



**Science
Foundations
Guidance**

Introduction

Families, caregivers, and early educators all work together to help children grow and learn. This guidance is intended to be a resource for educators to support and enhance children's learning and development while using the Foundations, Indiana's Early Learning Development Framework. While this is not an exhaustive list, this guidance is meant to serve as a suggestion for practice from birth to age five including the transition into kindergarten. It can be used to support a child's development at different levels of learning and promotes fluid movement between developmental stages. The Foundations are not intended to be a curriculum, but what children should know and be able to do throughout developmental stages. Curricula is content that children should learn and methods to teach the content whereas lesson plans are intended to demonstrate how the content is conveyed to children. This guidance is a resource for educators to use while developing an intentional lesson plan.

Looking Ahead to Kindergarten

High quality early experiences help a child become ready for kindergarten and beyond. The Foundations show early educators the developmental progression that typically developing young children should experience as they grow toward kindergarten readiness. In 2014, Indiana's Early Learning Advisory Committee approved the following definition of kindergarten readiness: "In Indiana, we work together so that every child can develop to his or her fullest potential socially, emotionally, physically, cognitively, and academically. Through growth in all of these domains, the child will become a healthy, capable, competent, and powerful learner."

Family Engagement

Indiana's Early Learning Advisory Committee (2016) has approved the following definition for family engagement:

- Families actively supporting their children's learning and development, and sharing the responsibility with early care and education providers who are committed to engaging with families in meaningful, culturally respectful ways;
- Continuous across a child's life, beginning in infancy and extending through college and career preparation programs;
- Occurring across the various early care and learning settings where children play and grow."

Children develop in the context of their environments, which includes family, culture, and community. Family engagement is a strong predictor of children's development, wellness, educational attainment, and success later in school and life. Early educators can use the Family Engagement sections and the Powerful Practices throughout this guidance for strategies that they can encourage family members to use at home. Children and their families also face a number of complex challenges and situations. Communities are strengthened when there are strong partnerships between organizations. Educators and program administrators are encouraged to refer families to agencies that have the most in depth knowledge to meet their needs.

Special Populations

The Indiana Core Knowledge and Competencies encourage educators to see children as unique individuals within a family and community and to be sensitive to individual developmental needs. This guidance supports special populations including dual language (DLL), exceptional, and high ability learners; however, many of the recommended strategies are appropriate and beneficial to all children. It's encouraged that educators use a flexible approach when designing curriculum and keep the needs of all children in mind. The use of the Universal Design for Learning (UDL) provides a blueprint for creating instructional goals, methods, materials, and assessments that work for everyone (See Appendix B for additional information). Additionally, with family/parental consent, we encourage educators to engage and collaborate with other professionals in closely related sectors supporting the child and family to further inform and align services. This could include professionals from education, health, and social services (e.g. First Steps/Early intervention, public schools, therapists, and physicians).



SC Foundation 1: Physical Science

Early learners develop foundational skills in learning and understanding the properties of objects and changes in the physical world.

SC1.1: Demonstrate ability to explore objects in the physical world

Scientific learning at any age involves curiosity, exploration, and discovery. During the early years, children use all of their senses to **explore objects in the physical world**, but often need to touch objects to experience them. Understanding the properties of objects in the physical world provides a perspective of the world and also provides the base of knowledge required for advanced sciences in K-12 education (physics, chemistry, etc.).

Looking Ahead to Kindergarten

In kindergarten, students will be asked to plan and conduct an investigation using all senses to describe and classify different kinds of objects by their composition and physical properties. Students will also explain these choices to others and generate questions about the objects (K.PS.1). They will also identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas (K.PS.2.). Students will 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 (K.PS.3). Lastly, they will analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull (K.PS.4). Examples of this include investigating observable properties, cause and effect, energy, and matter.

Family Engagement

Encourage families to:

- Narrate daily experiences and tasks, using consistent language (e.g. using bath time as an opportunity to dump and fill).
- Ask questions about objects (e.g. "Are the clothes wet or dry? We will put them in the dryer, so they will be dry.").
- Provide time for children to investigate and explore solutions, and ask probing questions (e.g. "What do you think will happen if...", "How else could you...").

Special Populations¹

Educators can:

- Ensure that items such as sand/water tables are high enough to ensure children in wheelchairs can play with their peers.
- Respond to verbal and non-verbal contributions.
- Use graphic, sensory, and interactive supports to promote language development during child and educator directed activities.
- For DLL, use small group activities or pair children with others who speak their native language.

¹With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners’ ability to explore objects in the physical world:

SC1.1: Demonstrate ability to explore objects in the physical world

Across all developmental stages, educators can:

- Provide materials and opportunities indoors and outdoors for children to manipulate materials in various ways (e.g. objects that children can push, pull, dump, fill, carry, pass back and forth, etc.).
- Provide a schedule that includes the freedom and flexibility to explore and discover, extending time when children are engaged.
- Observe and provide specific, authentic enthusiasm for discoveries that children make throughout the environment.
- Narrate the experiences of children using descriptive and consistent language (e.g. “I see how you are filling the bucket with sand and then dumping it into the sand table.”).
- Encourage and respond to children’s questions about discoveries.

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Jointly attend to and discuss various lights, sounds, and movement in the environment</p> <p>Place infant on the floor while awake and offer toys and materials that engage infant’s senses, including mouthing of non-chokable materials that can be sanitized (e.g. cold and soothing teethers, books, etc.)</p> <p>Create environments that support exploration and curiosity (i.e. limit the use of “baby containers” or equipment that restricts an infant’s movement such as bouncy seats, swings, etc.)</p> <p>Observe infant’s reaction to changes in light (e.g. play with lighting, flashlights, etc.)</p>	<p>Provide a variety of cause and effect experiences (e.g. filling/dumping, sinking/floating, and pop up toys)</p> <p>Provide toys and tools aimed at exploration in indoor and outdoor environments (e.g. buckets, dump trucks, scoops, shovels, etc.)</p> <p>Use everyday routines (e.g. meal time) as an opportunity to discuss cause/effect, textures, and temperatures</p>	<p>Use simple words to describe sensory experiences, objects, and how objects move (e.g. hot/cold, fast/slow, heavy/light, wet/dry, etc.)</p> <p>Foster simple problem solving by giving children time to make attempts or find a solution on their own prior to the educator intervening (e.g. stacking rings, blocks, balance, weight, puzzles, dressing/ undressing, etc.)</p> <p>Use everyday routines (e.g. meal time) as an opportunity to discuss cause/effect, textures, and temperatures</p>	<p>Use simple words to describe sensory experiences, objects, and how objects move (e.g. hot/cold, fast/slow, heavy/light, sharp/dull, etc.)</p> <p>Foster simple problem solving (e.g. setting up an experiment that allows for trial and error)</p> <p>Use meal time and cooking activities as an opportunity to explore and discuss various textures, and temperatures</p> <p>Observe and describe state changes in materials during various activities (baking, freezing, melting, changing, etc.)</p>	<p>Observe and record how different types of materials bounce and roll</p> <p>Encourage children to share findings of investigations with others (e.g. educator notices discovery, and reflects with child and peers on what they found)</p> <p>Use meal time and cooking activities as an opportunity to explore and discuss various textures, and temperatures</p> <p>Observe and discuss state changes in materials during various activities (e.g. baking, freezing, melting, changing, etc.)</p>



SC Foundation 1: Physical Science

Early learners develop foundational skills in learning and understanding the properties of objects and changes in the physical world.

SC1.2: Demonstrate awareness of the physical properties of objects

A **physical property** is a characteristic of an object that you can measure or observe with at least one of your five senses. Examples of observable physical properties are color, size, shape, smell, and form (e.g. liquid, solid, or gas). Physical properties that you can measure include weight and temperature. An awareness of physical properties of objects leads to the ability to:

- Explain uses of objects
- Classify objects based on characteristics
- Understand physical changes in objects (e.g. liquid to a solid or a gas)
- Make predictions
- Reason and make sense of the world around us

Looking Ahead to Kindergarten

In kindergarten, students will be asked to sort objects and categorize by various attributes. Additionally, they will be asked to identify and explain possible uses for an object based on its properties and compare these uses with other students' ideas (K.PS.2). Kindergarten students will also be asked to identify, sort, and classify objects by size, number, and other attributes. Finally, they will be asked to identify objects that do not belong to a particular group and explain the reasoning used (K.DA.1).

Family Engagement

Encourage families to:

- Conduct experiments to change the physical properties of objects (e.g. melt ice and discuss what happens).
- Sort laundry by color or who it belongs to.
- Play a guessing game with unique items in your house (e.g. "How do we use this?" or "What else could it be used for?").

Special Populations²

Educators can:

- Ensure that items such as sand/water tables are high enough to ensure children in wheelchairs can play with their peers.
- Provide adaptations or larger handles for exploratory tools (e.g. magnifying glasses or pinchers).
- Use graphic, sensory, and interactive supports to promote language development during child and educator directed activities.

²With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' awareness of the physical properties of objects:

SC1.2: Demonstrate awareness of the physical properties of objects

Across all developmental stages, educators can:

- Ensure access to a variety of materials and objects (i.e. materials on low, open shelves) that reflect the children's changing interests, introducing new objects from time to time.
- Use descriptive and consistent language to identify materials that make up objects and their properties of objects as children explore them.
- Identify, describe, and compare the differences between physical properties of objects.

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Provide opportunities and materials for infants to observe cause and effect with all five senses (e.g. infant drops toy, and educator picks it up)</p> <p>Draw attention to cause & effect experiences in the environment to focus infant's attention on those events (e.g. "I hear Claire banging the drum!")</p> <p>Talk about the actions and experiences while infant explores</p>	<p>Model/demonstrate ways of exploring objects and encourage imitation (e.g. "Let's look more closely at this together!" or "Feel this with your finger.")</p> <p>Use simple descriptive words (color, shape, texture, size, etc.) and provide experiences for children to practice using those words (sorting by characteristics, reading stories, sensory table)</p> <p>Draw attention to the actions of other children in the space ("Marcus is pouring water in and out of the cup." and "I see Joe's hands are ready to sing "Baby Shark.")</p> <p>Engage in rhythmic songs and fingerplays that have a predictable patterns</p>	<p>Ask questions for descriptive words (e.g. "How does that feel?")</p> <p>Provide experiences that encourage children to use descriptive language (e.g. sink or float in water, art experiences, etc.)</p> <p>Describe objects using simple terms (e.g. smooth, rough, soft, hard, squishy, slimy)</p> <p>Provide similar objects that can be combined or sorted by physical attributes</p>	<p>Facilitate projects where ingredients are mixed together and observe changes (cooking projects, mixing paint, water/borax, baking soda/vinegar, slime, etc.)</p> <p>Explore solid/liquid/gas states using water or a safe alternative (e.g. looking at condensation in a bottle to discuss evaporation, freezing/melting water, etc.)</p> <p>Have child describe object through touch (e.g. sensory box)</p> <p>Provide similar objects that can be combined or sorted by physical attributes</p>	<p>Facilitate projects where ingredients are mixed together and observe changes (cooking projects, mixing paint, water/borax, baking soda/vinegar, slime, etc.)</p> <p>Experiment with materials that dissolve or do not dissolve in water</p> <p>Explore and observe change when adding food coloring to water</p> <p>Experiment with and discuss state changes using a variety of materials (e.g. dirt becoming mud, etc.)</p>



SC Foundation 2: Earth and Space Science

Early learners develop foundational skills in learning and understanding the natural world through exploration of Earth, sky, weather, and seasons.

SC2.1: Recognize the characteristics of Earth and sky

The ability to **recognize the characteristics of Earth and sky** help us to understand the connections between land, ocean, and life. This also helps us to understand the relationships between them and the cycles that sustain life on earth. Additionally, recognizing these characteristics helps us to understand that the things people do can affect the world around them and that they can make choices that reduce their impacts on the land, water, air, and other living things.

Looking Ahead to Kindergarten

In kindergarten, students will be asked to make observations to determine the effect of sunlight on Earth's surface and use tools and materials to design and build a structure to reduce the warming effect on Earth's surface (K.ESS.1). They will also be asked to describe and compare objects seen in the night and day sky, observing that the sun and moon move across the sky (K.ESS.2). Additionally, students will investigate the local weather conditions to describe patterns over time (K.ESS.3). Finally, they will be asked to communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment (K.ESS.4).

Family Engagement

Encourage families to:

- Observe the night sky with their child, discuss and record observations through drawing (e.g. observe changes in moon).
- Discuss and try tracing shadows of certain objects during daily activities.
- Notice the weather, then talk about how it feels and sounds. Talk about the differences from day to day and season to season.
- Talk about Earth's different natural features (e.g. rivers) when encountering them.

Special Populations³

Educators can:

- Ensure that items such as sand/water tables are high enough to ensure children in wheelchairs can play with their peers.
- Provide adaptations or larger handles for exploratory tools (e.g. magnifying glasses or pinchers).
- Use graphic, sensory, and interactive supports to promote language development during child and educator directed activities.

³With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' ability to recognize the characteristics of Earth and sky:

SC2.1: Recognize the characteristics of Earth and sky

Across all developmental stages, educators can:

- Encourage exploration of the outdoor environment and provide a variety of earth materials for children to use and explore.
- Describe features of the sky and earth (e.g. "The clouds are so white and fluffy today!").
- Describe observable changes in the moon and sun throughout the day, week, and month (e.g. sun goes behind the clouds).
- Name geographic features and highlight features that children can observe directly or in media (e.g. trees, grass, plants, volcano, hill, lake, river, creeks, streams, dirt, soil, cliffs, caves, etc.).
- Provide books that show and discuss features of the Earth (e.g. books that contain real life pictures of Earth and sky).

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Expose infant to various indoor and outdoor surfaces (e.g. grass, tile, carpet, dirt, concrete)</p> <p>Talk to infant about daily routines and narrate daily activities (i.e. what occurs in the morning and before going home)</p> <p>Keep the lights on in the environment to help infant distinguish night versus day</p>	<p>Draw attention to and name items in the sky during outdoor play, (e.g. clouds, sun, moon, birds, airplane, helicopter)</p> <p>Talk to children about daily routines and narrate daily activities (i.e. what occurs in the morning and before going home)</p> <p>Explore the natural environment both inside and outside (e.g. grass, dirt, leaves, water, etc.)</p>	<p>Encourage children to name items in the sky during outdoor play (e.g. clouds, sun, moon, birds, airplane, helicopter)</p> <p>Point out child's shadow and offer experiences to explore shadows through art and sensory.</p> <p>Provide materials and opportunities for child to dig and explore sand/soil/water</p>	<p>Play games with or trace child's shadow</p> <p>Provide materials for children to draw pictures of the sky at various times of day and in various seasons</p> <p>Provide various Earth surface materials to the child to explore, observe and describe (e.g. clay, silt, sand, top soil, etc.)</p> <p>Provide or have children collect a variety of rocks and minerals for children to sort and categorize</p>	<p>Draw or trace shadows at various times of day (e.g. morning and afternoon)</p> <p>Provide various Earth surface materials to the child to explore, observe and describe (e.g. clay, silt, sand, top soil, etc.)</p> <p>Provide or have children collect a variety of rocks and minerals for children to sort and categorize</p>



SC Foundation 2: Earth and Space Science

Early learners develop foundational skills in learning and understanding the natural world through exploration of Earth, sky, weather, and seasons.

SC2.2: Recognize seasonal and weather related changes

Recognizing seasonal and weather related changes helps us to understand how weather works. Being aware of these changes helps us to make predictions and understand patterns that affect our environment and daily lives (e.g. activity and clothing choices), and the lives of plants and animals. This understanding also lays the basis for the ability to:

- Practice safety during severe weather conditions
- Understand the placement and rotation of the Earth and how that impacts seasons and weather
- Understand low/high pressure systems
- Understand the impact of weather on the environment
- Understand the physical changes created by weather (e.g. rain turning into mud, flowers needing rain to grow, etc.)

Looking Ahead to Kindergarten

In kindergarten, children will be asked to investigate the local weather conditions to describe patterns over time (K.ESS.3). Examples of this include discussing local weather patterns and natural disasters.

Family Engagement

Encourage families to:

- Incorporate talking about the weather into daily conversation (e.g. "It rained a lot today!").
- Discuss weather changes and how that impacts clothing and activity choices (e.g. "It's cold and snowing today. We should put on our winter coats and boots!").

Special Populations⁴

Educators can:

- Provide experiences related to concepts being presented (e.g. pouring water on dirt to make mud and then watching it happen outside on a rainy day).
- Ensure all experiences and materials are accessible to all children (e.g. ensuring key terms are available for those using communication devices).
- Use graphic, sensory, and interactive supports to promote language development during child and educator directed activities.

⁴With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' ability to recognize seasonal and weather related changes:

SC2.2: Recognize seasonal and weather related changes

Across all developmental stages, educators can:

- Authentically observe weather conditions and go outside daily in all kinds of weather⁵.
- Provide opportunities for children to experience the natural conditions⁵ (e.g. stomping in puddles, digging in dirt, and playing with snow).
- Talk about and practice weather safety.
- Discuss clothing appropriate for specific weather conditions.
- Describe weather using correct terminology (e.g. rain, snow, storm, tornado, thunder, etc.).
- Use various media (i.e. books, magazines, online resources) to discuss and to provide accurate information about seasons and weather.

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Take infant outside in all seasons and provide opportunities to experience climate and weather⁵</p> <p>Talk about and draw attention to the weather conditions outside</p> <p>Bring natural elements indoors when temperatures do not promote outdoor exploration (e.g. snow)</p>	<p>Take children outside in all seasons and talk about the current weather conditions⁵ (e.g. “Do you feel the wind blowing through your hair?, “Brrr it is cold on my face”, and “I am getting wet from the rain. Do you feel that?”)</p> <p>Bring natural elements indoors when temperatures do not promote outdoor exploration (e.g. snow)</p>	<p>Introduce basic terminology to describe weather (e.g. cloud, wind, rain, snow, etc.)</p> <p>Discuss daily and seasonal weather changes while outdoors (e.g. “It was hot yesterday and today we need our jackets!”)</p> <p>Facilitate authentic discussions about basic weather conditions (e.g. “Is it wet/dry outside? Is it hot/cold outside?”)</p>	<p>Introduce more complex terminology to describe weather (e.g. temperature, tornado, etc.)</p> <p>Use tools to measure rainfall, snow, wind, and record observations (e.g. recording observations of a windmill, wind vane, or direction of a flag)</p> <p>Talk about, discuss, and practice safety during severe weather</p>	<p>Describe, make predictions, and record information about the weather (e.g. charting a series of days using a chart/graph throughout the day and asking children to make predictions)</p> <p>Use tools to measure rainfall, snow, wind, and record observations (e.g. recording observations of a windmill, wind vane, or direction of a flag)</p> <p>Observe and discuss how seasonal weather changes affect animal and plant life</p> <p>Talk about, discuss, and practice safety during severe weather</p>

⁵ Please refer to any applicable licensing laws, rules, and related policies regulated by the Family and Social Services Administration and the Office of Early Childhood and Out-of-School Learning. Additional information can be found here: <https://www.in.gov/fssa/carefinder/2734.htm>



SC Foundation 3: Life Science

Early learners develop foundational skills in learning and understanding the presence and characteristics of living creatures and plants.

SC3.1: Demonstrate awareness of life

Children encounter and experience science on a daily basis. Science and the **awareness of life** are all around us in nature and in our everyday interactions with plants and animals (including humans). The development of demonstrating awareness of life leads to:

- Critical thinking skills
- An understanding of and respect for the world
- Citizenship
- Enhanced curiosity and imagination
- Healthy habits (e.g. physical exercise, nutrition, personal hygiene, and safety)
- Scientific inquiry

Looking Ahead to Kindergarten

Kindergartners will be asked to describe and compare the growth and development of common living plants and animals (K.LS.1), as well as describe and compare the physical features of common living plants and animals (K.LS.2). Students will also be asked to use observations to describe patterns of what plants and animals (including humans) need to survive (K.LS.3). Examples of this include activities that demonstrate how plants and animals change in the environment and how humans change the environment.

Family Engagement

Encourage families to:

- Explore outdoors with their child and visit local parks and gardens.
- Model respect for the environment.
- Observe wildlife in their neighborhoods.
- Plant and care for flowers or vegetables in gardens or windowsill containers.
- Visit the local library to find nonfiction books on animals, plants, and the environment.

Special Populations⁶

Educators can:

- Consider providing adaptations or larger handles for exploratory tools such as magnifying glasses or pinchers.
- Use visual supports to support language use during various activities (e.g. providing a diagram of the life cycle of a tadpole in the discovery center).

⁶With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' ability to demonstrate awareness of life:

SC3.1: Demonstrate awareness of life

Across all developmental stages, educators can:

- Bring natural materials into the environment that are safe for children to examine (e.g. animal pelts, magnifying glasses, soil and beans in a plastic bag to see roots, etc.).
- Have plants and/or animals in the everyday environment⁷.
- Point out signs of life and growth within the environment (e.g. noticing and acknowledging that plants, animals, and other children are growing.).
- Discuss safe interactions with animals⁸.
- Spend time observing the outdoor environment over time, using accurate terms when discussing various topics with children (e.g. acknowledging the changing colors of leaves during the fall and then when there are no leaves during the winter).
- Sing songs and fingerplays that identify body parts (e.g. *Pat-a-Cake, This Little Piggy*).

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Share realistic picture books about animal and plant life</p> <p>Talk about the infant's body parts during routine care including diapering, dressing, feeding, etc. (e.g. "I am going to wipe your nose. Your nose is all clean!")</p> <p>Provide opportunities for infants to explore their body and notice when they have done so (e.g. "You found your foot. Does your foot taste good?")</p> <p>Provide floor time that encourages infants to interact with one another and explore each other with their bodies, while modeling "gentle touches"</p>	<p>Share realistic picture books about animal and plant life, labeling things as you read and encouraging the child to use the sign or word for the item</p> <p>Explore the outdoors and label living things in the natural environment (e.g. animals, plants, and sounds)</p> <p>During routine care, such as diapering and dressing, label the child's body parts and encourage them to use the word or point to it themselves</p> <p>Sing songs and fingerplays that identify body parts (e.g. <i>Head, Shoulders, Knees and Toes</i>)</p>	<p>Model respect for nature by being gentle with plants and animals and respectfully exploring the natural world</p> <p>Take nature walks and collect items to observe and talk about, focusing on individual characteristics (e.g. bumpy, spikey, smooth, etc.)</p> <p>Sort natural materials by one characteristic (e.g. sorting rocks by smooth and bumpy)</p> <p>Explore basic similarities and differences in living things (e.g. farm animals, ocean animals, people, etc.)</p> <p>During play, label more complex body parts (e.g. "You have a sticker on your cheek!")</p>	<p>Plant seeds and observe how they grow</p> <p>Take nature walks and collect items to observe, describe, and record information through discussions, drawings, and charts</p> <p>Point out similarities and differences between animal and human bodies</p> <p>Provide materials for children to draw self and family portraits</p> <p>Provide materials and books on plants, the human body, and animals for children to explore and ask questions about what they see</p>	<p>Do a simple experiment to investigate the needs of growing plants</p> <p>Provide materials for child to draw pictures of plants and animals and their life cycles</p> <p>Facilitate discussions about how plants and animals react and adapt to their environment (e.g. "Why does the raccoon need a thick coat?")</p> <p>Provide materials for children to use in exploration (e.g. magnifying glasses, pinchers, etc.)</p> <p>Provide materials and books on plants, the human body, and animals for children to explore and ask questions about what they see</p>

⁷ Please refer to any applicable licensing laws, rules, and related policies regulated by the Family and Social Services Administration and the Office of Early Childhood and Out-of-School Learning. Additional information can be found here: <https://www.in.gov/fssa/carefinder/2734.htm>

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SC Foundation 4: Engineering

Early learners develop foundational skills in learning and understanding how to solve problems using the engineering design process.

SC4.1 Demonstrate engineering design skills

Young children encounter problems on a daily basis. Within **engineering**, learners dive deep into the scientific method to solve problems they face. The intellectual work that occurs when a young child identifies a problem, ponders a solution and evaluates the outcome of the process requires high functioning cognitive abilities in engineering.

The development of engineering design skills leads to the ability to:

- Define problems
- Develop predictions and possible solutions to problems
- Compare different solutions
- Understand cause and effect

Looking Ahead to Kindergarten

In kindergarten, students will be asked to pose questions, make observations, and obtain information about a situation or problem. They will ask questions based on observations to find more information about the world (K-2.E.1). Students will also develop a simple model based on evidence to represent a new and improved object or tool (K-2.E.2). Finally, they will be asked to analyze data from testing an object to determine if it works as intended (K-2.E.3).

Family Engagement

Encourage families to:

- Take opportunities to assemble things together (e.g. toys, furniture, etc.).
- Build structures using household items such as cardboard, sticks, packing materials, blankets, or sheets.
- Create and test different types of ramps with various objects.
- Celebrate effort in ingenuity and creative thinking skills.

Special Populations⁹

Educators can:

- Provide adaptive materials for ease of assembling.
- Ensure adequate space for children with varying mobility to access materials and centers.
- Use graphic, sensory, and interactive supports to promote language development during child and educator directed activities.

⁹With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' ability to demonstrate engineering design skills:

SC4.1: Demonstrate engineering design skills

Across all developmental stages, educators can:

- Model the use of vocabulary related to engineering (e.g. engineering, problem, design, plan, construction, simple machines, prototype, etc.).
- Provide time and encourage a child's project plan to develop over extended periods of time (e.g. encouraging a child to continue building a castle over several days).
- Provide age-appropriate and safe construction materials and space in the everyday environment (e.g. interlocking manipulatives, magnetic tiles, wooden blocks, cardboard blocks, hollow blocks, large boxes, PVC piping, bottles, sticks, etc.). Consider choking hazards for children under three when selecting materials.¹⁰
- Teach safety and use of real tools under close supervision¹¹ (e.g. screwdriver, hammers, wrenches, etc.).
- Read books about engineering and make them available to children (e.g. nonfiction and fiction books around building and construction).
- Emphasize what is in the child's environment to spark activities and conversations (e.g. skyscrapers, tractors, fire trucks, airplanes, etc.).
- Include simple machines in the environment (e.g. wedges, gears, levers, pulleys, etc.). Consider choking hazards for children under three when selecting materials.¹²

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Provide cause and effect toys in the everyday environment (e.g. rattles, mobiles, floor gym, mirrors, balls, toys with moving parts, etc.)</p> <p>Place infant on the floor and provide accessible toys and books to explore, mouth, and engage with</p> <p>Talk with infant as they explore materials (e.g. "You are chewing on the rattle. It squeaks when you chew!")</p>	<p>Provide opportunities for appropriate risk taking to encourage children to explore the limits of their environment (e.g. climbing up steps to slides)</p> <p>Provide toys (e.g. balls, ramps and sensory table materials) to explore boundaries in space (e.g. "The ball rolled down the ramp and ran into the wall. It stopped because it ran out of room to move.")</p> <p>Provide a variety of building materials for children to explore constructing and deconstructing (e.g. blocks, building materials, playdough, etc.)</p>	<p>Provide a variety of tools in different learning centers to explore and problem solve (e.g. measuring tape, scales, magnifying glasses, scissors, clip boards, pretend construction tools, etc.)</p> <p>Add unconventional materials to existing materials to help children explore and solve problems (e.g. adding shaving cream or foam paint to blocks to help them "stick" together)</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p> <p>Ask questions that show support to encourage thinking (e.g. "You want to build a fire station but it keeps falling over. What else could you use to hold it up?")</p>	<p>Provide open ended materials and simple tools for design, construction and deconstruction across learning centers (e.g. blocks, ramps, cardboard boxes and tubes, cups, bottles, clipboards, dramatic play items, etc.)</p> <p>Encourage novel use of objects in the everyday environment</p> <p>Model plan making (e.g. use picture schedule to detail daily activities, write steps for making recipe)</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p>	<p>Provide open ended materials and simple tools for design, construction, and deconstruction across learning centers (e.g. real screwdrivers, hammers, wrenches, tree cookies, rocks, tape, string, clipboards, dramatic play items, etc.)</p> <p>Provide writing and drawing materials for children to create and document plans throughout the environment</p> <p>Encourage children to use a plan to create a useful object</p> <p>Help children evaluate what they made (e.g. "Did it work the way you thought it would?")</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p>

¹⁰Please refer to any applicable licensing laws, rules, and related policies regulated by the Family and Social Services Administration and the Office of Early Childhood and Out-of-School Learning. Additional information can be found here: <https://www.in.gov/fssa/carefinder/2734.htm>

¹¹Please refer to any applicable licensing laws, rules, and related policies regulated by the Family and Social Services Administration and the Office of Early Childhood and Out-of-School Learning. Additional information can be found here: <https://www.in.gov/fssa/carefinder/2734.htm>

¹²Please refer to any applicable licensing laws, rules, and related policies regulated by the Family and Social Services Administration and the Office of Early Childhood and Out-of-School Learning. Additional information can be found here: <https://www.in.gov/fssa/carefinder/2734.htm>



SC Foundation 5: Scientific Inquiry and Method

Early learners develop foundational skills in learning and understanding about the world around them through exploration and investigation.

SC5.1: Demonstrate scientific curiosity

The development of *scientific curiosity* in young children promotes a sense of wonder that grows as they age. Educators are critical in promoting the scientific curiosity of young children as well as their confidence in problem solving.

The development of scientific curiosity leads to the ability to:

- Think critically
- Raise thoughtful questions
- Make predictions
- Record observations
- Identify patterns or create theories
- Problem solve

Looking Ahead to Kindergarten

In kindergarten, students are expected to ask questions based on their observations in order to understand and solve problems (K-2.E.1). Students will also work with sketches, drawings, and/or physical models as representations for communicating ideas for a problem's solution (K-2.E.2). Finally, they will compare, test, and discuss strengths and weaknesses of a design solution (K-2.E.3).

Family Engagement

Encourage families to:

- Ask open-ended questions, explore options, and learn together.
- Discuss ways that people affect the environment in positive and negative ways with their child.
- Conduct long term experiments at home (e.g. plant a seed in a windowsill and record observations together, freezing water inside, and then bring it outside to thaw).

Special Populations ¹³

Educators can:

- Consider providing adaptations or larger handles for exploratory tools such as magnifying glasses or pinchers.
- Acknowledge and respond to children's verbal and non-verbal contributions to projects and activities.

¹³With familial consent, we encourage early educators to collaborate with other service providers.

Powerful Practices

Examples of ways adults can support young learners' ability to demonstrate scientific curiosity:

SC5.1 Demonstrate scientific curiosity

Across all developmental stages, educators can:

- Encourage children to observe closely.
- Provide a wide variety of equipment and materials that children can use to experiment and test hypotheses safely in both collaborative and individual opportunities.
- Provide an environment that is interesting and inspiring for children, adapting as their interests evolve.
- Encourage children to use all senses (seeing, smelling, touching, hearing and tasting) and ask questions (e.g. "What does that feel like?").
- Promote awareness and learning of the child's environment and investigate topics of interest to the children (e.g. urban/rural settings, exploring local environments, etc.).
- Research and investigate topics alongside the child, considering their preference when it comes to problem solving.
- Acknowledge children's efforts to hypothesize and discuss, providing additional resources and supports if necessary (e.g. getting books from the local library on a topic children are exploring).
- Provide activities and resources to families that will enable them to engage in scientific experiments and projects at home (e.g. supply seeds/pots/soil to families and ask them to plant and journal what they observed).
- Model and use prompts to encourage exploration and curiosity (e.g. "I wonder what would happen if we pushed this button!").

Infant	Younger Toddler	Older Toddler	Younger Preschool	Older Preschool
<p>Provide materials on low shelving in open containers and encourage infants to actively explore the environment (e.g. limiting the use of "baby containers" such as swings, bouncy seats, etc.)</p> <p>Encourage infant to use their own body as a tool for investigation (e.g. grasping and mouthing objects, listening to sound in the environment)</p> <p>Jointly attend to objects of interest and talk about those objects with infants</p> <p>Encourage repetition through play, by repeating the same actions over and over (e.g. building a tower and knocking it over several times)</p>	<p>Provide materials on low shelving in open containers and encourage children to actively explore the environment</p> <p>Encourage trial and error by providing toys that encourage problem solving (e.g. pegs/peg boards, puzzles, blocks, etc.)</p>	<p>Ask children open ended questions during play (e.g. "What do you think will happen when...")</p> <p>Provide simple tools or props for play</p> <p>Provide a variety of natural, repurposed and store bought materials to explore</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p>	<p>Make investigation tools accessible to children (e.g. magnifying glasses, scales, scoops, shovels, containers, etc.)</p> <p>Encourage children to closely examine natural and human made objects</p> <p>Provide materials for child to document findings of investigation (e.g. encourage child to dictate observation to adult, draw observations)</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p> <p>Validate child's questions and curiosities with a response (e.g. child: "What does the bug eat?" Educator: "What a good question! Let's find out!")</p>	<p>Make investigation tools accessible to children (e.g. rulers, magnets, tweezers, medicine droppers, etc.)</p> <p>Ask open-ended questions that help children think about what they are observing (e.g. "What do you notice? What do you wonder about? Tell me more.")</p> <p>Provide materials for child to document findings of investigation (e.g. encourage child to dictate observation to adult, draw observations)</p> <p>Provide children opportunities to problem solve alone or with peers before stepping in</p>

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For additional resources, please see the Early Learning Foundations Guidance Online Tool at www.doe.in.gov/earlylearning.