It’s very cold up in the sky where the airplanes fly.**

“When water is in its GAS form, it is called WATER VAPOR. Water vapor has no shape because it is a gas. HEAT turns a liquid into a gas. On Earth the sun is our major source of heat. I can’t bring the sun into this room to show you what happens because the sun is too big and too hot. But I can use electricity to heat up the liquid water that’s in this kettle and turn it into water vapor. I’m going to turn this on and let it heat.”

Go to the whiteboard and explain the water cycle using the magnetic labels or just write “accumulation,” “evaporation,” condensation,” and “precipitation” per the illustration at the end of this lesson plan. Explain it as outlined below and draw it on the whiteboard as you explain it. Start with the accumulation of water on the ground.

“On a rainy day, puddles form on the playground, right? This is ACCUMULATION. Have you ever noticed that if the next day is sunny and warm, the puddles will be gone by the end of the day? This is EVAPORATION.” Explain how the sun heats the water and changes its state of matter from a liquid to a gas, which we call water vapor. **“We can’t see water vapor because it mixes with the air right away and is too small for our eyes to see it.**

“Now the water vapor, which is lighter than air, goes up, up, up into the sky. And as it goes up higher and higher it gets colder and colder. As the water vapor gets colder it changes form again, from a gas back to a liquid. This is CONDENSATION.

The LIQUID water hangs onto dust particles in the air until it gets too heavy and gravity pulls the water back to Earth. That’s why it always rains down and not up, because of gravity. This is PRECIPITATION, which we usually call rain.

“When the water falls back to Earth and where does it land class?” (On the ground.)
“That’s right! Then it ACCUMULATES, or mixes together again, to form puddles, creeks, rivers, and then finally winds up in the ocean.”

✓ *As soon as the kettle starts to boil, stop the whiteboard activity and show the vapor to the students. Point out how some of the vapor mixes with the air in the room. Tell them there is always water in the air but we cannot see it.*

Go through the whole cycle again, drawing arrows as you point from step to step so you wind up with a cycle drawing. Repeat at a faster pace. **“We have a puddle on the playground and the sun heats it. What happens? WHOLE CLASS…”** (Water vapor!) **“Then the water vapor goes into the sky. As it goes up and up and gets colder and colder, what happens?”** (It becomes water!) **“Then the water gets heavy and what happens?”** (It rains!)

Point to the arrows you drew previously and show how the cycle goes round and round. **“The water cycle has no beginning and no end. Did you know that the water you drank today**

might have been drunk by a dinosaur millions of years ago? Well, it's true. The amount of water on the Earth today is exactly the same amount that existed millions of years ago."

✓ During the whiteboard activity, stop at appropriate times to point out the water cycle phenomena occurring in the kettle demonstration. For example, show condensation when beads of water form on the bottom of the metal pan.

"The water cycle is very interesting, but sometimes I get confused about which step happens next. I have a bracelet that helps me remember. Hey, would you like to make a water cycle bracelet?" (Yes.) **"Will you all follow directions very carefully? Are you sure you can do that?"** (Yes.) **"Okay let's make one together."** Either you or the teacher moves the students to their seats.

3. Modeling/Guided Practice

Hold up a bag that contains six beads and a piece of twine. **"Okay I am about to give you directions and I only give directions once so you must pay very close attention. Are you sure you can do this?"** Make eye contact with each student to emphasize how important this is.

"Some people have trouble opening these bags. When you get yours, try squeezing the top between your fingers and then holding one side to pull it apart." Demonstrate. **"But first, I'm going to give each of you a paper plate. Don't worry if there is more than one plate because they tend to stick together. I want you to place the paper plate in front of you on the [ground/desk]. Do not fan yourself with it or wave it around. It is not to be played with. Just leave the paper plate in front of you and keep your hands in your lap."**

With an aide's assistance, hand out the paper plates. **"I'm looking for students who show me they are ready by having their paper plates in front of them. Now I'm going to give you your bag of beads. Do you remember how to open it? When it's open, it is very important to pour the beads directly onto the plate and leave the plate flat on the table or else you will lose your beads and I do not have extras.** As you speak, demonstrate how to pour beads onto the plate, noting how close the bag is to the plate. **"Notice how I am touching the bag to the plate. Do I hold the bag up here?"** Hold the bag at about chest height over the plate. **"Do I hold the bag here?"** (No.) Hold the bag at about waist height over the plate. (No.) **"You might have to use your finger to get the string out. Once the beads and string are on your plate do not pick them up. Just wait for my next instruction. Your teacher and I will be looking to see who can follow directions."**

With an aide's assistance, hand out the bags. Then sit down and pick up the string.

"Okay, everybody pick up the piece of string. Look at it and notice that there is a knot at one end but not the other. I want you to hold the string at the end WITHOUT the knot. Hold up the string so I can see it." Look around pretty carefully. If a student is goofing off ask if he is confused about the instructions; if a student has it wrong, gently correct.

“Everybody looks ready. This is a water cycle bracelet so we’re going to start with the water bead, which is dark blue.” Hold up the dark blue bead. **“We put the dark blue bead onto the end of our string and let it slide all the way to the knot. Now the sun warms the water and the sun is yellow, so we take the yellow bead and we put that on next.”** Do each step as you are saying it and watch the students carefully, making sure everyone is with you. If a student is having trouble or is behind, give them a hand in a matter of fact way.

“As the water warms, what happens? It turns to water vapor, which is hard to see. So we use the clear bead next. Clear is the one with no color. It is not the white bead.

Now the water vapor goes into the air. As it goes higher and higher, it gets colder and colder. Then what happens? It condenses and forms a...? Cloud! So we put on the white bead next. Now the water is in the cloud and it starts to get heavy and gravity starts pulling on it. What happens next? It rains? Precipitation? That’s right, so we put on the light blue bead next.

“What do you think the brown bead stands for?” (THE EARTH! THE GROUND!) “That’s right, so we put on the brown bead last.

“Now we are not quite done yet, so listen carefully. Some first graders can tie a knot and some can’t. If you can’t, that’s okay. If you can, I want you to tie a knot in the string at the end you are holding.” Show this on your string. **“Not down here next to the beads,”** (show this on your string) **“but at the end where you are holding your string. [Aide] and I are going to go around the room and help tie the knots. Then we are going to tie the bracelet on to your wrist. If you can, help one another. Please hold out your wrist when we come by.”**

Ask the aide to begin tying on students’ bracelets. Once an entire table is tied, bring that group of students up to the rain machine to look at it up close. Emphasize: DO NOT TOUCH IT.

Encourage all students to wear their bracelets. If a student does not want to wear it (very rare) then ask student to put it in his/her cubby for safekeeping.

4. Check for Understanding

As a whole class, have students use their bracelets to recite the water cycle.

5. Practice

The students make their bracelets while you and the aide help with tying knots.

6. Assessment and Closure

The completed bracelet is an assessment for the lesson. On the next day, also have students complete the Student Worksheet.

PREPARATION CHECKLIST

Pre-class Preparation – Do well in advance

- Obtain materials for bracelets (see below) and prepare one “bracelet bag” for each student. Each bag contains a 14-inch length of hemp twine and six Pony beads, one of each color (dark blue, yellow, clear, white, light blue, brown). Snack-size bags (2" x 3") with zipper closure work well.
- Obtain equipment for rain machine or borrow it from DSRSD (see below). Set
- At least 24 hours ahead**, obtain eight blue ice packs and put them in the freezer and make sure to have about 10 ice cubes on hand. Obtain a small cooler for transporting blue ice and ice cubes.
- Print the Student Worksheet (“Water Cycle”), one per student
- Familiarize yourself with the book, *The Magic School Bus - Wet All Over*, and practice reading it aloud smoothly. Note instructions in the lesson plan (see page 4, above) to skip the page in the book that describes the wastewater treatment plant.
- Paper plates, one per student
- Rain machine equipment
 - One 9x15 **metal** baking pan
 - One **plastic** pan, slightly larger than the metal pan (a Rubbermaid TakeAlong container works well)
 - Electric kettle
 - Extension cord for kettle
 - Laminated “Cloud” (optional)
 - Rack to hold the metal pan above the plastic pan (see photos below)

Possible Sources for Bracelet Materials

Richard’s or Michael’s craft stores, or online at BJ’s Craft Supplies, www.bjcraftsupplies.com, 316-286-3366, 203 Bickford Road, Tivoli TX 77990

1. Hemp twine ~\$6.99/400feet
2. Pony Beads ~ \$2.99 for 700 beads (Clear, Dark Yellow, Light Blue, White, Royal Blue, Brown)

How to Set Up the “Rain Machine”

Contact DSRSD Public Information (925-875-2282) to borrow equipment if needed. Position the metal pan above the plastic pan. Position the kettle so steam will strike the bottom of the metal pan.



Laminated Cloud

Metal Pan

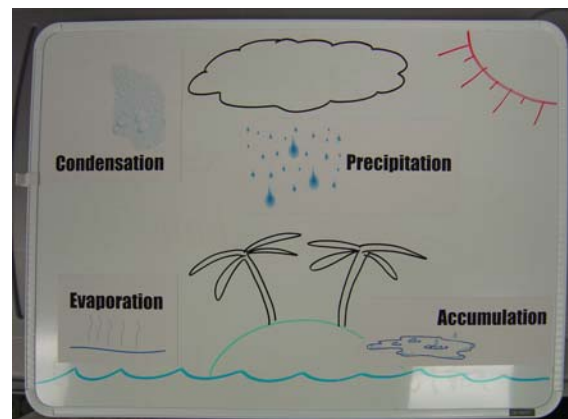
Plastic Pan

Kettle



Blue Ice and Ice Cubes

The picture at right illustrates what to write on the white board while explaining the water cycle.

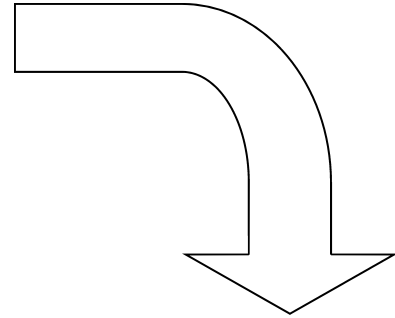
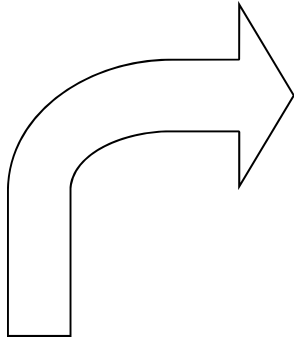


Name: _____

Cut out the picture and glue it over the word that describes it.

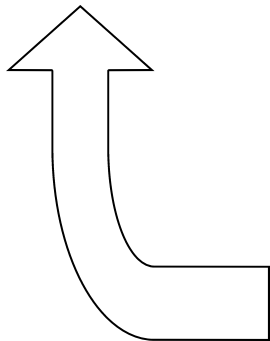


Condensation



Evaporation

Precipitation



Accumulation

