Thinking BIG Learning BIG

Benefits of Models

- Models make it easier for children to see, touch, investigate and interact with materials.
- Science topics become approachable and child-sized.
- Models help children explore science content and concepts.
- Children can learn vocabulary in context.
- Building models provides opportunities for spatial learning: stuffing newspapers *inside* the paper bag.
- Teachers can assess skills in realistic situations.

The BIG Picture – Beyond Models

- Science topics connect all parts of the curriculum: math, literacy, language, art, drama, gross motor.
- Children are immersed in explorations. Science happens throughout the program, not solely at a science table or in a science room.
- Exploring children's interests, ideas and questions is empowering.
- Problem-solving skills are boosted.
- Children learn through play.
- School-home communication is strengthened.

Thinking BIG means Learning BIG

Thinking BIG, Learning BIG: Connecting Science, Math, Literacy and Language in Early Childhood, (Gryphon House) features explorations from the Mountain View Parent Nursery School

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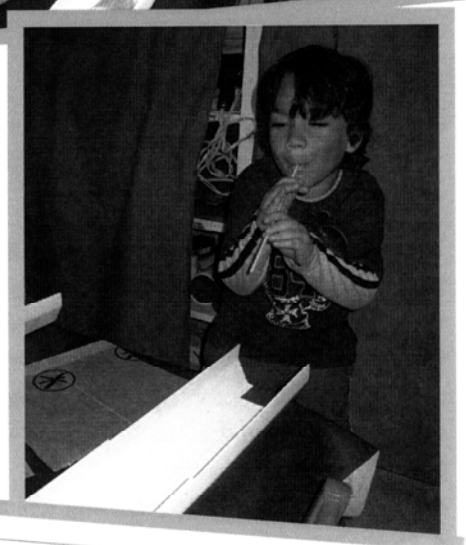
Experiment: Wind Power



FOCUS AREAS

Science: planning and conducting a simple investigation, using simple equipment and tools, communicating investigations and explanations

Math: counting, measuring—distance

MATERIALS

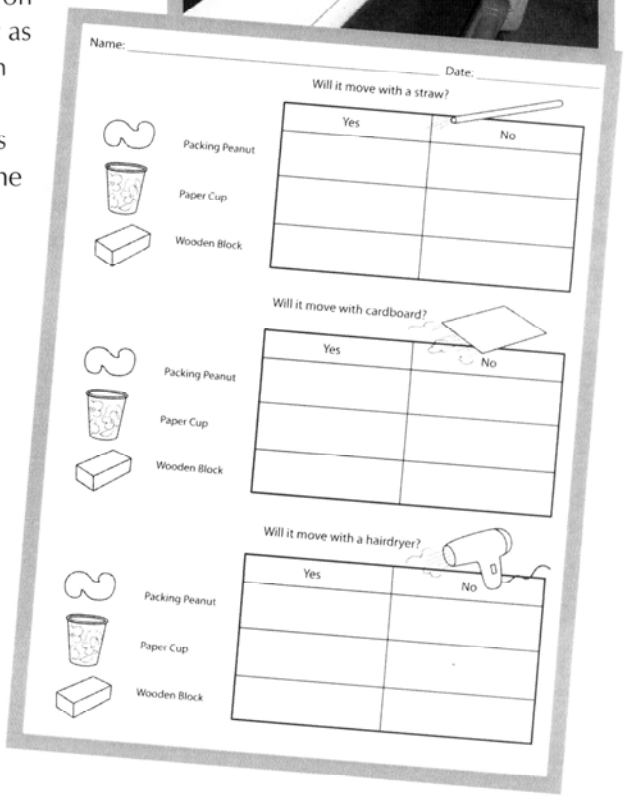
Duplicated recording sheets, 1 per child (see Preparation)
4 rigid cardboard pieces, about 8" square
Drinking straws, 1 per child
2 hair dryers, each with low or cool settings
3 items of different weight, at least 4 of each item, such as packing noodles, paper cups, and wooden blocks. (Optional: straw or grass, sticks, and stones as a preview to acting out "The Three Little Pigs" at another time.)
Pencils or markers
Masking tape
Table
4 lengths of plastic rain gutter or large plastic trays

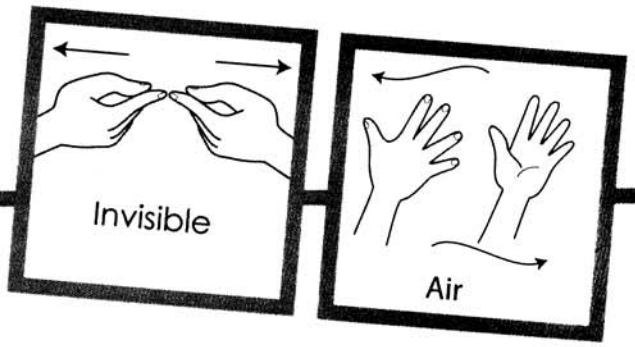
PREPARATION

- Choose three types of items the children will *experiment* with—one that will be easy to move, such as packing noodles, an item that will be harder to move, such as small paper cups, and one difficult to move, such as wooden blocks.
- Create a recording sheet by drawing pictures of each item and the different methods the children will use to blow. Make copies, 1 for each child
- Tape four lengths of plastic rain gutter to a table or set out large plastic trays.

WHAT TO DO

1. Tell a small group of children they are going to be *scientists* who study the *wind*. Say and clap out the syllables, **sci**-en-tist, with the emphasis on the "sci" syllable. Say *scientist* as you hold your closed hands in front of your body, thumbs sticking out. Move your hands in alternate circles, pointing the thumbs down as if they were test tubes being poured out. This is the sign for *science*. Then add the sign that indicates a person's occupation: flat palms face each other in front of the chest, then move the hands down to indicate the sides of the body.
2. Introduce more BIG vocabulary words. Say, "*Scientists* make *predictions*, what they think might happen, based on what they already





know. *Scientists* test their *predictions* by doing *experiments*, which are tests to see what will happen.
Note: For more information about the vocabulary words of *prediction* and *experiment*, see pages 40–41.

3. Allow the children time to try blowing and fanning a variety of items down the rain gutter or tray. After the children have had time to explore, invite them to choose items to *experiment* with.
4. Ask the children, "When you blow through the straw, will you be able to move your item?" After they blow, ask, "Did your item move?" Have them record the result on their recording sheets. The children then predict and try moving the other items with straws and then cardboard.
5. To increase interest, use BIG vocabulary words by saying, "See if you can make *hurricane winds* with your cardboard." "You can make a little *breeze* with your straw."
6. After all the children have had a chance to *experiment* with the various items and different kinds of *wind* power, allow two children at a time to *experiment* by moving items with a hair dryer on the low or cool setting.
Safety note: It is essential at all times to have an adult supervising the children's use of the hair dryer.
7. Save the children's recording sheets in their portfolio.

DISCUSSION STARTERS

Use these questions to spark children's thinking during and after the activity:

- What did you find out about how things move in the *wind*?
- What was the hardest to move?
- Why do you think some items move and others don't?
- Where does it work best to blow? (Children need time to figure out that they need to apply the *air* behind the item to make it move forward. They usually start off blowing and fanning from above.)
- What type of *wind* power did you like using the best—blowing with the straw, fanning with the cardboard, or the using the hair dryer?

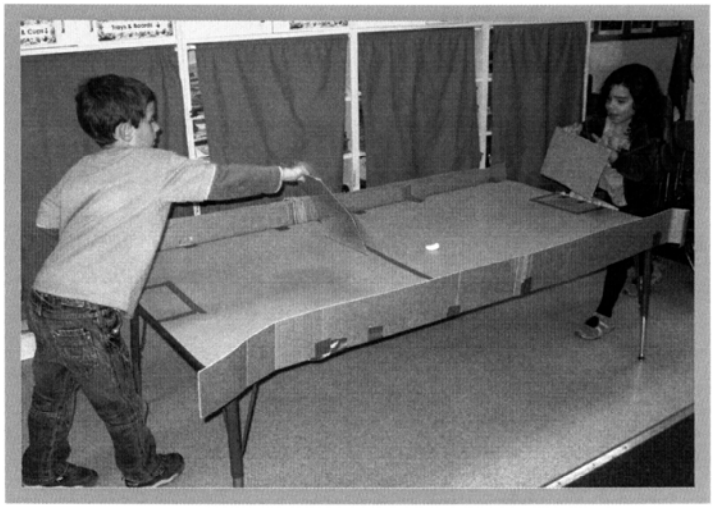
SKILLS ASSESSMENT

Use these questions to determine a child's abilities and understanding:

- Can the child make a *prediction*?
- Do the child's *predictions* become more realistic with experience?
- Can the child mark the correct box on the recording sheet?
- Does the child enjoy *experimenting* with different materials and methods of *wind* power?
- Is the child curious about the results?
- How well does the child wait for a turn using the hair dryer?

Air Soccer

WHAT TO DO



1. Work with a small group of children. Two children stand on opposite ends of the table, each holding an 8″ x 8″ cardboard piece. Invite them to fan their faces with the cardboard so they can feel the *air* move.
2. A third child places a packing noodle in the center of the table. The children with cardboard try to fan the packing noodle to the goal at the opposite end of the table. Tell them, "Use only *wind* power. No touching the noodle."
3. The children enjoy moving the packing noodle up and down the table. There is no need to keep score. If other children are waiting, set a timer to take turns.
4. Invite the children to observe where it works best to fan the packing noodle—behind it or above it. This is a good opportunity for you to reinforce directional vocabulary words, such as *above*, *behind*, and *in front of*.

SUPERSIZE IT!

The children can play *air* soccer indoors or outdoors with a light beach ball or partially inflated sturdy balloon on the ground. Remind the children not to kick the ball. Say, "In this game, only the *wind* can touch or move the ball." Several children may need to fan together to get a beach ball to move. **Safety note**: If a balloon pops, it is essential to pick up **all** the pieces.

DISCUSSION STARTERS

Use these questions to spark children's thinking during and after the activity:

- How can you make the packing noodle go where you want?
- Which type of fanning works best, light waves or strong waves?
- How is this game like any other games you have played?

SKILLS ASSESSMENT

Use these questions to determine a child's abilities and understanding:

- Can the child manipulate the cardboard?
- Does the child try different methods of fanning?
- Does the child enjoy the game?

FOCUS AREAS

Science: experimenting with air movement

Gross Motor: practicing eye-hand coordination

MATERIALS

Packing noodles
2 rigid cardboard pieces about 8″ x 8″
Cardboard strips about 5″ wide, enough to cover both long sides of a classroom table
Table
Masking tape
Sand timer (optional)

PREPARATION

- Create a "playing field" by taping strips of cardboard about 5″ high to the sides of a table.
- Make goals at the ends of the table with masking tape. (See photo)
- Mark the centerline with masking tape.
- Cut cardboard into two pieces that are about 8″ x 8″.

Is it Waterproof?

FOCUS AREAS

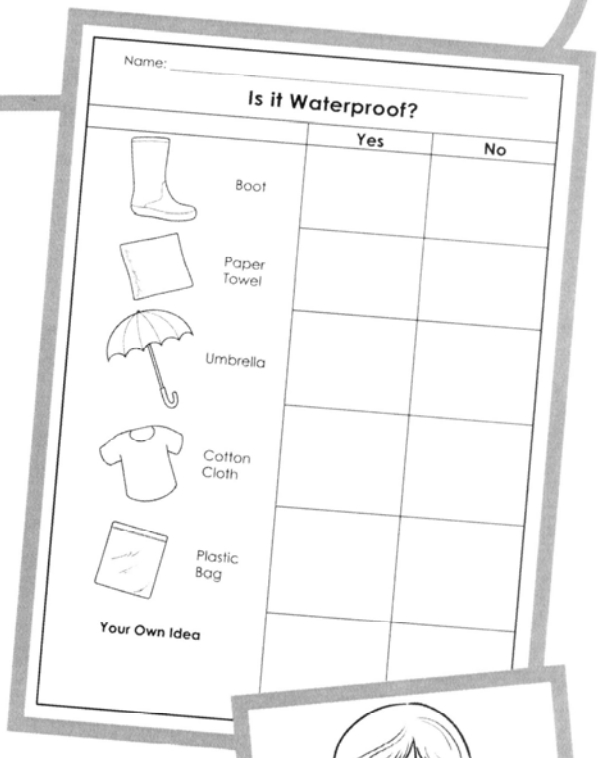
Science: conducting simple investigations, communicating results
Language Arts: learning vocabulary
Fine Motor: practicing a pincer grasp

MATERIALS

Recording sheets for each child (see PREPARATION)
Small trays, 1 per child in the group
Eyedroppers or pipettes, 1 per child in the group
Small containers of water for children to fill eyedroppers
Plastic spoons, 1 per child
Magnifying lenses, 1 per child
Absorbent fabric—pieces of fabric such as cotton T-shirt or sheets, enough for each child to have dry samples at least 3" square
Absorbent paper—pieces of absorbent paper, such as paper towels, construction paper, or newspaper, at least 3" square
Small plastic bags
Waterproof materials—umbrella, rain jacket, boots, either adult or child-size
The vocabulary words WATERPROOF and ABSORBENT written in large letters

PREPARATION

- Prepare a recording sheet for each child, labeled, "What is *waterproof*?" Make a copy for each child in the class. On the sheet, alternate *waterproof* and *absorbent* materials.



WHAT TO DO

1. Work with a small group of children at the activity table, demonstrate how to use an eyedropper or pipette and introduce the word *drop*, a small amount of water or another liquid. Say and clap **drop**. Show the children a *drop* of water. Invite the children to practice using the eyedroppers to make water *drops* by sucking up water and dripping it on their tray. Allow plenty of time for practice. (See Teacher-to-Teacher Tips on the following page.) **Note**: If some children get frustrated with the eyedroppers, suggest that they use a plastic spoon to pick up the water.
2. Invite the children to look at the *drops* with a magnifying lens.
3. Give each child a recording sheet and show them the different items you will be testing. Tell the children they will be scientists doing an *experiment* to see what material will keep water out and which will soak up the water. Introduce the word *waterproof*. When something is *waterproof,* it keeps water out. Say and clap the syllables, **wat**-er-proof, with an emphasis on the "wat" syllable. Say *waterproof* as you make the ASL signs for *water* and *protect*. To make the sign for *water*, extend your three middle fingers and tuck back your pinkie and thumb (the W handshape), and tap your chin. *Protect* is arms crossed at the wrist, closed fists, moving out as if you were protecting yourself.
4. Say, "Some materials will not keep water out. Water goes into the material and the material becomes wet." Introduce the word *absorbent*. When something is *absorbent*, water soaks in. Show the children how a piece of cotton fabric absorbs the water. Say and clap the syllables, ab-**sorb**-ent, with the emphasis on the "sorb"

syllable. Say *absorbent* as you make the ASL signs for *water* plus *enter*. To make the sign for *water*, extend your three middle fingers and tuck back your pinkie and thumb (the W handshape), and tap your chin. *Enter* is your left hand held horizontally in front of your body while your right hand goes down and under your left hand.

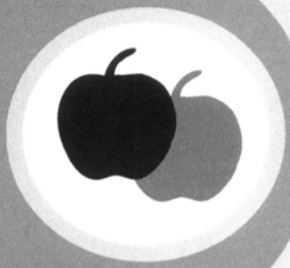
5. Encourage the children to make a *prediction* about which materials will be *waterproof* and which will absorb water. Review the word *prediction*—a guess, something you think might happen, based on what you already know. Say and clap the syllables, pre-**dic**-tion, with the emphasis on the "dic" syllable. Say *prediction* as you make the sign for *guess* by moving your open right hand across your forehead and grabbing the air.
6. Before the children put *drops* of water on an item, have them predict whether it will absorb the water or not. Then have them try it. Was their *prediction* correct? Ask the children to mark whether the item was *waterproof* or *absorbent*.
7. Repeat with each item. Save the recording sheets in each child's portfolio.

MORE IDEAS

- Encourage the children to explore the different materials. If they put a dry piece of cloth or paper in the plastic bag or *rain* jacket sleeve and then drip water on it, does the item stay dry?
- Invite the children to test additional items to see what might be *waterproof* such as the back of their hand, green leaves, a plastic tablecloth, a plastic chair.

TEACHER-TO-TEACHER TIPS

- Using an eyedropper can be tricky for some children. To teach them how to use an eyedropper say, "Dip in, squeeze, unsqueeze, hold gently—no squeezing, now get ready for a *drop*, squeeze slowly."
- It is fun to test if umbrellas are *waterproof*; just be aware that some people are superstitious about opening umbrellas indoors. Consider doing this test outside.
- Use your knowledge of the children's interests and abilities to determine whether to introduce all of the BIG vocabulary words at the same time, or to introduce them over the span of a few days.



DISCUSSION STARTERS

Use these questions to spark children's thinking during and after the activity:

- What would be good to wear out in the rain?
- What items would help clean up spilled water?

SKILLS ASSESSMENT

Use these questions to determine a child's abilities and understanding:

- What kind of pencil grip does the child use?
- Can the child mark the appropriate box on the recording sheet?
- Can the child use the vocabulary—*waterproof*, *absorbent*, and *drop*?

Exploring Drops in a BIG Way

PREPARATION

- Fill ice cube trays or egg cartons half full with water. Add a few *drops* of red, blue, and yellow to three of the sections.
  Safety note: Egg cartons must be washed thoroughly to eliminate any trace of egg.
- Place a sheet of waxed paper in a tray for each child.

WHAT TO DO

1. Encourage a small group of children to *experiment* using the eyedroppers to see if they can get just one *drop* at a time to come out. This will be very challenging for young children. Allow lots of time for free exploration. The children may prefer mixing the colors in the ice cube trays or egg cartons to making *drops* with them. That is fine.
2. Invite the children to *experiment* with the *drops*. What happens if they place two *drops* right next to each other on a piece of waxed paper? What happens if the *drops* are different colors? What happens if they put a *drop* right on top of another *drop*? What happens if they hold the eyedropper up higher when they squeeze? What happens if they tilt the tray?
3. After the children have had time to *experiment* with water *drops*, invite them to make a print of their *drops* by quickly pressing a paper towel on the waxed paper. Write the children's names on the paper towels and invite them to hang the paper towels up. If a paper towel gets really saturated, it works better to lay it flat on a tray so it does not drip on the floor. See the following activity, Making Rain, to introduce the concept of *evaporation*.
4. Encourage the children to make many different prints of their explorations. Save at least one print for each child's portfolio including their comments about the shapes and colors.

DISCUSSION STARTERS

Use these questions to spark children's thinking during and after the activity:

- Is the waxed paper *waterproof* or *absorbent*? How can you tell?
- Is the paper towel *waterproof* or *absorbent*? How can you tell?
- How do the *drops* move on the waxed paper?
- What shapes do your *drop* puddles form?

SKILLS ASSESSMENT

Use these questions to determine a child's abilities and understanding:

- Can the child make just one *drop* come out at a time?
- Does the child keep trying to make *drops* if she has trouble at first?
- Can the child predict what will happen when the *drops* combine?
- Does the child use her imagination when describing her print?

FOCUS AREAS

Science: studying properties of water
Math: counting
Language Arts: learning vocabulary
Fine Motor: practicing a pincer grasp

MATERIALS

Eyedroppers, 1 per child
Ice cube trays or Styrofoam egg cartons filled with water. Liquid water color or food coloring in red, blue, and yellow
Waxed paper cut in sheets
Trays to hold the waxed paper sheets
Magnifying lenses, 1 per child
Paper towels
Permanent marker to write children's names