

## OUTCOMES CHARTS

The two outcomes charts that follow will help you to describe and record your children’s progress. You may also find them useful when talking with others about the goals of *Discovering Nature with Young Children*. The first chart, “Science Outcomes,” is in two parts: science inquiry skills and science concepts. Each skill or concept is defined in the column on the left. On the right are three levels of behaviors, starting with simple and moving to more complex. What your children will achieve will depend on their level of maturity and prior experiences.

The second chart is “Connections between Inquiry Skills and Outcomes in Other Domains.” This chart provides a visual presentation of how science inquiry skills relate to outcomes or skills in other areas. The inquiry skills are listed in the left-hand column. Language, literacy, and mathematics skills, as well as social abilities and approach to learning, appear at the top. Checked boxes show where inquiry skills support abilities in other areas. While the outcomes of other subject areas listed are based on the Head Start Child Outcomes Framework, they are also relevant to a range of early childhood programs.

### SCIENCE OUTCOMES: SCIENCE INQUIRY SKILLS AND SCIENCE CONCEPTS

Science Inquiry Skills	Naturalist Behaviors
<p><b>Engages, notices, wonders, questions:</b> Engages in open-ended explorations of living things in different environments; forms questions that guide actions.</p>	<ul style="list-style-type: none"> <li>• Searches for and finds different plants and small animals in the natural environment.</li> <li>• Observes various plants and animals, noticing similarities and differences in appearance and behavior; wonders why.</li> <li>• Focuses observations on particular characteristics or behaviors; poses questions.</li> </ul>
<p><b>Begins to explore, investigate:</b> Engages in simple investigations to extend observations, test predictions, and pursue questions.</p>	<ul style="list-style-type: none"> <li>• Asks “what if” (“What if I put the worm over here?”); revisits a plant or animal to observe more closely.</li> <li>• Focuses on a specific question that can be answered. (“How does the snail move?”)</li> <li>• Participates in designing simple investigations. (“Let’s put lettuce and cabbage in the terrarium and see which one the snail likes.”)</li> </ul>
<p><b>Collects data:</b> Uses senses, varied tools, and simple measures to gather data.</p>	<ul style="list-style-type: none"> <li>• Uses sight and touch when gathering information about living things.</li> <li>• Uses hand lens and penlights to better see details of plants and animals; uses hearing and smell.</li> <li>• Uses string, rulers, and other tools to get quantitative data on living things (such as length, area, weight, and diameter).</li> </ul>
<p><b>Records and represents experience:</b> Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.</p>	<ul style="list-style-type: none"> <li>• Demonstrates observations through body movements; makes simple drawings that may incorporate one characteristic of a plant or animal.</li> <li>• Creates two- and three-dimensional representations that incorporate several characteristics of a plant or animal.</li> <li>• Participates in creating a chart that records comparative data from an investigation; makes detailed, realistic drawings.</li> </ul>
<p><b>Reflects on experiences:</b> Explores patterns and relationships among experiences; makes reasonable predictions, explanations, and generalizations based on experience.</p>	<ul style="list-style-type: none"> <li>• Draws on prior experiences when describing, comparing, and talking about experiences.</li> <li>• Bases predictions and explanations on observations and data from past experiences.</li> <li>• Connects observations and data from multiple explorations, identifying patterns and relationships and stating conclusions.</li> </ul>
<p><b>Uses language to communicate findings:</b> Develops increased vocabulary and ability to communicate observations and ideas.</p>	<ul style="list-style-type: none"> <li>• Responds to direct questions about physical characteristics of living things and recent experiences.</li> <li>• Contributes more detailed descriptions and ideas about living things to discussions. (“Look—the tail is so long!”)</li> <li>• Mentions various characteristics (such as shape, color, size, or names of body parts) when describing a plant or animal; shares questions, ideas, and speculations.</li> </ul>

## OUTCOMES CHARTS (CONT'D)

### SCIENCE OUTCOMES: SCIENCE INQUIRY SKILLS AND SCIENCE CONCEPTS (CONT'D)

Science Inquiry Skills	Naturalist Behaviors
<p><b>Shares, discusses, and reflects with group:</b> Shares materials, tasks, and ideas; collaborates in joint investigations.</p>	<ul style="list-style-type: none"> <li>• Works alone or alongside others (such as sharing a trowel to dig worms for the classroom).</li> <li>• Takes part with a small group of children (such as studying a tree).</li> <li>• In a small group, plans, conducts, and reports on a simple experiment (such as examining what mealworms eat).</li> </ul>

Science Concepts	Naturalist Behaviors
<p><b>Characteristics of living things:</b> Shows a growing awareness of physical characteristics of plants and animals (such as parts, shapes, colors, textures, or sizes); and describes basic behavioral characteristics.</p>	<ul style="list-style-type: none"> <li>• Identifies basic characteristics of plant and/or animal (such as color, size, and shape).</li> <li>• Identifies more detailed physical characteristics and simple behaviors (such as movement or eating).</li> <li>• Begins to think about simple functions of different parts and relationship to structure. ("The snail has gooey stuff that helps it move.")</li> </ul>
<p><b>Living and nonliving:</b> Shows a growing ability to classify living and nonliving things.</p>	<ul style="list-style-type: none"> <li>• Uses one or two criteria, such as motion or eating, to define living and nonliving.</li> <li>• Starts to identify categories of things that are not living but move, such as machines or cars; talks about some plants as living things.</li> <li>• Can differentiate living and nonliving things and recognizes that living things do not always move.</li> </ul>
<p><b>Needs of living things:</b> Develops an understanding that living things have basic needs including (for most) water, food, light, air, and space.</p>	<ul style="list-style-type: none"> <li>• Is aware that living things have needs; tends to attribute own needs to other animals, such as a place to play or toilet.</li> <li>• Begins to understand that all animals need food, water, and a place to live and that plants need water.</li> <li>• Understands that plants and animals have certain basic needs, but they're met in different ways.</li> </ul>
<p><b>Life cycle:</b> Shows an increasing awareness that all living things go through a life cycle, consisting of birth or germination, growth and development, reproduction, and death.</p>	<ul style="list-style-type: none"> <li>• Talks about baby plants and animals, mommies and daddies, and growing bigger with reference to self.</li> <li>• Describes parts of the life cycle of plants and animals in the classroom or outdoors (such as observing that a caterpillar changes to a butterfly but is uncertain it is the same organism).</li> <li>• Describes the life cycle of a particular plant and/or animal; begins to include reproduction and death; and sees changes connected with the same organism.</li> </ul>
<p><b>Diversity and variation:</b> Develops an awareness of the diversity of living things and variation within species.</p>	<ul style="list-style-type: none"> <li>• Notices that there are different plants and animals; makes very basic comparisons (such as big/little; bug/"animal").</li> <li>• Can compare observable similarities and differences among living things (such as leaves of most plants are green; snails have eyes like we do).</li> <li>• Can categorize plants and animals and describe variation within categories (such as leaves from different plants have different shapes; monarch butterflies have similar colors but different patterns from painted lady butterflies).</li> </ul>
<p><b>Habitat:</b> Develops growing awareness and understanding that plants and animals have their needs met in particular ways in particular places.</p>	<ul style="list-style-type: none"> <li>• Returns to similar environments looking for a particular plant or animal.</li> <li>• Contributes ideas to discussions about what specific animals or plants want or need. ("The worm likes dirt.")</li> <li>• Helps to plan the development of an indoor environment for a particular organism; has specific ideas related to that organism.</li> </ul>

## CONNECTIONS BETWEEN INQUIRY SKILLS AND OUTCOMES IN OTHER DOMAINS

<b>LANGUAGE</b> →  <i>and</i>  <b>SCIENCE</b> ↓	Shows progress in understanding and following simple and multistep directions.	Shows increasing abilities to understand and use language to communicate information, experience, ideas, feelings, opinions, questions, and so on.	Progresses in abilities to initiate and respond appropriately in conversation and discussions with peers and adults.	Links new learning experiences and vocabulary to what is already known about a topic.
<b>Explores/questions</b> —Engages in open-ended explorations; forms questions that guide actions.		✓	✓	
<b>Begins to investigate</b> —Engages in simple investigations to extend observations, test predictions, and pursue questions.	✓	✓	✓	✓
<b>Collects data</b> —Uses senses, varied tools, and simple measures to gather data.	✓	✓		
<b>Records and represents experience</b> —Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.		✓		✓
<b>Synthesizes and analyzes data from experiences</b> —Sees patterns in data and relationships among experiences; makes reasonable predictions, explanations, and generalizations based on experience.		✓	✓	✓
<b>Uses language to communicate findings</b> —Develops increased vocabulary and ability to communicate observations and ideas.		✓	✓	✓
<b>Collaborates</b> —Shares materials, tasks, and ideas; collaborates in joint investigations.		✓	✓	

## CONNECTIONS BETWEEN INQUIRY SKILLS AND OUTCOMES IN OTHER DOMAINS (CONT'D)

<b>LITERACY</b> →  <i>and</i>  <b>SCIENCE</b> ↓	Progresses in abilities to retell and dictate stories from books or experiences, act out stories in dramatic play, and predict what will happen next in a story.	Develops an understanding that writing is a way of communicating for a variety of purposes.	Begins to represent stories and experiences through pictures, dictation, and play.	Experiments with a growing variety of writing tools, such as pencils, crayons, and computers.
<b>Explores/questions</b> —Engages in open-ended explorations; forms questions that guide actions.				
<b>Begins to investigate</b> —Engages in simple investigations to extend observations, test predictions, and pursue questions.	✓			
<b>Collects data</b> —Uses senses, varied tools, and simple measures to gather data.		✓		✓
<b>Records and represents experience</b> —Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.	✓	✓	✓	✓
<b>Synthesizes and analyzes data from experiences</b> —Sees patterns in data and relationships among experiences; makes reasonable predictions, explanations, and generalizations based on experience.	✓	✓	✓	✓
<b>Uses language to communicate findings</b> —Develops increased vocabulary and ability to communicate observations and ideas.	✓	✓	✓	✓
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## CONNECTIONS BETWEEN INQUIRY SKILLS AND OUTCOMES IN OTHER DOMAINS (CONT'D)

<b>MATHEMATICS</b> →  <i>and</i>  <b>SCIENCE</b> ↓	Begins to recognize, describe, compare, and name common shapes and their parts and attributes.	Increases understanding of directionality, order, positions of objects, and words ( <i>up, down, over, under, top, bottom, and so on</i> ).	Enhances abilities to recognize, duplicate, and extend simple patterns using a variety of materials.	Increases abilities to match, sort, put in a series, regroup, and compare objects according to one or two attributes (such as shape or size).	Shows progress in using standard and nonstandard measures for length and area of objects.	Participates in creating and using real and pictorial graphs.
<b>Explores/questions</b> —Engages in open-ended explorations; forms questions that guide actions.						
<b>Begins to investigate</b> —Engages in simple investigations to extend observations, test predictions, and pursue questions.				✓	✓	✓
<b>Collects data</b> —Uses senses, varied tools, and simple measures to gather data.	✓	✓		✓	✓	✓
<b>Records and represents experience</b> —Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.	✓	✓		✓	✓	✓
<b>Synthesizes and analyzes data from experiences</b> —Sees patterns in data and relationships among experiences; makes reasonable predictions, explanations, and generalizations based on experience.	✓	✓	✓	✓		✓
<b>Uses language to communicate findings</b> —Develops increased vocabulary and ability to communicate observations and ideas.	✓	✓				
<b>Collaborates</b> —Shares materials, tasks, and ideas; collaborates in joint investigations.						

## CONNECTIONS BETWEEN INQUIRY SKILLS AND OUTCOMES IN OTHER DOMAINS (CONT'D)

<b>SOCIAL</b> →  <i>and</i>  <b>SCIENCE</b> ↓	Demonstrates increasing capacity to follow rules and routines; uses materials purposefully, safely, and respectfully.	Increases abilities to compromise in interactions, take turns, and sustain interactions with peers by helping, sharing, and discussing.	Progresses in understanding similarities and respecting differences among people (such as gender, race, special needs, culture, and so on).	Develops growing awareness of jobs and what is required to perform them.
<b>Explores/questions</b> —Engages in open-ended explorations; forms questions that guide actions.	✓	✓	✓	✓
<b>Begins to investigate</b> —Engages in simple investigations to extend observations, test predictions, and pursue questions.	✓	✓	✓	✓
<b>Collects data</b> —Uses senses, varied tools, and simple measures to gather data.	✓	✓	✓	✓
<b>Records and represents experience</b> —Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.	✓	✓	✓	✓
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<b>Uses language to communicate findings</b> —Develops increased vocabulary and ability to communicate observations and ideas.	✓	✓	✓	✓
<b>Collaborates</b> —Shares materials, tasks, and ideas; collaborates in joint investigations.	✓	✓	✓	✓

## CONNECTIONS BETWEEN INQUIRY SKILLS AND OUTCOMES IN OTHER DOMAINS (CONT'D)

<b>APPROACHES TO LEARNING</b> →  <i>and</i>  <b>SCIENCE</b> ↓	Chooses to participate in an increasing variety of tasks and activities, developing the ability to make independent choices.	Approaches tasks and activities with increased flexibility, imagination, and inventiveness.	Grows in eagerness to learn about and discuss a growing range of topics, ideas, and tasks.	Grows in abilities to set goals and persist in and complete a variety of tasks, activities, and projects, despite distractions or interruptions.	Develops increasing ability to find more than one solution to a question, task, or problem.	Grows in recognizing and solving problems through active exploration, interactions, and discussions with peers and adults.
<b>Explores/questions</b> —Engages in open-ended explorations; forms questions that guide actions.	✓	✓	✓	✓		✓
<b>Begins to investigate</b> —Engages in simple investigations to extend observations, test predictions, and pursue questions.	✓	✓	✓	✓	✓	✓
<b>Collects data</b> —Uses senses, varied tools, and simple measures to gather data.		✓	✓		✓	✓
<b>Records and represents experience</b> —Describes and records experiences and information through a variety of means, including two- and three-dimensional representation, charts, and movement.	✓	✓	✓	✓	✓	
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