Indoor Gardens: Growing Grass and Moss

DESCRIPTION

Growing grass and moss indoors is exciting for children and creates many learning opportunities. Although grass and moss are familiar features of the outside environments of many children, they typically have many misconceptions about these two organisms. Some children do not believe that grass is a plant because it does not appear to have leaves. Many also confuse moss with grass. Growing grass and moss indoors is easy, inexpensive, and exciting for children.

STANDARDS

Next Generation Science Standards, Kindergarten – K-LS1-1 From Molecules to Organisms: Structures and Processes (Life Sciences)

Use observations to describe patterns of what plants and animals need to survive.

Head Start Early Learning Outcomes Framework – Scientific Reasoning (Reasoning and Problem Solving)

Goal P-SCI 4. Child asks a question, gathers information, and makes predictions.

Ohio Early Learning and Development Standards – Life Science

With modeling and support, identify physical characteristics and simple behaviors of living things.

MATERIALS

For Grass

- ☐ several clear plastic trays or containers, approximately 16 by 11 by 5 inches
- ☐ package of grass seed
- ☐ potting soil
- ☐ several small spray bottles

For Moss

- ☐ 1 small, clear plastic container with lid per child (lunch-meat containers work well)
- ☐ pebbles
- ☐ potting soil
- ☐ several small spray bottles
- ☐ moss collected from yards, parks, or nearby woods
- ☐ magnifying glass

SCIENTIFIC INFORMATION

Grass is a large family of plants characterized by hollow stems and flat leaves that hug the stem and grow from its base. Because growth occurs so low in the plant, grass can be mowed or grazed by animals without damage to the plant.

Mosses are small plants that do not have roots or seeds; instead, their leaves take in moisture and nourishment directly from the air. They are part of the plant group called *bryophyte*. Mosses may grow on damp soil, trees, rocks, or concrete. Although mosses vary as to how much sunlight they need, many varieties grow in moist, shady locations. To determine the sunlight needs of the moss collected for this activity, observe the environment where it grows naturally. Be sure to get permission when collecting moss from places other than your own property. It is illegal to remove moss from some parks. Try not to take too much moss from one place.

IMPLEMENTATION

Growing Grass

1. Begin with the grass, which is likely to be more familiar to children. Working in small groups, children should first spread about 2 inches of potting soil in the bottom of their container. Next, they can take turns scattering grass seed across the soil and gently pressing the seeds into the dirt. Finally, children can take turns spraying the seeds with water.
2. The grass containers should be placed near a window where they can receive sunlight. The seeds should be sprayed each day with water to keep the soil moist. In 1–2 weeks children will see their grass begin to grow.
3. Children can do many things with the grass. They can insert a stick to mark daily growth. As the grass grows, they can cut it with scissors. Children may want to take the grass to the block area and use it as a pasture for toy animals. They may decide to divide it among the group so that each can take a section home. Children may also decide to transplant the grass into the playground.

Growing Moss

1. While children are waiting for their grass to grow, they can start on their moss gardens. Clear lunch-meat containers work well for moss habitats and can be collected ahead of time from parents. Although children will have individual containers for this activity, they can work in small groups for the assembly phase.
2. Children should spread two thin layers in their containers: 1) pebbles, and 2) potting soil. Children can press the moss gently into the soil to anchor it and spray it lightly with water. Most mosses prefer filtered instead of direct sunlight.
3. As the moss begins to stabilize in its new container, children may want to assemble small play scenes with tiny figures or animals. They can also add sticks, pebbles, or shells to create a colorful moss garden.

ASSESSMENT

WHAT TO LOOK FOR	RELATED COMMENTS/QUESTIONS
Children will be excited to see the grass begin to grow.	Look at the grass carefully. Do you see any roots?
Children may be surprised at how quickly the grass grows.	Let's add a stick to your grass container. You can draw a line on it each day to mark the top of the grass. Then we will know how much it grows every day.
Children will handle the moss. They may not think it looks like a plant.	Let's look through the magnifying glass and see if we can see any roots. I can't find any.
Many children will like creating moss gardens by adding small objects to their container.	Remember to keep your moss moist. What would you like to add to your moss garden?

ELEMENTS OF SCIENTIFIC INQUIRY

Hypothesize: Children may hypothesize that the moss will not grow because it does not have roots.

Observe: Children will observe the differences between the grass and the moss.

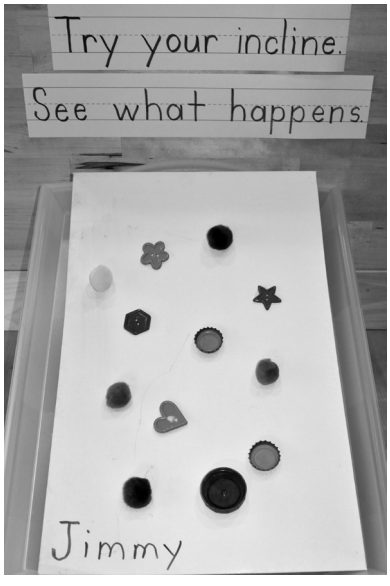
Experiment: Some children may experiment by cutting the grass.

Measure: Some children will measure daily plant growth.

Compare/contrast: Children will compare and contrast the characteristics of the moss and the grass.

Communicate: Children will record and discuss their opinions about whether the moss is a plant.

More Ramp Races: Inclines with Various Surfaces



DESCRIPTION

The surface of an incline affects how objects move on it. In this set of activities, children begin in the science area, where they race cars down two ramps that are identical except for their surfaces: one is rough and one is smooth. Later, they compare inclines with four different surfaces. In the block area, children construct structures with premade inclines that have a variety of surfaces. The added materials are small boards, each with a different material on top. Finally, children create their own incline surfaces with cardboard and collage materials and incorporate them into their block structures. The results of these explorations can be photographed and added to the class engineering book (activity 5.2).

STANDARDS

Next Generation Science Standards, Kindergarten – K-PS2-1 Motion and Stability: Forces and Interactions (Physical Sciences)

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Head Start Early Learning Outcomes Framework – Scientific Reasoning (Reasoning and Problem Solving)

Goal P-SCI 5. Child plans and conducts investigations and experiments.

California Preschool Learning Foundations – Physical Sciences

2.2. Observe and describe the motion of objects (in terms of speed, direction, the way things move), and explore the effects of own actions (e.g. pushing, pulling, rolling, dropping) on making things move.

MATERIALS

Science Center Inclines

- ☐ 4 ramps, constructed by taping one double-unit block (11 inches long) to a unit block (5½ inches long) at right angles, as pictured
- ☐ strips of bumpy fabric, corrugated paper, rough sandpaper, or other materials of various textures cut the same length as the long unit blocks and long enough to wrap around them
- ☐ 4 small cars, preferably identical
- ☐ duct tape, for holding the blocks together and adhering the various materials to the blocks

Block Area Inclines

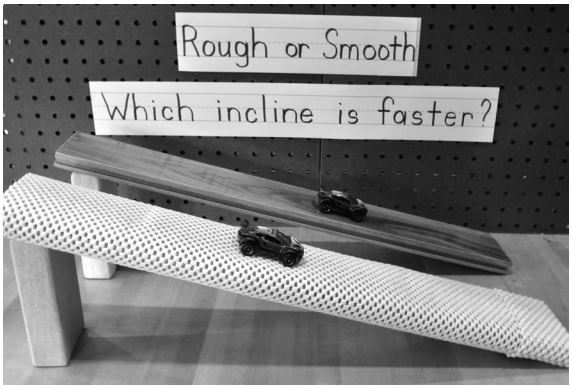
- ☐ 4 or more pieces of ¼ by 6 by 12 inch wood, available in craft stores
- ☐ bumpy stickers, webbed drawer liner, fabric scraps, felt, or other materials to adhere to the boards

Child-Made Inclines

- ☐ cardboard boxes, cut into 6-by-12-inch pieces, for the collages
- ☐ collage materials, such as cotton balls, fabric trim, fabric scraps, buttons, sequins, and pom-poms
- ☐ digital or smartphone camera
- ☐ white construction paper, for the class engineering book

SCIENTIFIC INFORMATION

The surface of an incline has an effect on how objects move on it. In the ramp races in this activity, children will notice that bumpy or rough surfaces slow the cars down. This is because as a car strikes the bumps on the surface, the bumps exert an upward push against the car that slows its acceleration. When moving over a soft, spongy surface, such as quilted material, the car pushes down and displaces some of the fabric as it moves over it. Therefore, some of the energy propelling the car down the incline goes into deforming the cloth, thus slowing the car down.



IMPLEMENTATION

1. Begin with two ramps, one of plain wood and one covered with a bumpy surface. This allows children to construct beginning relationships between the surface of an incline and how objects move on it.
2. After several days, add two more ramps so that children can conduct further experimentation.
3. During the second week, place the teacher-made incline boards in the block area for children to incorporate into their block structures.
4. At the beginning of the third week, introduce the collage activity. As soon as the collages are dry, children can begin incorporating their own inclines into their block structures. Teachers can photograph these structures and display them in the block area along with the child's comments. Eventually, they can be added to the class engineering book (activity 5.2).

ASSESSMENT

WHAT TO LOOK FOR	RELATED COMMENTS/QUESTIONS
Children will discover that the car on the ramp with a rough surface moves slower than the car on the smooth ramp.	Why do you think this car moved slower? The ramps are the same height.
Children will examine the surfaces of the four ramps to determine why the cars move at different speeds on them.	Which ramp had the slowest car? Which one was the fastest? If it were raining or icy, which road would you want to be on?
While building with blocks, children will experiment with inclines that have different surfaces.	What have you discovered about the inclines in the block area? Which ones might be good for a steep hill?
Children will compare the block structures in the class engineering book.	Civil engineers build roads and bridges. Engineers and architects have to know a lot about inclines.

ELEMENTS OF SCIENTIFIC INQUIRY

Experiment: Children will experiment with how objects move on inclines with various surfaces.

Observe: Children will observe how the surface of an incline affects the speed of an object rolling down it.

Compare/contrast: Children will compare ramps with many different surfaces.

Measure: Children may measure or compare how far cars roll after moving down inclines with various surfaces.

Communicate: Children will share their ideas in the class engineering book.

Infer: Children may infer objects move more slowly along inclines with rougher surfaces.

Use technology/tools: Children will explore an early technology, the incline.

Fruit Smoothies: Using a Wedge

DESCRIPTION

As in activity 5.17, this activity also combines physical and life sciences through a cooking activity; however, this time it is fruits rather than vegetables that are transformed. Children once again use plastic knives as part of the cooking process. They also have an opportunity to measure one of the ingredients. When the ingredients are blended, children observe a physical change as solid pieces of fruit and ice are transformed into a liquid.

STANDARDS

Next Generation Science Standards, Kindergarten – K-PS2-1 Motion and Stability: Forces and Interactions (Physical Sciences)

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Head Start Early Learning Outcomes Framework – Scientific Reasoning (Scientific Inquiry)

Goal P-SCI 1. Child observes and describes observable phenomena (objects, materials, organisms, and events).

Alabama Developmental Standards for Preschool Children – Science and Environmental Education

S.P.2.3. Name and use simple machines in the context of daily play and problem solving.

MATERIALS

☐ 4–5 bananas

☐ 1 quart strawberries

☐ 1 quart juice (orange, pineapple, etc.)

☐ 1 quart yogurt

☐ ice cubes

☐ tablespoon

☐ plastic knife for each child

☐ small plastic bowl for each child

☐ cutting board or tray

☐ blender

☐ glass for each child

Instructions for Individual Portions

This recipe makes an individual fruit smoothie. Each child will need:

☐ ¼ banana

☐ 3 strawberries

☐ 2 tablespoons juice

☐ 2 tablespoons yogurt

☐ several ice cubes

1. Children can use the plastic knives to cut the fruit into small pieces.
2. Put all the ingredients into a blender and mix.

SCIENTIFIC INFORMATION

The physical properties of fruits include color, shape, texture, and taste, which all change during the process of cutting and blending. Once the ingredients are blended, they cannot be separated into the original components again. The addition of ice changes the fruit and yogurt from cool to cold. The ice changes from a solid form of water to a liquid.

IMPLEMENTATION

1. Although each child makes an individual fruit smoothie, the teacher can work with several children at a time. Each child should have his or her own knife and bowl so that dishes do not have to be cleaned in between children.
2. The teacher should operate the blender while children observe. Before the first child in each group adds his or her ingredients to the blender, the teacher should let the children see the blades inside the blender that will mix the ingredients. These are also wedges.
3. Children can drink their fruit smoothies immediately, or save them for snack or lunch. The questions that teachers ask are particularly important for helping the children focus on the scientific aspects of the cooking process.

ASSESSMENT

WHAT TO LOOK FOR	RELATED COMMENTS/QUESTIONS
Children will find that the knives help them efficiently cut the fruits into pieces.	What does the blade of the knife look like? In science, we also call this a wedge.
Children will compare the taste and texture of the fruits before and after they are mixed.	Can you tell that there are both bananas and strawberries in your fruit smoothie? Are the fruits still solid chunks, or is everything liquid now?
Children will observe that the ice is no longer in solid form.	What happened to the ice? I don't see any ice cubes, do you?

ELEMENTS OF SCIENTIFIC INQUIRY

Experiment: Children will experiment with how the wedges (knives) cut through the fruit.

Observe: Children will observe the difference in the fruit and ice before and after they are blended.

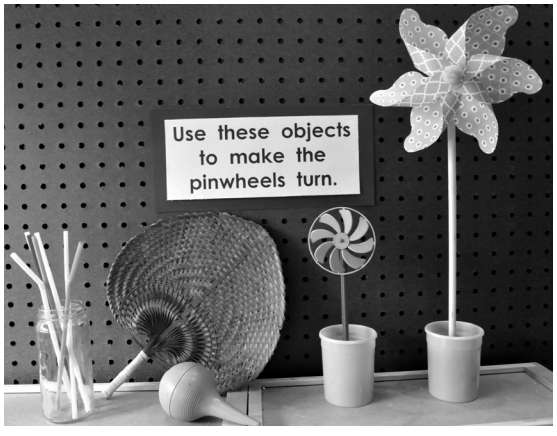
Communicate: Children will discuss what happens as they experiment with the knives. They will also communicate changes they notice in the fruit and ice after they are blended.

Compare/contrast: Children will compare the texture, color, and taste of the fruits before and after they are blended.

Measure: Children will measure the yogurt using a standard measuring device.

Use Technology/tools: Children will use the wedge and the blender as tools to accomplish a task.

Pinwheels, Inside and Out: Force of Moving Air



DESCRIPTION

The force of moving air can move objects. In this activity, children use pinwheels to observe the effect of moving air. In the classroom, the pinwheels are mounted in jars of dried playdough to hold them in position while children use fans, basters, and air blown through a straw to make them move. Outdoors, children can observe how natural breezes move the pinwheels.

STANDARDS

Next Generation Science Standards, Kindergarten – K-PS2-1 Motion and Stability: Forces and Interactions (Physical Sciences)

Plan and conduct an investigation to compare the effects of different strengths or different directions of pushes and pulls on the motion of an object.

Head Start Early Learning Outcomes Framework – Scientific Reasoning (Reasoning and Problem Solving)

Goal P-SCI 5. Child plans and conducts investigations and experiments.

Rhode Island Early Learning and Development Standards – Science

S 1.a. Children learn to plan for and carry out investigations and to collect, evaluate, and communicate information.

MATERIALS

- ☐ several varieties of pinwheels
- ☐ playdough
- ☐ plastic jars, such as peanut butter containers
- ☐ fans
- ☐ basters
- ☐ straws
- ☐ children's books about windmills, such as *Windmills (How it Works)*, by Charlotte Hunter

SCIENTIFIC INFORMATION

The force of moving air can move objects and be converted into energy to do work. A windmill converts the energy from wind into rotational energy by means of blades (called *sails*) on the windmill. Gears transfer this energy to machinery that grinds grain.

Today, wind turbines are used to generate electricity. Wind farms may have hundreds of wind turbines that cover hundreds of square miles.

IMPLEMENTATION

1. To prepare for the indoor activity, push playdough into the plastic jars. Insert a pinwheel into each jar, and allow the playdough to dry out overnight. The dried playdough will support the pinwheels while the children experiment. Old playdough that is ready to be discarded can be used.
2. Display the jars with pinwheels in the science area along with the fans and basters, which children can use to create wind and move the pinwheels.
3. Add straws to the area. Children can blow air through the straws to move the pinwheels.
4. Share books about windmills with the children. They can be placed in the science area for reference.
5. Meanwhile, take a set of pinwheels outside so that children can observe how the wind moves them. Children can generate their own wind by running with the pinwheels.

ASSESSMENT

WHAT TO LOOK FOR	RELATED COMMENTS/QUESTIONS
Children will discover that moving air generated by the fans and basters can move the pinwheels.	Can you make the pinwheels move without touching them? What can you do with these fans?
Children will experiment with directing air through the straws to move the pinwheels.	Where does the air need to hit the pinwheel in order to make it move?
Outdoors, children will observe that the pinwheels move faster the more the wind blows.	What is making the pinwheel spin? Did you touch it?
Children will discover that they can generate their own wind by running with the pinwheels.	The faster you run, the faster your pinwheel turns.

ELEMENTS OF SCIENTIFIC INQUIRY

Experiment: Children will experiment by moving the fans and blowing air though straws to move the pinwheels.

Observe: Children will observe that the more moving air that hits the pinwheel, the faster it turns.

Communicate: Children will help each other figure out how to make the pinwheels turn.

Compare/contrast: Children will compare how fast the wheels turn when they use various tools to generate moving air.

Use technology/tools: Children will explore the technology of windmills and wind turbines by experimenting with pinwheels and reading books about windmills.