

# Exploring Water

## Instructional Guide

### Pre-K – Earth and Physical Science Unit

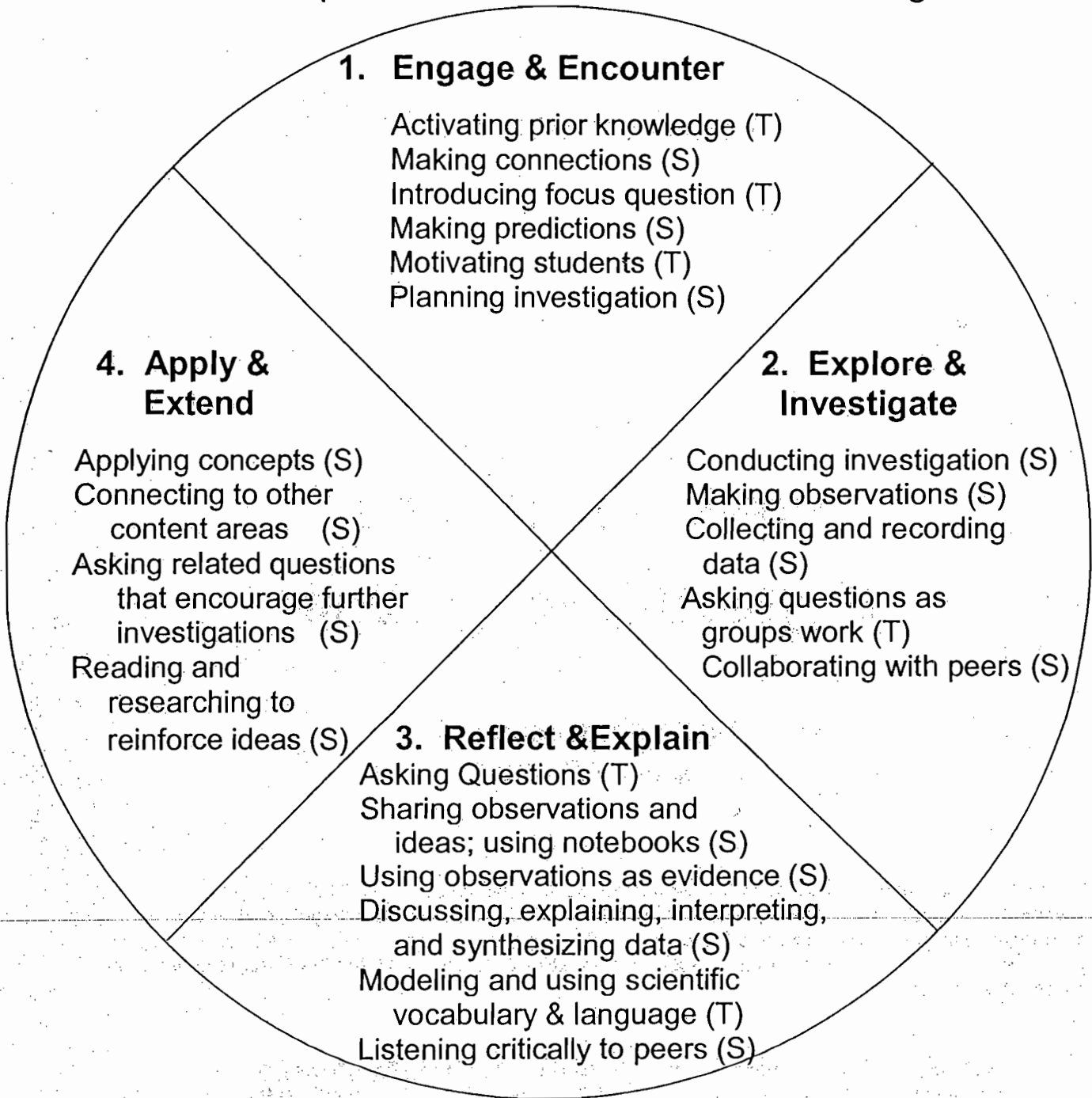
- Tips for Success
- Support Materials

This Instructional Guide supplements the *Exploring Water* Teacher's Manual (©2005 Education Development Center, Inc.). The Instructional Guide has information that will help you meet the Washington State Early Learning and Development Benchmarks, bring rigor, and teach the science unit more effectively. The modifications are based on state standards, research, feedback from teachers, and input from scientists.

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# Seattle Public Schools Learning Cycle

Key Components of the Inquiry-Based Science Lesson  
Sequence to Promote Student Learning



T: Teacher Facilitates      S: Student Behavior

## Tips and Ideas

### Open Exploration Step 1: Introducing Children to Exploring Water

Science Talks can be done with a whole group or a small group. If discussions are done in small groups, consider coming back together as a whole group and sharing ideas as a class at a later point.

#### Science Talk 1: Introduction to the unit.

- Gather students in your discussion area and invite them to share their experiences with water. Begin by sharing an example of your own.
- Ask students:
  - Where do you play with water? Inside? Outside?
  - What do you do?
  - What do you play with?
  - Who else likes to play with boats in the bathtub? Splash in puddles?
  - What happens to the water when you do that?
- Record student's ideas on a chart labeled "Our Experiences with Water." Include both words and illustrations on your chart.
- Post charts where students can see it in the water area
- Following this discussion, show students some of the materials from the unit. Ask:
  - Where have you seen something like this?
  - What is it used for?
- Give students time to investigate with the new materials. As students work, observe the types of play and any challenges students face. This will give you ideas for the direction to take future science talks.

#### Science Talk 2: Rules for Water Exploration (See page 27-28 in the manual).

- Begin by asking students what they have been doing at the water table.
- Say: Today we are going to talk about how we can be safe and stay dry in the water area. Let's see if we can come up with some guidelines, or rules, for the water area.
- Some possible questions to guide the discussion:
  - What should we wear when we explore water?
  - What should we do if water spills? What do we need to clean it up?
  - How can we fill and empty the water table?
  - What else can we do to be safe and fair in the water area?
- As students share ideas, help the group formulate a statement that can be put on the "Rules for Safe and Fun Water Play" Chart.
- Post the chart in the water area.

#### Children's Water Exploration

- As students begin water play, observe and document the following things:

- What are they noticing as they fill and empty containers? The weight of the water? The way it spills over the top?
- What are they doing with the tubes? How are they filling them with water?
- How are they using the funnels?
- How are they combining the materials?
- What kinds of play are children engaged in?
  - Exploratory—trying out new materials to see what they do?
  - Dramatic—using the materials in dramatic play scenarios?
  - Constructive—using the materials to build something?
- **Sample questions to ask as students engage in water play:** (Not all students will want to talk with you as they are working, do not force the conversations if students wish to focus on their work without interruption)
  - What materials did you use?
  - What did you do with them?
  - How did you use the funnel?
  - What happens to the water when you pour it into the funnel?
  - Can you show us how you got water into the tube?
  - What does the water look like?
  - What happens when you continue to pour water into a cup after it is full?
  - What new ways have you discovered to use the materials?
  - How does water feel when it comes out of the baster?
  - What does the water look like when it comes out of the pump?
- **Types of documentation** (Documentation is critical to future science talks. Discussions will be much richer if students have a physical object or picture to remind them of their work).
  - Photograph of students working with materials
  - Teacher illustration of student work
  - Student illustration of students work
  - Saving a setup of materials
  - Adding vocabulary to the word bank.

## Tips and Ideas

### Open Exploration Step 2: Ongoing Open Exploration and Reflection

#### Ways to Encourage Children to Explore Water and Maintain Interest:

- Acknowledge students ongoing exploration by holding informal science talks with individuals or small groups during work time. For example:
    - When you squeezed the baster into the tube, what happened?
    - What are you using these materials for?
    - What happens when you lift the funnel up?
    - What did you notice about what happened to the water?
    - Did the same thing happen to anyone else? How was your experience different?
  
  - Share a photograph of a student's work. Place photos of students' work in the water area for students to use as plans.
  
  - Add materials that squirt water. You could use the following questions to introduce the materials that squirt water:
    - How could you use this at the water table?
    - How do you think it works? (Avoid telling or showing students how to use the materials—let them investigate and figure it out themselves.)
    - Can you use this to make bubbles?
    - What rules do we need for materials that squirt?
  
  - Invite advanced water users to share their ideas with the class.
    - What did you do at the water table yesterday?
    - How have you been getting the water into the tubing?
    - What happened when you put the funnel in the tubing?
- 
- Assign reluctant students to the water center during one or two choice times.
  
  - Declare an "all girls" or "all boys" day in the water center to encourage all to participate.
  
  - Ask students if you can draw how they are moving the water. Model using arrows to show the direction the water is moving.

- **Introduce the Science Notebooks:**
  - Begin by asking students if you can draw a picture of their work. Model looking carefully at the materials and water and making an illustration to represent it on paper.
  - Use the clipboards for students to begin making illustrations of their work on paper or their science notebooks.
  - Ask students to tell you about their drawings and show you where the materials they are using are in their illustrations.
  - Students can dictate to you what they would like to record about their work and you can add their language to their notebook entry.
  - Students can use the word bank to add words to their illustrations.
  - Many students find it easier to make more careful illustrations and observations if they use only pencil in their drawings.
  - Consider providing blue pencils or crayons for representing where the water is in the illustration.
  
- Encourage students to make predictions about how and where the water will move with different materials.
  
- Encourage students to notice other's work. Discuss the similarities and the differences in children's water exploration strategies. Encourage them to try out new ideas that they like.
  
- Look at water moving outdoors. Go on a walk around the school yard and look for water. Bring a camera to document water or consider having students bring their notebooks to record the water they find. Ask:
  - Where do you think we will see water?
  - What do you think it will look like?
  - Where do you think we will find puddles? Drips? Streams?
  
- **Hold Walkabouts.** At the end of a work period, before clean up, have students leave their work up so that other students may walk around and look at it. Students may interview the students about their work. You can ask about things you have noticed such as:
  - I noticed that you got the water to go up the tube. How did you get it to go up?
  - Can you show us how you made bubbles?
  - How are you using these materials to move the water?

*Science Talks can be done with a whole group or a small group. If discussions are done in small groups, consider coming back together as a whole group and sharing ideas as a class at a later point.*

### Science Talk Ideas:

- Show one or two pieces of equipment. Have student generate a list of words to describe how it can be used to move the water. Make words cards to add to the word bank.
- Choose two different containers. Have the students tell you how they are the same and different. Create a Box and T-Chart to display in the water area. Use the word "Both" to help think of ways that the containers are the same. When writing about differences, be sure to talk about the same property for both containers. (e.g., color, shape).

Example:

Same

Both are containers Both hold water Both are clear	
Measuring Cup	Container
Round	Square
Holds more water	Holds Less Water
Has a handle	No Handle
Has number	No numbers
Has a bump/spout	Smooth
Short	Tall
Wide	Narrow

- Show a photograph of a Student's Water Exploration
  - Glue the photograph on a large sheet of paper.
  - Ask student to describe what they observe (see).
  - Write student's observations on the paper.
  - Add the words that the students generate to a word bank.
- Use a student drawing as a blue print.
  - Choose a child's representation of their water exploration.
  - Ask: What does this drawing show us about \_\_\_\_'s work?
  - Work together to use the drawing to set up the materials in the same way.
  - Add students' drawings and picture of work to the water area to generate ideas for water exploration.
- Discuss a student challenge or problem. For example:
  - Yesterday I was watching Amina build in the water area. She trying to get the water to go up the tube into this container. How could we get the water to go up?
  - Does anyone have a different idea?
  - Have materials in the discussion area so that students can try out their ideas.

## Tips and Ideas:

### Focused Exploration: Flow

*You may notice that some children will remain engaged in open exploration and will continue to explore broadly. Open exploration and focused exploration can occur simultaneously.*

## Steps 1 and 2: Moving Water through Tubes

### Science Talk 1: Introducing Moving Water through Tubes

- Share experiences with water flow so far. You might use the following questions:
  - When have you seen water moving?
  - What do you think was making it move?
  - How have you been moving the water at the water table?
  - What happens to the water when it comes out of the faucet?
  - How does it feel? What happens when you put your hand in the water?
  - Can you make the water flow stop? Slow down? Go faster? Go in a different direction?
  - What about the tubes in the water table? How have you been getting water to go through them?
  - How have you made the water flow faster? Slower? Stop? Change directions? Go up?
- Show students the wire water wall and the connectors. Demonstrate how the connectors can be used to put the tubes together. Ask:
  - Where do you predict the water will go once it is poured into one of the connected tubes?
  - How might you use this wire water wall in the water table?
  - What do you think will happen to the water when you do that?
  - How do you think you will use this wire wall to help you move water?
- Demonstrate how tubes can be stuck through the wire wall to hold them in place and how clothespins can be used to attach funnels to the wall.

### **Children's Water Play**

- **As students begin exploring flow, observe and document the following things:**
  - How are they making the water move through the tubing?
  - Are they controlling the water flow? If so, how are they stopping it? Slowing it down? Making it go faster? Making it change direction?
  - Are they generating their own challenges?
  - What kinds of cooperative play are you noticing?
  
- **Sample comments and questions to use as students engage in exploration of flow:** (Not all students will want to talk with you as they are working, do not force the conversations if students wish to focus on their work without interruption.)
  - The water went down this tube and then when it got to the connector it flowed into both of these smaller tubes.
  - How do you want to make the water flow? How can you use the materials to make that happen?
  - What do you predict will happen if we put a connector here?
  - Is this what you expected to happen? Did anything surprise you?
  - How did you get the water to stop? Go faster? Change direction?
  - What might happen if you put your finger over the end of the tube? Hold the tube higher? Put one end of the tube in the water?
  - What do you observe happening?

### **Conduct Weekly Walkabouts**

- Before clean up, have students leave their work standing and gather together as a whole group. Walk around and look at the different setups for flow.
- Give students a chance to talk about their setups.
- Other students can ask questions.

### **Science Notebooks**

- Continue to encourage students to record their work in their science notebooks. Encourage them to use the word bank to add labels to their illustrations. Take dictation and record students descriptions and thinking about their work in the science notebooks.
- Use the following questions to help students with their illustrations:

- What materials did you use? How can you show them in your notebook?
- Carlos started by drawing the tube on the bottom, and then the funnel on top of it. Would you like to try that?
- How many cups are you using? How many cups are in your picture? Did you draw them all?
- Tell me about your drawing. What part does this show?
- What shapes did you use in your drawing?
- How did the water flow? Can you use arrows to show the way the water is moving?

### **Science Talk Ideas for Flow Exploration:**

- **Bring photos or drawings of student's work and discuss the different setups.**
  - Ask the following questions about the photo and record students thinking:
    - Tell us about the setup. How did the water move? Did it move fast or slow?
    - I see that you used the smallest funnel? What might happen if you used the larger funnel?
    - How could you make the water flow faster? How could you change the direction the water is flowing?
  - Add new vocabulary that comes up to the word bank.
  - Add photos and drawing to the water center for students to use as "blueprints" in their water play.
- **Look at a Book or Poster of Water flow**
  - Look at the image and facilitate the following discussion:
    - How did the illustrator show water in this book?
    - How did he/she show that the water is moving?
    - How could we show water dripping, squirting or flowing on paper?
    - Who has an idea they would like to show us on this chart paper?
    - Does anyone have a different idea?

- **Discuss a Student Challenge or Problem.** For example?
  - I noticed Ibrahim was trying to make the water flow faster, but it kept slowing down when it got to the funnel. How could we design a system so that the water flows faster?
  - Be sure to have materials in the discussion area so that students can try out their ideas.
  
- **Look for water pipes.**
  - Walk around your building and look for faucets with visible water pipes Ask:
    - Where do you think the water comes from?
    - Where do you think it goes? What makes you think that?
    - How do you think the faucet stops the water?
    - What have you used at the water table that reminds you of the faucet? How did you make the water flow? Stop flowing?
  
- **Brainstorm new challenges**
  - Chart students' ideas (for example: What are all the ways you can think of to move the water from this bucket on the floor into the water table? How can we make the water flow fast? How can we make the water flow up? ).
  
- **Explore water flow outdoors on rainy days**
  - Help children notice flowing water outdoors by looking out the window on a rainy day or going for a walk after a rain or during a light rain. Try building dams to stop the flow of water in the schoolyard.

## Tips and Ideas:

### Focused Exploration: Flow

#### Steps 3 and 4: Cups and Bottles with Holes

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

##### Science Talk 1: Introducing Cups and Bottles with Holes

- Gather students in the discussion area and show students the cups with holes. Point out that the holes are different sizes and in different locations. Ask:
  - What do you think you will see when we fill this cup with water?
  - How do you think it will change as we watch it?
- Fill cup with water and watch the stream. Ask:
  - Is this what you expected to happen? Did anything surprise you?
  - What did you see happen? How did the stream change?
  - What do you think will happen if I put my finger on the hole and fill the cup with water again?
  - What do you think will happen if I use the cup with a bigger/smaller hole? With a hole in a different place?
- Let children know that the cups/bottles with holes will be available in the water center during work time.

##### Children's Water Play

- Sample questions to use while students are exploring bottles and cups with holes:
  - What is happening to the water?
  - What is happening to the stream?
  - How can you make the water shoot out farther?
  - How can you make just a dribble come out of the hole?
  - Did the stream change shape?
  - What did it look like when it first started?

- Then what happened to its shape?
- How are the streams that come out of the holes on the sides different from the holes on the bottom?

**Science Talk Ideas for Flow Exploration:**

- Hold a science talk that focuses on comparisons. Some examples:
  - How does the stream from a large hole compare to a small hole?
  - How does the stream from a hole on the side compare to a hole on the bottom?
  - How does the stream when you first pour in water compare to the stream when most of the water is out of the cup?
- Construct a Box and T-chart to help students think about the comparisons.
- Add new vocabulary that comes up to the word bank.
  
- **Share photographs of fountains or sprinklers**
  - Have students think about what is causing the water to move the way that it does in the photograph. How is what is happening in the picture like what you are doing in the water area?
  
- **Share students' notebooks entries.**
  - Continue to model how to represent water flow on paper and give students an opportunity to share their work with others.
  
- **Help students analyze what they have been learning by asking the following questions and charting students thinking**
  - Do all of the holes make the same kind of stream?
  - What does the stream coming out of the bottom of a cup with one hole look like? How does it change? Why do you think that happens?
  - What are the best ways to get a stream to shoot out of the sides of a cup/bottle really far? To stop? To dribble? Why do you think that works?
  - What do you have to do to keep the stream from turning into a dribble? Why do you think that works?

- What are the best materials to use to make a stream that shoots out? A dribble? A stream that lasts for a long time?
- What would happen if we put a lot of holes in this cup/bottle?
  
- **Encourage students to design their own cups with holes.**
  - Provide Styrofoam cups and model how to use a pencil to make holes. Let students explore with the cups that they made and share what they are working on. Ask:
    - What were you trying to get the water to do?
    - What kinds of holes did you make?
    - What happens to the streams when the cups aren't full?
    - What kinds of streams do the big holes make? The small holes? Why do you think that happens?

## Tips and Ideas:

### Focused Exploration: Drops

*You may notice that some children will remain engaged in open exploration and will continue to explore broadly. Open exploration and focused exploration can occur simultaneously.*

### Step 1: Making and Observing Drops

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

#### Science Talk 1: Introducing Making Drops

- Share experiences with drops so far. You might use the following questions:
  - How would you describe what a drop is?
  - Where have you seen drops?
  - Where did they come from?
  - When have you felt water drops? What did they feel like? What happened to the drops when you touched them?
  - Have you made any drops in the water area?
  - What materials did you use to make the drops?
- Show students a bowl with tinted water and a large plastic garbage bag or an overhead projector for making drops on. Ask:
  - Who can make some drops on the overhead projector (or plastic bag)?
  - Nida made drops by shaking her hands. How else might we make them?
  - How could we make the drops move? Does anyone have another way?
- Introduce children to the eyedroppers. Ask:
  - Have you seen something like this before? What was it used for?
  - Could we use this to make drops? How? (Do not tell children how to use the dropper, let the figure it out on their own)
- Show students the plates and droppers that can be used in a water center (the water table can continue to be used for exploring flow or open exploration). If possible, provide hand lenses for observing the drops closely

### Children's Water Play

- Sample questions to use while students are exploring drops on plates: (Not all students will want to talk with you as they are working, do not force the conversations if students wish to focus on their work without interruption.)
  - How can you make a drop?
  - What do you see as the water comes out of the dropper?
  - How long can you make the drop stick to the eyedropper?
  - What shape is the drop when it falls off of the eyedropper?
  - What do you notice about the drops on the plate?
  - What happens to the drops as you begin to tilt the plate?
  - Can you make a very small drop?
  - What is the smallest drop you can make?
  - What is the biggest drop you can make?
  - What happens when you make a pile of drops?
  - Do you think you can make the water in the sink come out in drops?
  - Are drops always the same shape?
  - How can we make the drops move on the plate?
  - What happens when you tilt the plate? Turn it upside down?
  - Where do you want the drop to fall?

### Science Talk Ideas for Flow Exploration:

- **Model drawing drops.**
  - Encourage students to look at drops from the top and the side and also to think about their shape, height and width. Practice drawing drops from the top and the side.
  - Add new vocabulary to the word bank.
- **Look at books and photographs of raindrops.**
  - How are the drops in the book the same as the ones you have been making? How is it different?

- **Observe drops outdoors**
  - Go on a walk during a light rain or just after it rains and look for drops.  
Ask:
    - Where did these drops come from?
    - Do you see any drops moving? How are they moving?
    - What do you notice about the way these drops move?
    - How are these drops the same and different from the ones that we have been making?
  
- **Discuss the shapes of drops. Ask:**
  - What different shapes do you see?
  - What different sizes do you see?
  - What do you have to do to make a flat drop? A round one?
  - What do the sides of the drops look like when you look at them with a hand lens?
  
- **Discuss the way drops move. Ask:**
  - Tell us if anything happened to the drops when they were on your plate?
  - What happened when two drops touched? Why do you think that happened?
  - What happened when you tipped your plate? What do you think makes them slide like that?
  - What happens when you drag the dropper or your finger through your drop?
  - Can you turn one drop into two or more drops? Can you combine drops to make one big drop? How?

## Tips and Ideas:

### Focused Exploration: Drops

## Step 2: Make and Observe Drops on Various Surfaces

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

### Science Talk 1: Introducing drops on different surfaces

- Gather students in the discussion area and show students a piece of aluminum foil
  - What do you think you will see if we put drops on the foil?
  - What shape will the drops be? How will they move?
- Let children know that they will be able to test out their ideas during work time. Show other surfaces that you have collected as well (waxed paper, paper towels, plastic wrap, other kinds of paper, different scraps of fabric, etc.)

### Children's Water Play

- Sample questions to use while students are exploring drops on different surfaces:
  - What do you observe when you put drops on \_\_\_?
  - What size/shape are the drops?
  - Why do you think the drops are different shapes?
  - Can you make the drops move?
  - Which surfaces work best for making drops move?
  - Can you pick the drops back up?
  - Which surface is the best for making big drops? Little drops? Round drops? Flat drops?
  - What other surfaces would you like to try? What do you predict will happen if you put drops on it?
  - What do you want your drops to do? What surface will work best for that?
- This is a great lesson for generating vocabulary: absorb, repel, soak in, spread out, and soak through are examples of words that might come up and be added to the word bank.

### Science Talk Ideas for Drops on Various Surfaces:

- **Hold a science talk that focuses on comparisons. Some examples:**
  - Does the plate or the foil make the roundest drops?
  - Do drops move faster on waxed paper or paper towels?
  - What happens when you put a drop on and fold the surface in half? Do all the surfaces do the same thing?
    - Construct a Box and T-chart to help students think about the comparisons.
    - Add new vocabulary that comes up to the word bank.
- **Discuss strategies for making very small drops.**
  - Have students think about what materials are best for making very small drops. How can the materials be used to do this?
- **Challenge—how close can you make drops without them touching?**
  - Share and try many strategies. Discuss what happens when drops touch on different surfaces.
- **Go outside on a rainy day and observe drops on clothing.**
  - What happened to the rain that landed on your jacket? Did anyone's jacket do something different?
  - How is this like what happened when we put the drops on different surfaces? Which surface is most like your jacket?
  - Which drops that you have been making moved like the ones on your raincoat?
- **Which surfaces are best for moving drops around?**
  - Encourage students to share their thinking. Highlight that there is not one right answer.
- **Which surfaces would make the best raincoat?**
  - Encourage students to use their work with drops on different surfaces as evidence.

## Tips and Ideas:

### Focused Exploration: Sinking and Floating

*You may notice that some children will remain engaged in open exploration and will continue to explore broadly. Open exploration and focused exploration can occur simultaneously.*

### Step 1: Test Objects to See if They Float or Sink

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

#### Science Talk 1: Introducing Floating and Sinking

- Share experiences with floating and sinking. You might use the following questions:
  - What do we mean when we say, “float”? Can you give me an example?
  - What about the word sink? What does that mean?
  - What can you think of that goes to the bottom, or sinks, in the bathtub or a sink full of water?
  - What can you think of that stays at the top, or floats, in water?
  - What things have you seen that sink very quickly? Slowly?
  - What things have you seen that float for a while and then start to sink?
- Show students a number of objects and ask them to predict if they will float or sink. Record class or group predictions in a T-chart labeled “Predictions”. Draw the items and label them.

Predictions	
Float	Sink

- What do you think will happen if we put this metal spoon in water? Why do you think so?

- Test a few items together record the results in a second T-chart labeled "Results." Again use pictures and words. Save both the Predictions and the Results charts for later science talks.
- Show students the container of objects you have for them to test during work time to see if they float or sink.
- Encourage students to make a T-chart in their science notebooks to record what floats and what sinks using pictures or words. Be sure to add word cards with pictures of the objects to the word bank to be used for this purpose.

### Children's Water Play

- For this focused investigation it is very helpful to have an adult in the floating and sinking center to facilitate the testing. Children need to be reminded to test one item at a time and record it by drawing a picture or recording the word.
- Sample questions to use while students are exploring floating and sinking. (Not all students will want to talk with you as they are working, do not force the conversations if students wish to focus on their work without interruption.)
  - What do you predict this object will do?
  - Can you find an object you think will float? What makes you think that?
  - Can you find an object you think will sink? What makes you think that?
  - You said you thought it would sink because it is round. Do all round things sink? How can you find out?
  - What is it made out of? Do you think all things made of the same material float? How can you find out?
  - Did any of the objects surprise you?
- If possible, provide an opportunity to explore floating and sinking outdoors. Observe what happens when leaves, sticks, and rocks are thrown into puddles.
  - What happened when you put a leaf in the puddle?
  - Did anyone have something different happen when you put a leaf in a puddle? Why do you think that is?

- What do you think makes some sticks float and others sink?
- Do you think there are rocks that float? What makes you say that?

**Science Talks:**

- Focus science talks on helping students discuss and make theories to explain what they are observing. Chart students thinking. Remember students will not fully understand the concept of floating and sinking, as they are not developmentally ready. However, they can begin to formulate generalizations to explain their observations. Refer to the Predictions and Results charts to make generalizations.
  - What do you think is important about shape? Can you use the shape of an object to help you predict if it will float or sink?
  - What is the object made of? How do you think that material helps it float or sink?
  - How do you think the way you put it in the tub of water helped it float or sink?
- Chart student ideas about floating and sinking throughout this focused exploration.

## Tips and Ideas:

### Focused Exploration: Floating and Sinking

#### Step 2: Rigid Tubes

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

##### Science Talk 1: Introducing Rigid Tubes

- Gather students in the discussion area and demonstrate how to use the rigid tubes.
  - Put a few small items in a tube that is capped at one end; model using a funnel and cup to fill it with water almost to the top and adding the second cap. **Emphasize the importance of pressing down on the caps to make sure that they are secure.**
  - Turn the tube upside-down and model describing what you see
    - The rubber band is moving back and forth from one side to the other as it slowly sinks down.
    - The yellow wooden bead popped right up to the top.
    - Look what happens when the bubble bangs into the paper clip.
  - Turn the tube upside down again and ask the students:
    - Which things are going up? Which ones are going down?
    - How is the penny moving?
    - Are the paper clip and the sequin moving the same way? How are they moving differently?
    - Why do you think the sequin doesn't go straight down?
- Let children know that they will be able to build and observe the tubes at a water center. Model how to work with a partner—one holds the tube; one uses a funnel and a cup to fill the tube with water.
- **Caution students to press down on the caps to make sure that they are secure before turning them over.**
- Encourage students to record what they observe in their tubes in their notebooks.

### Children's Water Play

- Sample questions to use while students are exploring drops on different surfaces:
  - Which items are moving up (floating)?
  - Which items are moving down (sinking)?
  - Which things are moving fast? Which move slow?
  - Which object moved the fastest/slowest?
  - Do all the objects move the same way?
  - What is happening to the button? Why to you think it isn't going straight down?
  - What do you think will happen if you turn the tube upside down?
  - Can you show me with your finger how this object moved?
  - What is the bubble doing? Does it always do that?
  - Can you make it move slower? Faster?
  - Can you make more bubbles? Can you make bigger/smaller bubbles?
  - Where do you think the bubble came from? What makes you say that?

### Science Talk Ideas for Rigid Tubes:

- Present a challenge for individuals or a small group:
  - Can you make a tube of objects that all move up?
  - Can you make a tube of objects that all move down?
  - Can you make a tube of objects that all move fast, or slow?
  - How did you decide which objects to put into your tube?
- Continue adding the "Our Ideas About Floating and Sinking Charts begun in Step 1."
  - Continue discussing student's observations about the shape, size, and materials that the objects are made of and how that influences how they float or sink.

## Tips and Ideas:

### Focused Exploration: Floating and Sinking

#### Step 3: Boats

*Continue to hold weekly walkabouts and encourage students to record their work in their science notebooks. As new vocabulary comes up, add the new words to the word bank.*

##### Science Talk 1: Introducing Boats

- Gather students in the discussion area to discuss boats.
- Invite students to share their prior experience with boats
  - Who has been on a boat before?
  - Who has made a boat? What material did you use to make it?
  - Do boats float or sink?
- Read a story that features a boat. (For example Mr. Gumpy's Outing by John Burningham or Who Sank the Boat? By Pamela Allen.)
  - Why do you think the boat floated?
  - What made it (or might make it) sink?
  - What do you think helps it float, even with so many animals?
- Show the students the supplies you have collected for them to make boats. Also introduce the idea of cargo, by referring to the book you read, and show the students objects that they can use (math manipulatives, marbles, pennies, paper clips, etc.).
- Add the word cargo to the word bank.
- Help students begin to think about building boats by asking:
  - What kinds of boats do you think you will make?
  - How will you keep your boats from sinking?
  - What cargo will your boat carry?

##### Children's Water Play

- Sample questions to use while students are making boats:
  - What are you doing to make sure your boat won't sink?

- What will your boat be able to carry?
- What materials did you use to make your boat? Why did you choose that material?
- What do you think will happen to your boat when you put it in the water?
- What shape is your boat? Why did you choose that shape?
- What do you think will happen to your boat when you put cargo in it?
- Can you make a boat that holds even more cargo?

**Science Talk Ideas for Boats:**

- **Find out how much cargo a boat holds:**
  - How many marbles do you think we can put in this boat?
  - How could we record how many on paper?
  - Let's count together as we add marbles?
  - Do you think we could add more?
  - How many marbles did it take to sink the boat?
  
- **Make comparisons between boats:**
  - Let's look at all these boats we made. Which made good boats?
  - How much cargo did they hold?
  - What shapes are the good boats?
  - What materials were used to make good boats?
  - What about boats that didn't float? What shapes were they? What were they made from?
  - What materials would you choose to make a good boat?
  - What shape would you make your boat if you wanted it to hold a lot of cargo?
  
- **Continue adding the "Our Ideas about Floating and Sinking Charts begun in Step 1.**
  - Continue discussing students' observations about the shape, size, and materials that the objects are made of and how that influences how they float or sink.

## Bibliography

Author:	Title:
Allen, Pamela	Who Sank the Boat?
Arnold, Tedd	No More Water in the Tub
Asch, Frank	Water
Barton, Byron	Boats (board book)
Berger, Melvin	Amazing Water
Bruce, Nick	We Use Water (National Geographic)
Burningham, John	Mr. Gumpy's Outing
Cobb, Vicki	I Get Wet
Davies, Kay and Oldfield, Wendy	Floating and Sinking
Duvall, Jill	Who Keeps the Water Clean? Ms. Schindler
Evans, David and Willams, Claudette	Water and Floating (Let's Explore Science)
Fowler, Allan	The Wonder of a Waterfall
Fowler, Allan	It Could Still be Water
Frost, Helen	Keeping Water Clean
Frost, Helen	Water as a Liquid
Frost, Helen	We Need Water
Graham, Joan Bransfield	Splish Splash
Huggins-Cooper, Lynn	Water
Jen Green, Wendy	Why Should I Save Water?
Kerley, Barbara	A Cool Drink of Water
Locker, Thomas	Water Dance
Martin, Jacqueline Briggs	Snowflake Bentley
Marzollo, Jean	I am Water (Hello Reader Science Series)
Matthews, Rachel	Water
Mitton, Tony	Busy Boats
Neye, Emily	Water (All Aboard Science Reader Series)
Royston, Angela	Water (My World of Science Series)
Simon, Seymour and Fauteux, Nicole	Let's Try it Out in Water
Wick, Walter	A Drop of Water

### Recommended websites:

[www.dramainnature.com/photographs\\_of\\_waterfalls.htm](http://www.dramainnature.com/photographs_of_waterfalls.htm)

Photographs of waterfalls

[www.esipomline.org](http://www.esipomline.org)

Using children's books in science

[www.freefoto.com/pictures/nature/fountain/indx.asp](http://www.freefoto.com/pictures/nature/fountain/indx.asp)

Photographs of fountains

[www.nesc.wvu.edu/ndwc/ndwc\\_kids\\_dwinfo.htm](http://www.nesc.wvu.edu/ndwc/ndwc_kids_dwinfo.htm)

Information and resources related to teaching children about water