

## K. Scientific Thinking: Children collect information through observation and manipulation

Birth to 18 months	18 to 36 months	36 to 60 months
Some Indicators for Children:	Some Indicators for Children:	Some Indicators for Children:
<ol style="list-style-type: none"> <li>1. Turns head toward sounds or voices</li> <li>2. Gathers information through the senses (e.g., mouthing, grasping, reaching)</li> <li>3. Uses more than one sense at one time (e.g., uses sight, touch, taste, and hearing by examining and shaking a toy)</li> <li>4. Observes objects in the environment for a brief period of time</li> <li>5. Uses another object or person as a tool (e.g., expresses the desire to be picked up to reach something, uses block to push buttons on a toy)</li> </ol>	<ol style="list-style-type: none"> <li>1. Uses all five senses to examine different objects with attention to detail</li> <li>2. Observes and manipulates objects to identify similarities or differences</li> <li>3. Observes and examines natural phenomena through senses (e.g., notices different types of insects)</li> </ol>	<ol style="list-style-type: none"> <li>1. Identifies and distinguishes between senses (e.g., tastes, sounds, textures)</li> <li>2. Uses nonstandard tools (e.g., blocks, paper tubes) to explore the environment</li> <li>3. Uses standard tools (e.g., magnets, magnifying glass) to explore the environment</li> <li>4. Participates in experiments provided by adults and describes observations (e.g., mixing ingredients to bake a cake)</li> </ol>

### Sample Strategies to Promote Development and Learning:

- Show child self in the mirror.
- Demonstrate and explain how things can be manipulated to make them different and/or more useful.
- Provide objects that invite exploration with multiple senses (e.g., rattle with bright colors and different textures).

### Sample Strategies to Promote Development and Learning:

- Provide opportunities for child to explore natural objects and events.
- Explore the environment with child and show interest in objects found and observed.
- Provide opportunities for child to examine things in detail by asking open-ended questions.

### Sample Strategies to Promote Development and Learning:

- Provide opportunities for child to learn through all of the senses (e.g., provide active and large motor strategies to support scientific thinking).
- Provide opportunities for child to share observations through pictures and words.
- Help child represent his/her observations using charts and graphs.





**L. Scientific Thinking:**  
**Children engage in exploring the natural world by manipulating objects, asking questions, making predictions, and developing generalizations**

Birth to 18 months	18 to 36 months	36 to 60 months
<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>
<ol style="list-style-type: none"> <li>1. Actively uses one or more sense to explore environment (e.g., touch, sight, taste, smell, hearing)</li> <li>2. Expresses a sense of wonder about the natural world</li> <li>3. Investigates new phenomena (e.g., reaches out to touch rain)</li> <li>4. Tries new activities, motions, experiences</li> <li>5. Progresses from trial and error to solving problems more systematically, with assistance</li> </ol>	<ol style="list-style-type: none"> <li>1. Asks simple questions about the natural world (e.g., "Where did the rainbow go?")</li> <li>2. Observes and/or manipulates objects and events to answer simple questions about the natural world</li> <li>3. Demonstrates ability to think before engaging in an activity</li> <li>4. Makes guesses about what might happen based on past experience</li> </ol>	<ol style="list-style-type: none"> <li>1. Asks questions and finds answers through active exploration</li> <li>2. Records information from an experience (e.g., drawing, storytelling, writing, photographing)</li> <li>3. Makes predictions and develops generalizations based on past experiences</li> <li>4. Uses vocabulary that shows recognition of scientific principles to explain why things happen (e.g., uses words such as sink, float, melt, freeze)</li> </ol>

**Sample Strategies to Promote Development and Learning:**

- Provide child with opportunities to play and explore the natural world.
- Explore objects and the environment together with child.

**Sample Strategies to Promote Development and Learning:**

- Provide opportunities for child to ask questions about the environment and provide descriptive answers.
- Provide opportunities for child to think ahead by asking "what if" questions about the natural world.
- Provide opportunities for child to note patterns in behaviors and to discuss what comes next (e.g., "After we read a bedtime story, we turn out the lights:").

**Sample Strategies to Promote Development and Learning:**

- Demonstrate, explain, and engage child in activities that make predictions about natural events (e.g., growing seeds, caring for animals, charting weather).
- Invent and conduct simple experiments with child (e.g., which object will sink and which will float).
- Engage child in simple and nutritious cooking projects from own and other cultural backgrounds, demonstrating simple scientific principles (e.g., freeze, melt, liquid, solid).



## M. Scientific Knowledge: Children observe and describe characteristics of living things

Birth to 18 months	18 to 36 months	36 to 60 months
<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>
<ol style="list-style-type: none"> <li>1. Notices plants, animals, and other people in the environment</li> <li>2. Explores characteristics of certain living things (e.g., picks up an earthworm, tries to catch ants)</li> </ol>	<ol style="list-style-type: none"> <li>1. Explores and investigates physical properties of living and non-living things</li> <li>2. Comments on what it takes to make things grow (e.g., "That plant needs water.")</li> </ol>	<ol style="list-style-type: none"> <li>1. Identifies things as living or non-living based on their characteristics (e.g., breathes, moves, grows)</li> <li>2. Describes characteristics of plants, animals, and people (e.g., "That tree grew really tall!")</li> <li>3. Notices similarities, differences, and categories of plants and animals</li> <li>4. Demonstrates understanding of changes in the appearance, behavior, and habitats of living things (e.g., plants, spider webs)</li> <li>5. Asks questions about growth and change in plants and animals</li> <li>6. Demonstrates understanding of how things grow and change</li> </ol>

### Sample Strategies to Promote Development and Learning:

- Sing songs and read books from a variety of cultural backgrounds with child that describe plants and animals and how they grow and change.
- Take child on field trips to places where he/she can observe and explore living things (e.g., zoo, farm, park).

### Sample Strategies to Promote Development and Learning:

- Help child safely observe animals and insects around the home and neighborhood.
- Provide opportunities for child to observe and interact with live animals and plants (e.g., field trips to farm, zoo, veterinarian's office, science museum, aquarium, plant nursery).
- Read or act out stories and legends about plants and animals from child's cultural background.

### Sample Strategies to Promote Development and Learning:

- Provide opportunities for child to use all five senses to learn about the outdoor environment (e.g., listen for sounds of nature, watch small insects, smell freshly mowed grass, touch rough pine cones).
- Explain and engage child in activities that explore plants and animals, including those found in diverse cultures.
- Provide opportunities for child to take care of living things (e.g., non-toxic houseplants, pets).

## N. Scientific Knowledge: Children observe and describe characteristics of the earth

Birth to 18 months	18 to 36 months	36 to 60 months
<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>	<b>Some Indicators for Children:</b>
<ol style="list-style-type: none"> <li>1. Observes sun and clouds</li> <li>2. Enjoys playing with water, sand, and mud</li> </ol>	<ol style="list-style-type: none"> <li>1. Asks questions about the earth</li> <li>2. Identifies weather (e.g., sun, rain, snow)</li> <li>3. Identifies or labels earth's materials (e.g., water, rocks, dirt, leaves)</li> <li>4. Demonstrates curiosity about the natural environment by asking "why" questions (e.g., "Why is the grass green?")</li> </ol>	<ol style="list-style-type: none"> <li>1. Investigates properties of rocks, dirt, and water</li> <li>2. Recognizes and provides simple descriptions of the states of matter (e.g., "Water is wet.")</li> <li>3. Makes simple observations of the characteristics and movement of sun, moon, stars, and clouds</li> <li>4. Discusses changes in the weather and seasons, using common weather-related vocabulary (e.g., rainy, sunny, windy)</li> </ol>

### Sample Strategies to Promote Development and Learning:

- Take child on walks, describing what you see.
- Read nonfiction books and sing songs with child that describes the properties of the earth.
- Provide safe opportunities for child to explore dirt, sand, and water.

### Sample Strategies to Promote Development and Learning:

- Introduce child to pictures of natural phenomena (e.g., sea, caves, waterfalls, forests).
- Provide opportunities for child to explore his/her natural environment.
- Demonstrate, explain, and provide activities for child to take care of the environment.

### Sample Strategies to Promote Development and Learning:

- Provide opportunities for child to share observations of the earth.
- Help child develop a nature collection (e.g., leaves, shells).
- If possible, go to museums or community events that focus on the natural world (e.g., planetarium, aquarium, earth day event).

