

Science Standards

Practiced in *What's the BIG Idea?*™

In the National Science Education Standards, the National Research Council sets forth standards in eight areas that cover a broad range of science skills and understandings for children in kindergarten through grade 12. These standards—Science as Inquiry, Physical Science, Life Science, Earth and Space Science, and Design Technology—have been adapted to apply to young children. Science as Inquiry standard is addressed in this manual.

The process skills of science are the Science as Inquiry standard, listed below in alphabetical order. Children need to practice the process skills of science so that they learn to ask questions about the world and then study the world in special ways to find answers, just like scientists do.

Science as Inquiry includes:

Asking Scientific Questions

For young children, this includes...

- Questions such as: *What's that? How did it happen? What if...? and How many?*

Collecting and Using Data

For young children, this includes...

- Thinking back on what they have observed, sorted or measured, in order to explain their ideas about the world around them.

Communicating Information and Ideas

For young children, this includes...

- Using conversations, drawings, and/or simple charts to tell others about what they have learned and to offer explanations, even though they might not be scientifically accurate.

Designing and Making Models

For young children, this includes...

- Planning and creating models.
- Building from plans.

Asking Questions

A good question comes from the curiosity of the asker and relates to the subject being investigated. We can't investigate unknowns in a logical way unless we ask questions. Scientists and mathematicians are professional question-askers who ask both how and why questions. For more information about open-ended questions, see page 7.



Estimating and Predicting

Estimation is an informed guess about quantities in standard and non-standard units of number and measure. We estimate when we answer questions such as: *How many? How far? How cold?* The more we estimate, the more we improve our skills of observation and spatial visualization.

Predictions do not always require quantities. Predictions can be about what we think is likely to happen. Some examples: *I predict the hawk will land on that tree because it is the tallest and they like high places. I think the sunset will be red and orange because it was like that yesterday.*

From one librarian:

We checked the seeds between the moist paper towels we did one week ago today. We saw quite a bit of change and are planning to plant those seeds in cups of potting soil next week. I think that the two groups have learned a lot in keeping track of the progression of the root growth with our chart and predicting what may happen in two days' time or over the weekend.

Estimating and Predicting

For young children, this includes...

- Using clues to make informed guesses about quantities, causes and effects, or unknown information.

Experimenting

For young children, this includes...

- Pursuing answers to questions through controlled investigations.

Finding Patterns

For young children, this includes...

- Noticing repeated sequences and organized arrangements in the world, seeing and understanding how one thing influences another.

Measuring

For young children, this includes...

- Making comparisons of sizes, temperatures, and weights, as well as using numbers to quantify measurement. For young children, measurement can rely on non-standard units of measurement such as spoons, straws, shoes, etc., not just feet and inches.

Noticing Change Over Time

For young children, this includes...

- Recognizing and describing how objects and living things change—either quickly (an ice cube melting) or more slowly (a plant growing).

Observing

For young children, this includes...

- Using our senses to explore and learn about scientific objects and events.

Recognizing Relationships

For young children, this includes...

- Comparing sizes, shapes, quantities, colors, and events.

Sorting and Classifying

For young children, this includes...

- Noticing similarities and differences and putting objects into groups based on shared attributes (characteristics).

Using Simple Tools of Science

For young children, this includes...

- Using tools, such as magnifiers, eyedroppers, water pumps, balances, sieves and binoculars to explore and investigate.

Observing

We use all of our senses to observe the world. The information our senses give us adds to our understanding. Observation in all of its forms can be done quickly with little information collected or with patience and purpose so enough information is collected to solve a problem or make an inquiry. Learning to observe closely promotes curiosity in young children, along with the desire to know answers.



Sorting and Classifying

Understanding the concept of Same and Different helps us organize our world of objects and ideas into sets of patterns and relationships. Grouping by recognized characteristics or attributes improves our observation and measurement skills.