



Get Ready to Teach Science!



Science Concepts and Young Children

How Young Children Develop Science Concepts

Young children naturally engage in many behaviors that help them develop scientific knowledge and skills. They are curious and inclined to learn about the world around them by exploring their surroundings, asking questions, and developing their own answers to those questions.

Many science concepts are well-suited to early childhood learning, especially those that young children are likely to experience in their everyday lives. This familiarity enables children to make connections to prior knowledge and provide a way to bridge home and school learning. In *Early Science with Nico & Nor™*, children explore plant growth (something they may have observed in their own homes, gardens, yards, or parks), objects' movement (something they notice as they play with blocks, marbles, or slides at the playground), and shadows (things they may have seen in their bedroom at night or when they take a stroll with their family).

However, children (and adults!) often come to incorrect conclusions, or misconceptions, about important science concepts based on everyday experiences. These misconceptions can get in the way of future learning, but are hard to correct because they often are consistent with children's observations of the world. (This is the reason people used to think that the sun revolves around the Earth—it certainly looks like it does!)

The Early Science activities are designed to allow children to test and revise some of their ideas about key science concepts. You can play an important role in shaping children's development of science understanding by gathering and recording children's ideas about what they "think" they know about a topic. This creates a great starting point for an investigation and allows you to understand their current thinking. As activities unfold, you can help children transform these ideas by inviting them to share their observations, compare them with what they expected, and develop new ideas.

The next section provides an overview of some of the concepts and content children will explore in each unit.



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Plants: Concepts about Growth and Change

As you've probably noticed, young children are naturally interested in living things. They wonder how tall they will grow, how best to care for their pets, and where fruits and vegetables come from.

A central theme that interests young children is that of *growth and change* – how and why things change. This unit focuses on the growth and change of something familiar: plants. Most children have everyday experiences with plants. They may have gardens at home, visit parks frequently, or talk with family members about how trees or flowers grow. These everyday experiences serve as great starting points for science investigations that help young children understand growth and change.

In this unit, children will learn how plants grow by engaging in science practices such as observing, documenting, comparing, contrasting, making predictions, and carrying out science investigations.

In addition to promoting core science practices, this unit aims to help children learn the following concepts:



Plants grow over time, and this is usually a slow process.

Children will learn to observe characteristics of plants (such as size, shape, and structure) and how they change over time. As they observe growing plants, children will have opportunities to document these changes and track changes as time passes.



Plants need specific things to live and grow.

Children will learn that plants may need space, nutrients, water, light, and time to grow. They will compare bean seeds growing in clear plastic bags and in soil. They will also compare plant growth with and without water.



Plants have different parts and these parts have different functions.

Children will learn that plants may have roots, stems, leaves, flowers, fruits, and seeds. They will identify the parts and start to learn some of their functions. Fruits, for example, are where the plant's seeds can be found.



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Plants: Concepts about Growth and Change (continued)



Plants and animals depend on each other.

Children will begin to learn how plants and animals can affect each other. For instance, people and animals eat plants for food, while worms help make healthy soil for plants to grow in.

Ramps: Concepts about Force and Motion

Children experience concepts relating to *force and motion* in their everyday lives, such as when they go down a slide, play with blocks, roll a truck, or drop a toy. These playful experiences give them a foundation for learning more formalized ideas about how and why things move the way they do.

In this unit, children will develop a rich understanding of how objects move and what affects their movement. They will engage in science practices such as observing, documenting, comparing, contrasting, making predictions, and carrying out science investigations, including reviewing data.

In addition to promoting core science practices, this unit aims to help children learn the following concepts:



Force affects the movement of an object.

Children will learn how different forces (pushes, pulls, and gravity) affect how an object moves.



Objects move in different ways.

Children will learn that objects can move quickly or slowly, in straight or curvy lines, and by sliding, rolling, and tumbling.



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Ramps: Concepts about Force and Motion (continued)



Moving objects can be stopped by friction or something blocking the way.

Children will learn that for a moving object to stop moving, something must stop it. A block sliding across a carpet might be stopped by the friction created by the carpet, or by hitting a wall.



A pathway's steepness and surface texture affect the movement of an object on that pathway.

Children will learn how a pathway's steepness and surface texture affect how fast and how far an object moves on that pathway. Children will carry out several ramp experiments to observe and record objects moving on different pathways and to compare the results.



Children will learn that an object's shape affects how it moves.

Children will observe, document, and compare the movement of objects that have different shapes (rolling, sliding, tumbling, or staying put).



Children will learn that an object's surface texture affects how fast it moves.

Children will observe, document, and compare how fast objects with different textures move on the same pathway.



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Shadows: Concepts about Shadows

Young children delight in their first experiences recognizing their shadows on a sunny day and playing with the shadow's motions. Young children can build on such everyday experiences with *light and shadows* by exploring these intriguing phenomena through more structured investigations.

In this curriculum unit, children will develop a rich understanding of how shadows are made and how they change. Children will engage in science practices such as observing, documenting, comparing, contrasting, making predictions, and carrying out science investigations.

In addition to promoting core science practices, this curriculum supplement aims to help children learn the following concepts:



Children will learn that a shadow is seen when a light shines on a surface and something blocks some of the light. The shadow is the area that looks darker than the relatively brighter area around it.

Children will learn that the object blocking the light is always in between the light source and the surface where the shadow can be seen. Children will also observe that a shadow is not part of



Children will learn that shadows can be made using any source of light.

Children will identify different sources of light and will learn that some are natural (the sun) and some are made by people (lamps, flashlights).



Children will learn that shadows look different when cast on multiple surfaces versus only one surface.

Children will describe how shadows that are cast on multiple surfaces (e.g., where a floor meeting a wall) look different from those cast on only one surface (e.g., just a wall).



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Shadows: Concepts about Shadows (continued)



Children will learn that a shadow's size changes when the distance changes between the light source and the object blocking the light.

Children will learn that a shadow becomes bigger if the light source and the object blocking the light are closer together and smaller if they are farther apart.



Children will learn that a shadow's length, shape, and position change when the position and angle of the light source changes.

Children will learn that a shadow is shorter or longer depending on the location of the light.



Children will learn that a shadow's shape may change when the object turns and the light source shines on a different side of the object.

Children will be able to describe how the shape of a shadow changes when the thing blocking the light is turned or rotated.



Children will learn that multiple shadows can make a combined shadow shape when multiple objects block the light.

Children will assemble multiple objects and observe how their shadows combine into a single shadow shape.