NSTA is committed to publishing material that promotes the best in inquiry-based science education. However, conditions of actual use may vary, and the safety procedures and practices described in this book are intended to serve only as a guide. Additional precautionary measures may be required. NSTA and the authors do not warrant or represent that the procedures and practices in this book meet any safety code or standard of federal, state, or local regulations. NSTA and the authors disclaim any liability for personal injury or damage to property arising out of or relating to the use of this book, including any of the recommendations, instructions, or materials contained therein.

Permissions
Book purchasers may photocopy, print, or e-mail up to five copies of an NSTA book chapter for personal use only; this does not include display or promotional use. Elementary, middle, and high school teachers may reproduce forms, sample documents, and single NSTA book chapters needed for classroom or noncommercial, professional-development use only. E-book buyers may download files to multiple personal devices but are prohibited from posting the files to third-party servers or websites, or from passing files to non-buyers. For additional permission to photocopy or use material electronically from this NSTA Press book, please contact the Copyright Clearance Center (CCC) (www.copyright.com; 978-750-8400). Please access www.nsta.org/permissions for further information about NSTA’s rights and permissions policies.

ISBN: 978-1-68140-639-8
e-ISBN: 978-1-68140-640-4
# CONTENTS

Preface ........................................................................................................................................... ix

About the Editors ......................................................................................................................... xi

Introduction ................................................................................................................................. xiii

Simple Graphing for Young Children ....................................................................................... xxix

Science Teaching Boards and Boxes .......................................................................................... xxxi

Basic Materials List ................................................................................................................... xxxiii

## 1

**The Senses**

Useful Magnifiers .......................................................................................................................... 3

Looking at Me ............................................................................................................................... 6

Prism Play ....................................................................................................................................... 9

Color Walk ..................................................................................................................................... 12

Shape Walk ................................................................................................................................... 16

Light to See ................................................................................................................................... 20

Scavenger Hunt ............................................................................................................................. 23

Tasting ............................................................................................................................................ 27

Smelly Cans ................................................................................................................................... 30

Smelling Flowers .......................................................................................................................... 33

Sound: Shake, Rattle, and Roll .................................................................................................... 36

A Sound Walk ................................................................................................................................. 40

Vibrations ....................................................................................................................................... 43

Noise Makers ................................................................................................................................. 46

A Touch Collage ............................................................................................................................. 48

Matching by Touch ....................................................................................................................... 51
2
Weather

A Wind Walk ..............................................................................................................57
A Windy Day .............................................................................................................61
Air That Moves .........................................................................................................64
Parachutes ................................................................................................................68
My Shadow ................................................................................................................71
Shadows on My Playground .................................................................................74
Where Did the Shadows Go? ...............................................................................77
What Is the Weather Like Today? .................................................................80
Snow Tracks and Traces ........................................................................................83
Snow on the Go .........................................................................................................86
Keeping Warm: Coats ..............................................................................................90

3
Physical Science

What’s Magnetic? .....................................................................................................97
Magnetic Scavenger Hunt ....................................................................................100
Magnetic Force Through Objects ........................................................................103
Magnetic Mazes .......................................................................................................106
The Magnet Contest: Which Magnet Is Stronger? ..........................................109
My Favorite Rock ..................................................................................................112
All Kinds of Rocks ................................................................................................116
Balance ....................................................................................................................119
Balancing Me ..........................................................................................................123
Towers ......................................................................................................................126
Building With Blocks ..........................................................................................130
Will It Roll? ............................................................................................................133
Ramps .......................................................................................................................137
Roller Coasters .......................................................................................................140
Marble Painting ......................................................................................................144
Bubbles Raising Raisins .....................................................................................147
4
Animals

Roly-Polies ................................................................. 155
Mealworms................................................................. 159
Observing Earthworms ............................................ 162
Snails ........................................................................ 166
Jumping Crickets ....................................................... 170
Swimming Fish .......................................................... 174
Camouflage ............................................................... 178
Spiderweb Collecting ................................................. 181
Making a Giant Spiderweb .......................................... 185
Looking for Birds ...................................................... 188
Feeding the Birds ...................................................... 191
Building Bird Nests .................................................... 194

5
Water and Water Mixtures

Looking Through Water .............................................. 199
Water Painting .......................................................... 202
Absorbing Water ...................................................... 205
Absorbing Colors ...................................................... 208
Water Mixtures ........................................................ 210
Water Drops ............................................................. 213
Soaking Things ......................................................... 216
Bubble Makers .......................................................... 219
Sand Sculptures ......................................................... 222
Mixing Colors .......................................................... 225
Color Designs ........................................................... 228
Water Drops as Art .................................................... 231
Making Oobleck ........................................................ 233
Snappy .................................................................. 236
6

Seeds

Seeds in Our Food ................................................................. 241
Where Do Seeds Come From? ............................................... 244
Sorting Seeds ....................................................................... 247
How Are Seeds Alike? .......................................................... 251
Soaking Seeds ...................................................................... 254
Seeds to Plants .................................................................... 257
Terrariums ........................................................................... 261
An Ear of Corn ..................................................................... 264
Popping Up Some Change .................................................. 267
Seeds as Food ...................................................................... 270
Seed Wreath ......................................................................... 273
Pondering Pumpkins: The Outsides ...................................... 276
Pondering Pumpkins: The Insides ......................................... 279

7

Nature Walks

Nature Bracelets .................................................................... 285
Observing Weeds .................................................................. 288
Animal Walk .......................................................................... 291
Adopting a Tree .................................................................... 295
Visit to a Nursery ................................................................. 299
Branch Puzzles ..................................................................... 302
Leaves: Falling for You! ....................................................... 306

Appendix ............................................................................... 311
Index ................................................................................... 313
In 1996, *A Head Start on Science* began with the goal of increasing the quantity and quality of science learning in early childhood educational settings by supporting preschool and primary grade teachers in their efforts to bring engaging and meaningful science experiences to their children. The creation of the project, a collaboration between the Department of Science Education of California State University Long Beach and the Head Start program of the Long Beach Unified School District, was supported by funding from the U.S. Department of Health and Human Services. As part of this work, we compiled activities that had been used successfully by thousands of teachers in Head Start programs across the nation. We modified the activities to be useful to a greater variety of early childhood educators—including those who teach in programs such as day care, preschool, transitional kindergarten, home school, and grades K-2—and created *A Head Start on Science: Encouraging a Sense of Wonder*. This book, like all of our work, strives to foster a life-long interest in science among children in early childhood and to help adults become enthusiastic science explorers working alongside their young children. Twenty-three years, thousands of copies, and countless hours of professional development later, the program is still going strong. But much has changed in early childhood science education since 1996.

We have grown to understand that children are amazingly capable observers and thinkers and that facilitated early childhood experiences are central to children’s development of these skills. We now know that the benefits of an intentional, well-conceived, developmentally appropriate, child-centered preK/K education can be long lasting and key indicators of future school success. As the importance of preK and kindergarten education has become well documented, and its importance has grown in acceptance, the education of our youngest learners has
received increased support. Subsequently, our early childhood educators are more qualified, and have more resources available to them, than ever. Standards, assessments, evaluation tools, curricula, and other resources have all found an increased presence in early childhood education. And when used appropriately, each of these developments has led to improved classroom practice. Throughout all of these changes, one thing has remained constant in early childhood education—children’s curiosity about and awe of the natural world around them.

At the start of our project, we took inspiration from the beautiful book *The Sense of Wonder*, written by marine biologist and conservationist Rachel Carson. “A child’s world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood.... [I wish that] each child in the world be [given] a sense of wonder so indestructible that it would last throughout life.”

1 A Head Start on Science activities are written to help adults facilitate young children’s learning as they work together as partners in exploring the natural world. We hope your “sense of wonder” will be heightened as you interact with children, watching as their curiosity leads them to explore and find answers to their own questions about all that they experience in the natural world.

In this new edition of *A Head Start on Science: Encouraging a Sense of Wonder*, you’ll find updated activities that reflect current standards and learning frameworks that help shape our practice as educators and additional, more up-to-date, resources. We hope this edition serves you well in your noble and indispensable work—providing children with opportunities to follow and expand their own curiosity as they joyfully explore the natural world.

With great hope and admiration,

William Ritz and William Straits
Project Directors, A Head Start on Science

---

About the Editors

William C. Ritz, professor emeritus of science education at California State University Long Beach (CSULB), has been involved in science teaching and science teacher education all his professional life. Bill’s career began in the public schools of western New York state, where he taught junior high science and biology for many years. Then, four years as an elementary science consultant with the Eastern Regional Institute for Education took him into classrooms throughout New York and Pennsylvania; during this time he completed doctoral studies in science education at The State University of New York at Buffalo. In 1970, Bill joined the science education faculty of Syracuse University, where he also directed the university’s Environmental Studies Institute.

Since moving to California in 1977, he has taught both elementary and secondary science education courses at CSULB. Bill was elected to the Board of Directors of the National Science Teachers Association (NSTA) as its teacher education director in 1983. He returned to the NSTA Board in 1988–1989 as president of the Association for the Education of Teachers in Science (AETS) and again in 1996–1998, as director for District XVI. Author of more than 20 publications in science education, he has directed a number of funded projects at CSULB. Perhaps most important, in 1996 Bill developed the A Head Start on Science project that strives to provide quality science resources and professional development for early childhood educators. (Additional information can be found at the A Head Start on Science website: www.sci4kids.org.)

William Straits, professor of science education at California State University Long Beach, has taught science at the elementary, middle school, and college levels. After studies and work focused on biology, Bill tried his hand at teaching. These K–8 teaching experiences inspired a career focused on improving science teaching and learning and led Bill to the
University of Texas at Austin where he studied education, earning an M.Ed. in curriculum and instruction (1997) and a Ph.D. in science education (2001). After his doctoral studies were completed he worked as an elementary science teacher before joining the Curriculum & Instruction faculty at Appalachian State University.

In 2005, Bill returned home to Southern California. At CSULB he teaches science and science pedagogy to preservice and inservice elementary teachers. As Dr. Ritz began to embrace retirement, Bill stepped in as acting director of the National Center for Science in Early Childhood and the A Head Start on Science project. After emphasizing the natural and important connections between science and language literacies early in his career as a science teacher and teacher educator, he now focuses much of his scholarly work on early childhood science education. He is author of several Science and Children articles as well as A Head Start on Life Science: Encouraging a Sense of Wonder (NSTA Press, 2018).
Introduction

Our Theme
In 1956, Rachel Carson wrote a book, *The Sense of Wonder*, about the time she spent along the Maine coastline with her nephew Roger. From the time Roger was just a baby until he was more than four years old, he and Rachel shared in explorations of the world of nature. She never set out to “teach” him anything, but rather to have fun and marvel at all the plants and animals, the sounds and smells encountered on walks through the woods and near the ocean. Roger, of course, learned a great deal as Rachel called his attention to various things and as they made discoveries together. In *The Sense of Wonder* she wrote, “If a child is to keep alive his inborn sense of wonder … he needs the companionship of at least one adult who can share it, rediscovering with him the joy, excitement and mystery of the world we live in.”¹ *A Head Start on Science* was written to help young children, and the adults that care for and work with them, develop an increased sense of wonder about the natural world.

Our Beliefs About Science Education and Young Children

• Doing science comes naturally for young children.
• Young children learn about science through play.
• Early childhood teachers should build on the sense of wonder present in all children.
• The science practices that young children engage in are more important than learning science facts.

• Early childhood science teachers must serve as “facilitators” of learning rather than “instructors.”

• As children engage in science experiences, adults should observe their actions and listen to their conversations so that they can follow children’s leads.

• Science thinking and learning occur in all parts of the classroom and outdoors, not just at the science table.

• Children are intrinsically motivated when they have hands-on materials to manipulate, have some control over their learning, and enjoy success when involved in doing science.

• Children and adults should feel free to engage in science learning experiences, understanding that exploration is more important than right or wrong answers.

• A primary role of the early childhood science teacher is to provide an appropriate learning environment and opportunities for children to make, share, and compare discoveries.

• Children learn best when they have their own science materials to explore.

• Trial and error and cause and effect are natural parts of the scientific learning experience.

• Science activities and materials need to be culturally relevant and part of a child’s everyday world.

• Every child needs to have equal access to science experiences.

• Young children with disabilities are best served in classrooms where they are involved in science experiences along with typically developing peers.

• Adults need to model excitement and enthusiasm when involved in science learning experiences and when planning and anticipating discoveries.

• Children who engage in active learning in early childhood programs are more likely to succeed in school and in life than children who attend more teacher-directed programs.

• Peer modeling, lively interaction, and conversation are essential parts of the early childhood science curriculum.

• When talking with children about science, it is important to honor their ideas and choice of words.

• In early childhood classrooms there should be a balance between child-initiated and teacher-initiated science activities.

• Effective early childhood teachers must be effective parent educators who involve families in their children’s science learning experiences.

The Role of Questioning in Science

Listen to Children and Follow Their Leads

You will notice that we have included a recommendation in the “Getting Started” section of many of the activities in this curriculum: “Listen to what children say and observe what they do before asking questions.” Another frequent suggestion is: “Follow children’s leads when deciding which questions to ask.” If you observe children in their explorations and really listen to
what they say, your questions and comments will follow their interests. If you see Kayla pick up a snail and study the bottom of the snail, your asking, “What do you see on the bottom of the snail?” or “What does the bottom feel like?” makes sense. However, asking, “What do you think the snail eats?” (although a perfectly good question) does not make sense at this particular time. Instead, it interrupts the child’s concentration and pulls her attention away from something that she is interested in.

**Don’t Answer Too Quickly**
Give children time to think and explore before asking questions. Children will often answer their own questions. Sometimes they are just thinking out loud. If Tyler asks, “What do snails eat?” wait a bit. Then, if he doesn’t offer additional explanation, turn his question back to the group by asking, “Tyler is wondering what snails eat; How can we find out?” This gives children a chance to think and explain on their own, and also keeps a group of children engaged as they begin to think about how to find out what snails eat. You may have planned to discuss the snail’s hard shell today, but if the children are interested in finding out what snails eat, follow their lead! Ask children what they think snails might like to eat and spend the rest of the activity time testing various foods to see which becomes “snail food.”

**Ask Genuine Questions**
The questions you ask should always be genuine. They should often be questions to which you don’t know the answer. If you ask a child, “How does that smell to you?” you really don’t know the answer. On the other hand, if you ask, “How many rocks are in front of you?” you know there are four and the child probably knows there are four. This type of question does nothing to further children’s understanding. It can also interrupt the child’s explorations and even dampen a child’s enthusiasm. Genuine questions lead to conversations that allow adults and children to share thoughts and ideas and create an environment in which both share control of the learning.

**What Kinds of Questions Are Best?**
The most appropriate and effective questions are questions that follow children’s interests or leads, questions for which you may not know the answer, questions for which each person has his or her own correct answers, and questions that are genuine and lead to conversations. The following are examples of best questions:

- “What do you notice?”
- “What does it look/feel/smell/taste/sound like?”
- “How can we find out?”
- “Can you think of another way?”

**Encourage Children to Engage in Doing Science**
To promote children’s interest in science and understanding of science as an activity and not just a set of information, ask questions that prompt children to engage in science practices and processes (see The Importance of Science Practices and Skills, page xvii), such as the following:

- “How could you make the sound last longer?”
- “What do all the ones that rolled have in common?”
- “How does it feel? Do other materials feel similar?”
- “How is the object different from its shadow?”
INTRODUCTION

• “Is a larger magnet always stronger than a smaller one?”

• “How could you make your marble go farther?”

• “Are all the crickets the same?”

Questions like these encourage children to explore, compare, and communicate their findings. They are not used to find out if children know the “correct” information, but instead encourage children to consider different ways to discover information and develop understandings on their own. Also, general questions such as “How do you know?” “What could you do to find out?” and “Why do you think that?” can be used in many activities and will prompt children to think and explain, and promote science learning.

Encourage Children to Use Science Tools

Encouraging children to make regular use of science tools is important for helping them to become more independent in their explorations of the natural world. Use questions that prompt children to consider the use of science tools:

• “What can you find out with the magnifier?”

• “How could we measure how far it went?”

• “Which one is the heaviest? How would you use the balance to find out?”

These questions encourage children to make observations and to collect data—practices that are central to scientific endeavors.

Give Children Time to Answer

Once you ask a question, be sure to give children a chance to answer it! Science education innovator Mary Budd Rowe studied teachers’ responses to children’s questions. She advised waiting for at least three seconds after asking a question (longer for younger children). She called this “wait time.” After the child answers a question, pause again for another three seconds. If you provide time, the child will often add to his or her initial response or even change his or her answer.

Comments and Questions That Facilitate Learning

The following is a list of comments and questions that can facilitate learning. Post them in your classroom where you can refer to them. Put some of your favorites on tag board and post them up high to remind you to use them when talking to children about science.

• “I’m not sure I understand what you mean. Try telling me again.”

• “What makes you think so?”

• “Wow! Look at that!”

• “What would happen if…?”

• “Tell me more…”

• “I don’t know. What could we do to find out?”

• “What do you think those (things) might be?”

• “I wonder what that (animal) might like to eat?”

• “Paul, you did a nice job of being gentle to that mealworm!”

• “Let’s try that again.”

• “How does the top of that rock feel to you?”

• “How many pennies would it take to balance that rock?”
• “What could you do to make the marble roll farther?”
• “Tell me what you did from beginning to end.”
• “How could we find out which magnet is strongest?”
• “Does that (odor/sound/texture) remind you of anything else?”
• “How are the two objects alike? Different?”
• “Which of the two objects feels heavier?”
• “Which of these things belong together?”
• “Let’s put all the things that go together into one group.”
• “What can we call that group?”
• “How can you make your shadow longer?”
• “Draw a picture that shows how the snail eats.”

The final payoff in using these questions on a regular basis is that you will begin to hear the children ask them. When children can ask themselves questions that lead them to further explorations, then they are truly on their way to becoming effective and engaged science learners.

The Importance of Science Practices and Skills

A Head Start on Science emphasizes children’s active participation in doing science. It is through participating in science that our most important early childhood science outcome is achieved—an emotional connection to the natural world that fosters curiosity and a lasting sense of wonder. “I sincerely believe that for the child, and for the parents seeking to guide him, it is not half so important to know as to feel,” wrote Rachel Carson. “If facts are the seeds that later produce knowledge and wisdom, then the emotions and the impressions of the senses are the fertile soil in which the seeds must grow. The years of early childhood are the time to prepare the soil.” To “prepare the soil” we must help children engage in joyful explorations of science. This participation requires, as well as fosters, the use of science practices and skills. In Head Start and other preschool classrooms these are the skills required for scientific inquiry; in most kindergartens and elementary classrooms they are the practices of science and engineering. Across all of our early childhood settings, we aspire to offer science learning experiences that engage our children in actively doing science—where children do not merely learn science information, but discover science concepts by observing, measuring, comparing, predicting, and more. We know that active and joyful exploration will best inspire and prepare our children for future science success in school and beyond.

The Next Generation Science Standards (NGSS) calls for children in elementary school to develop an understanding of and competency in eight practices: (1) Asking Questions and Defining Problems; (2) Developing and Using Models; (3) Planning and Carrying Out Investigations; (4) Analyzing and Interpreting Data; (5) Using Mathematics and Computational Thinking; (6) Constructing Explanations and Designing Solutions; (7) Engaging in Argument from Evidence; and (8) Obtaining, Evaluating, and Communicating Information. Although these practices grow in complexity through the grade levels, all eight are included in the primary grades. Considering the central place these practices have in the NGSS, they are clearly important for all elementary teachers. However, given the prominence of these practices in K–12 science standards and their central place in the pursuit of scientific understanding, it is also important.

for preschool educators to be aware of these learning objectives and to consider the demands awaiting children as they grow.

For children to be successful in their learning and use of the practices of the NGSS, they must, in the early years (ages 3–8), develop important foundation skills. While it is important for young learners to develop their abilities to perform a number of science-related tasks, perhaps most important are the abilities to observe and compare. While there are several science practices and skills included in A Head Start on Science activities, observe and compare are intentionally the most frequently used. Observing is the use of our senses to notice and make sense of specific components of the world around us. Children make observations as they feel the texture of a rock or smell a flower. The ability to make and describe these observations is vitally important, as it is the foundation for nearly all other science tasks (e.g., measuring, comparing, gathering data). Comparing is the ability to observe two different objects or phenomena and analyze them to determine similarities or differences. Children compare as they observe the shapes of different objects or distinguish between two or more sounds. The ability to compare is foundational for other science practices and skills such as analyzing data, classifying or sorting, and identifying patterns. In addition to observing and comparing, A Head Start on Science activities provide opportunities for children to engage in analyzing data, communicating, classifying, graphing, identifying patterns, measuring, predicting, and using tools. By engaging children in joyful explorations that use science practices and skills, we can best “prepare the soil”—setting our children on course for a lifetime of appreciating and learning science.

**Using the Activities**

The activities in A Head Start on Science are developmentally appropriate for children in nearly all early childhood education settings. Children as young as two or three years old will enjoy observing and exploring new and familiar materials. At the same time, primary-grade children will enjoy the challenges of investigating and finding out more while they organize information and try out new ways to communicate results. Each activity calls for active involvement of children and adults. Adults should not focus on teaching children science “facts,” but rather should encourage children to make discoveries on their own and to frame new questions.

Each activity begins by providing introductory information. This Introduction includes the following components:

- **Investigation**: A simple description of the activity that includes the main point of the investigation.

- **Science practices and skills**: A list of the science practices and skills that children will use during the activity and follow-up activity. The practices and skills listed here relate directly to the Science and Engineering Practices domain of the NGSS and the Scientific Reasoning domain of the Head Start Early Learning Outcomes Framework (HSELOF).

- **Materials**: A list of all materials needed to complete the activity.

- **Safety**: A brief description of possible safety considerations, provided for nearly all activities.

The procedure of the activity is then explained. The Procedure section consists of four components:
• **Getting started:** Suggestions for beginning the investigation. Most include a reminder for the adult to observe children and listen to what they say before asking questions.

• **Questions and comments to guide children:** Ideas for how you can interact with children to deepen their interest in and attention on the investigation. Listening to children is equally important to forming questions and making comments. As you listen and follow children’s leads, decide which questions to ask, or which comments to make. Choose only a few; child talk should dominate as the investigation proceeds.

• **What children and adults will do:** A description of what children and adults will probably do as they engage in the activity. It is quite possible, however, that children’s interests may move the activity in a different direction. Adults should take advantage of these “teachable moments” even if the activity does not go exactly as planned. For example, children may be fascinated by looking through a magnifier and may begin looking through a variety of transparent objects instead of just looking at their hands as the teacher had planned.

• **Closure:** A description of how you might conclude the investigation. This often includes suggestions for various ways children might communicate their findings, such as participating in discussion, drawing, or graphing. It sometimes includes ideas for continuing the activity or discussion or extending it into a new direction, often as a bridge to the follow-up activity.

After the activity is explained, opportunities for extending the science learning are offered. The Extending the Activity section has three components:

• **Follow-up activity:** All of the investigations include suggestions for a follow-up activity using similar materials or investigating similar topics that will help children make additional discoveries. Of course, many young children love repetition, so you may want to repeat a popular activity exactly the way it was originally presented before introducing variations.

• **Center connection:** Center connections remind you to have materials available so children can continue to make discoveries and to explore “science” ideas well beyond the science activity. These connections relate the activity to multiple times and centers within the school day, including outdoor time and science, art, math, reading, dramatic play, music, blocks/building, listening, and writing centers.

• **Literature connection:** It is important that books, both fiction and non-fiction, with science themes be an everyday part of the classroom environment. The books listed in each activity include titles recommended by A Head Start on Science curriculum developers and by teachers who have used the activities in this book in their classrooms. We included books from the NSTA “Outstanding Science Trade Books for Students K–12” lists of the past decade. Additionally, a special effort was made to include newer titles as well as some “classics” for each section and to include books that have Spanish editions available.
Next, for each activity, we provide the most relevant standards from two important standards documents, the HSELOF and the NGSS, in a section called NGSS Connections and HSELOF Indicators.

The HSELOF is designed to have an important role in informing program planning and classroom practice. It describes what young children should know and be able to do as they progress through a Head Start program, from birth to age five. As such, it provides information useful to the development of effective, intentional, and responsive teaching. For preschool, the framework is composed of seven domains, and although the science activities in A Head Start on Science include elements from all domains, we have focused our connections on mathematics development and scientific reasoning. For each activity, we give the most prominent science and math goals and related indicators from HSELOF. (Please note that HSELOF goal P-SCI 2, “Child engages in scientific talk,” is part of every activity. However, it is only explicitly listed in the activities that most directly incorporate the standard.)

The NGSS are science standards for students, grades K–12; have been adopted, in some form, by several states across the United States; and are composed of three foundational “dimensions.” These dimensions—Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts—are designed to interact synergistically, helping teachers to design authentic student experiences that more accurately represent the discipline of science. With the NGSS, teaching content is integrated with teaching the practices of scientists and engineers. In alignment with the NGSS, the activities in A Head Start on Science include connections to the Disciplinary Core Ideas dimension and the Science and Engineering Practices dimension for grades K–2, helping children to participate in the doing of science while developing foundational experiences with science content. (Please note that although not explicitly stated in the activities, each is readily connected to a Crosscutting Concept, such as structure and function, cause and effect, or stability and change.)

In the What to Look For section, we present a four-level rubric to help teachers to better understand children’s participation in the activities. In the first edition of A Head Start on Science, we used the terms “Not yet,” “Emerging,” “Almost Mastered,” and “Fully Mastered” to represent these levels. We have changed these terms and their descriptions to better characterize what is achieved at each level and to more readily align with the assessment tools you use. We hope that the rubric can easily be adapted to the measures, and related terminology, used at your site. As you use this rubric, keep in mind that minor changes will be needed for preverbal children. The four levels are as follows:

I. Preparing: This level is typified by a lack of interest or curiosity about the subject. However, as the term “preparing” implies, although children may not (yet) be interested in a certain topic or activity (and should be free to choose an alternative), presenting the topic or activity to them as a possibility is important. These initial exposures can expand understanding and, more importantly, spark children’s curiosity.

II. Attempting: At this level, children are somewhat reluctant to participate in the activity, and instead—and importantly—choose to watch others. This alternative, indirect participation can be a safe and valuable way for children to figure out how they might negotiate this experience before participating at a more involved level. Although children may not appear to be actively
engaged or may only hesitantly participate, they are attentive and are sharing in the experience.

III. **Exploring**: Children at the exploring level are willing to observe and experience the materials, either in a group or independently. They participate in discussions about the topic or activity and may begin to ask questions as their curiosity and interest in the topic grows. Often they require some adult assistance to fully participate in the experience.

IV. **Connecting**: At this level, children are actively involved in the activity, making observations and comparisons and sharing these with peers or adults. Their thinking extends beyond the immediate task as they attempt to make connections between the current topic or activity and others they have experienced. Children at this level will exhibit a great deal of autonomy and curiosity, asking several questions.

Finally, a Family Science Connection concludes almost every activity. These connections, which are intended to be photocopied and sent home with children, extend the learning that has taken place at school and involve the whole family in a pleasurable science learning activity. The suggested materials can easily be found in the home or in the nearby outside environment. Directions are simple and open-ended, allowing family members to make choices depending on their particular interests and the availability of materials. Family members are also offered suggestions for comments or questions to use to stimulate children’s curiosity. These connections are provided in English and Spanish.

---

**Teaching Respect for Living Things**

Young children are often interested in and attracted to animals—especially those that can fit in the palms of their hands. These creatures bring squeals of joy and excitement from most children, their faces filled with wonder as they marvel at the animals. Bringing animals into your early childhood setting can be a wonderful decision; as you do so, consider the following.

**Selection and Care of Animals**

A sound first step is to select smaller, low-maintenance animals such as many invertebrates. (Invertebrates are animals that lack a backbone and include roly-polies, insects, earthworms, and many more.) Small reptiles and fish are also popular choices; however, reptiles and sometimes fish require a constant heat source, which calls for the use of electrical components in the classroom that can pose electrical dangers. It is also wise to steer clear of “hairy” animals with dander that can cause allergic reactions or asthmatic flare-ups. Using the internet, your local pet store, or biological supply companies as resources, learn about the habitat and food needed for the animal of your choice. And remember that many states, agencies, and school districts have regulations regarding the use of animals. Be sure to consult these as you find the most appropriate animals for your classroom.

**Involving Children**

Animals provide wonderful opportunities for children to question, wonder, and observe as they move, eat, drink, and more. As you investigate animals, keep in mind that your children have been fascinated by and thinking about animals long before they came to your classroom. In all of your lessons, make time for children to share what they know about animals and what they wonder.
about animals. Listen to the children and follow their leads, allowing them to safely explore what it is they wonder about the animals in their care. Be aware that some children may show some fear of certain animals. Never try to force children to handle animals that frighten them. Instead, begin by asking children to observe interesting features of the animal from outside the animal's enclosed area. As children’s familiarity with the animal grows, their fears may subside and most children will eventually want to handle the animal. Provide alternative tasks for children who are not comfortable handling the animal. As children are ready, encourage them to help with creating and maintaining an appropriate habitat for the animal to live in. Talk about proper feeding and care and ask the children to help you with the responsibilities of caring for your classroom animals.

Building Stewardship and Care

When incorporating the use of animals into your science teaching, be sure to continue to remind children that living creatures have similar needs to humans. Like us, they need food, shelter from harm, care, and respect from others. Encourage children to observe living creatures, handle them with gentleness and care, and be responsible for taking good care of them. Throughout your explorations, consider the safety of the animals children are observing. Also consider inviting local park naturalists, veterinarians, or 4-H members to bring animals into the classroom to demonstrate proper handling. Familiarize yourself with NSTA’s guidelines for the responsible use of animals in the classroom (see below). During lessons, engage children in conversations about the appropriate handling and treatment of animals and encourage children to be kind to animals. Remember that, throughout these lessons, your gentle and respectful treatment of animals will serve as an important model for your young learners.

Animals After Your Lesson(s)

In some of the activities in A Head Start on Science, you and your children are encouraged to find some sort of animal in your own schoolyard or neighborhood. When you do, make certain that children understand the importance of returning the animal to its own “home” after the activity ends. Also, if you purchased animals from a pet store, keep them as class pets or return them to the pet store. Animals obtained from stores should never be released outside; in many cases, these non-native species can harm native species and existing natural systems, as well as crops and gardens.

Not Just Animals

Of course, we want our children to respect all living things, including plants. As you and your children investigate living plants, keep in mind and discuss the considerations described above. Involve children in the care of plants and make caring for them an important part of your classroom routine. Build stewardship and respect for plants by discussing with children the needs of plants and modeling gentle and considerate care for the plants in and around your classroom.

Resources


All Children Can Do Science

All children in your care can and should participate in science activities. Science activities can often be door-openers for children coping with learning challenges. The open-ended, inquiry-based, child-centered environment that is at the heart of rich science learning offers children opportunities to be themselves while exploring and learning science concepts. Teachers who include science as a regular part of their school day celebrate what children think and wonder. These same attributes will make you a wonderful facilitator of all children’s learning, especially those with physical, cognitive, or social-emotional challenges. As you engage in science with special needs children, enjoy the differences they bring to the classroom. Create an atmosphere of kindness where children accept and embrace one another’s differences and demonstrate compassion. Teach children to care for and respect one another. Allow children to help one another. Keep in mind that including special needs children presents opportunities to enhance the learning experience for all children. The ideas offered in the specific descriptions that follow and the resource list at the bottom of this section will help you as you adapt activities for special needs children.

Children Who Are Hearing or Sight Challenged

The world of science must not be closed to children who are either hearing or sight challenged. Children with these special needs should be offered ample opportunity to explore based on their curiosities, talents, and abilities. Caregivers and teachers will have to modify activities to support exploration based on children’s individual strengths. This may mean enlarging printed text and pictures; using adaptive technologies in the classroom; making sure all activities take advantage of multiple ways of learning; increasing the number of ways directions are given—verbal, written, images, sign language, Braille; modifying the ways children are asked to interact with one another; adding sign language to skills offered to learners in your setting; and discussing how all people are able to learn and contribute to our society in unique ways.

Children Who Have Physical Challenges With Their Limbs

Due to birth defects, disease, or accidents, some young children struggle to use their arms or legs without the aid of adaptive devices such as prostheses, crutches, walkers, or wheelchairs. To assist these children you should first concentrate on modifying the classroom environment to enlarge aisles and traffic pathways to accommodate children who need to use ambulatory devices. Similarly, learning centers, eating areas, and play areas where science activities take place should have tables and areas easily accessible to all children. You may also need to adapt lesson materials or science tools to make activities possible for those with fine-motor challenges or those with prosthetic or missing limbs. After you have modified the classroom environment and science tools, you can focus on thinking about doing science outdoors. Once again, choose learning environments that are accessible to all—the terrain, natural barriers, and availability of accessible pathways and vehicles must be taken into consideration when planning outdoor science activities and field trips.
Children Who Have Allergies or Asthma

Children with allergies and asthma are present in virtually all childhood settings. Like the other children discussed here, these children cannot be grouped together under one heading, nor can they be instructionally adjusted for in a single manner. For some, your instructional changes may simply mean eliminating certain foods from activities. For others, the impact may be greater. Allergies to foods, plants, manufactured products, and natural environmental stimuli all need to be considered carefully as you plan for instruction. In general, plan “healthy” science activities that are aimed at all the children, but be ready to offer alternatives to children who cannot participate in the activity as planned. Choosing alternative foods, working with latex-free gloves, eliminating cleaning products and their odors from the classroom environment, selecting classroom pets with little to no dander—these are some, but not all, of the changes you may need to make to offer a healthy science learning environment. In addition, keep in mind that children with environmental allergies and asthma are often affected by seasonal changes in the outdoor environment. For example, a science nature hunt or activity in the winter months may work well for all your children, but may need to be adjusted in the fall or spring for any children who are affected by various pollens or molds. Try to be aware of each child’s needs and plan alternatives accordingly. If you are aware ahead of time, adjustments are often fairly easy to make.

Children Who Have Cognitive and Emotional Needs

Some of your children may have developmental or cognitive impairments, learning disabilities, or sociological or emotional challenges. All of these challenges may affect their attention, engagement, and achievement. Each challenge also brings its own unique set of triggers, trials, and learning implications. When “inappropriate” behaviors occur, keep in mind that often these are children’s attempts at communicating—focus on finding out the causes and purpose of the behaviors. Understanding why a behavior is occurring will allow you to better meet the needs of the child and help him or her to be successful. As you come to understand the needs of your children, help others in your classroom to understand and value the uniqueness of their classmates. Explicitly describe and model to children how to appropriately interact with and support classmates with cognitive or emotional needs. Allow children to help one another. Also, as teacher or caregiver, you need to be aware of your children’s diagnosed needs and how each child’s family is supporting and coping with these needs and issues. Ultimately, you and your colleagues will need to partner with the family to meet the needs of each child.

Resources


Science With English Language Learners

In far too many schools and districts, English language learners are denied full access to science
lessons as additional class time for these children is devoted to English language development (ELD). However, there is a growing consensus that science experiences can actually promote language learning. A substantial body of scholarly work details the important link between science and literacy and suggests that ELD and science instruction are complementary. Classroom experiences with a combined science and ELD focus can lead to increased language and science learning and achievement in the early childhood classroom. These benefits have been attributed, among other factors, to (1) the high-interest nature of science, which motivates children to use new language; (2) manipulatives and hands-on experiences, which allow all children to communicate via demonstration/manipulation of materials; (3) the collaborative nature of science, which includes discussion and peer-to-peer talk; and (4) the concrete, rich, and authentic contexts of science experiences, which make language (and science) learning meaningful. Children do not need to wait to first achieve a given level of English proficiency to participate in science; all children can and should engage in scientific explorations that focus on observing, comparing, analyzing, and sharing understandings of different aspects of the natural world.

To support your English language learners, begin to learn and incorporate into your classroom each child’s home language and culture, use real materials or pictures to support conceptual understanding, and support the ways children communicate and interact through language, drawing, and the use of manipulatives. Science should not be thought of as vocabulary-laden and text-centered, but rather as a field of study that is curiosity-based, question-driven, and open-ended. Doing science is more important than learning science ideas (see The Importance of Science Practices and Skills, page xvii). Thinking of science in this way will make your classroom science experiences wonderful common ground for children of all languages and cultures to come together as a learning community.

Resources


Safely Doing Science With Young Children

Wonderful science learning happens when young children enthusiastically explore the natural world around them. As teachers and caregivers of children, we have the responsibility to provide safe environments for their explorations. Here are some of the safety issues that early childhood educators are likely to encounter and some suggestions for establishing and maintaining safe indoor and outdoor learning environments.

The Senses

When “doing science,” early childhood teachers often encourage activities involving the senses. It is important to think about setting up the
classroom and outdoor environment so that children can use their senses to explore safely.

Seeing: You will already be aware of the need for safety with respect to children’s eyes. In particular, children need to be reminded to use caution when using sticks or sharp objects to probe an object of interest. If available, safety glasses or goggles are appropriate for children to wear at those times. However, because goggles are not always available to teachers of young children, consider using blunt objects for probing. Some teachers use craft sticks, cotton swabs, and unsharpened pencils because they are not sharp and are easy for small hands to use to move or lift objects while exploring. However, children should be directly supervised if using these probes because young children are apt to stick the probes in their ears and noses (even eyes). A safer probe might be a spatula. Start with a large spatula and work down to a smaller size as you determine your children’s dexterity.

Touching: Most of what children will be touching while engaging in science learning will not be dangerous. We often use the sense of touch to discover and discuss concepts such as smooth, rough, bumpy, and cold. At times, however, touching objects can be unsafe. For example, it is important to help young children learn to avoid hot and sharp objects that might be safety hazards. It is never too early for children to learn the signs and signals that something may be hot. Sensing heat or warmth, seeing a red, white, or blue glow, observing sparks or fire—these are all signs that an object may be hot and should not be touched. You will need to teach children these signs and tell them that they should always be with an adult if hot objects are present in their home, classroom, or outdoor areas. Teachers and caregivers also need to help children learn about the potential dangers of touching sharp objects. Pins, needles, knives, thorns, saws, and animals’ spikes and teeth are all sharp and can cut or puncture children’s skin. Help children to recognize sharp objects and their potential dangers; limit the number of sharp objects in your learning environment, including sharp corners on furniture, playground equipment, and toys; and help the children understand how to carry sharp objects with their points or sharp edges pointed away from their bodies and that they should alert an adult immediately if anyone is injured by a sharp object.

Smelling and tasting: From birth, children put their hands in their mouths and near their noses as primary ways of experiencing the world. As you know, this doesn’t stop when they become involved in day care, preschool, or even kindergarten. Much of the excitement of experiencing the everyday world comes through tasting new foods and smelling new smells. Without becoming overcautious, teachers and caregivers can help children learn some safety tips regarding tasting and smelling in the learning environment. Obviously, young children should learn that they should never put anything in their mouths except food or things identified by trusted adults as foods that are safe to eat. Furthermore, children need to understand the dangers of putting objects into their noses. When smelling, you should help children learn how to detect odors from a distance of several inches—not by burying their noses into the chosen element to be smelled. In addition, it is extremely important to check for allergies (peanuts, pollen, etc.) among all children in your care before including any food or other materials to be smelled or tasted in your classroom activities.

Hearing: One way to experience the details and nuances of the world around us is to use our ears—to sit quietly and listen. It is important to remind children to take care of their ears in the classroom and throughout their lives. Loud noises or music can hurt a child’s ears. Precautions...
should be taken to avoid unsafe noise levels and to protect children’s ears from being harmed. If possible, turning down the volume of the noise or music should be the first step. If this is not possible, giving children earplugs to dampen the noise level is a good second choice. Closely monitor the volume on all headphones used by children. It is important to educate children and the adults who care for them about the irreparable harm loud music or noise can cause the human ear. Finally, always remind young children not to put anything into their ears. Cotton swabs and other probe-like objects should not be used in the ears as they can easily damage eardrums.

General Caution for All Activities

Outside: Extended time outside exposes children to damaging ultraviolet radiation; be mindful of children’s exposure to the sun. Offer parents the option of providing children sunscreen and protective clothing to reduce exposure on a regular basis. Remember that some children have allergies to pollen, bees, and so forth. Parents should be consulted about these possible allergies. Familiarize yourself with the symptoms of allergic reactions in children and monitor your children closely. Before taking children outdoors, scout out the area to make sure it is safe and free of poisonous plants, tripping hazards, obstructions, trash, and other hazards. Recruit additional adults to help supervise children when outdoors and make sure that children wash their hands after outdoor science activities.

Electricity: When planning science activities, remember the need to plan for the safe use of electricity. Make sure all unused electrical outlets are covered, all loose cords are handled appropriately, all electrical tools or appliances are unplugged after use, and all electrical appliances are kept away from water and water sources. Ensure that the electrical outlets in your classroom are GFI (ground fault interrupter) or GFCI (ground fault circuit interrupter) outlets to protect children from possible electrical shock while using water.

Safety Summary

Being aware of safety hazards and having the resources to plan safe science learning activities are necessary for all those who manage or teach in early childhood settings. The reminders and suggestions in the paragraphs above, together with the information found in the Safety section of each activity and the resources listed below, will serve as a fine foundation for planning and implementing safe science activities. In addition, all teachers and caregivers should be aware of the safety procedures, crisis or natural disaster procedures, and parent notification plans in place at their school or caregiver sites. Knowing and following these procedures are vital to the safety of all children.

Resources


Color Walk

**Investigation:** Looking for objects in the environment that are a particular color

**Science practices and skills:** Communicating, comparing, observing

**Materials:** Chart paper, nontoxic markers or crayons, a piece of colored paper for each child, a few objects from the environment that are a particular color, cameras (optional)

**Safety:** Before taking children outdoors, check with parents for children’s environmental allergies (pollen, bees, etc.) and make sure the area is safe and free of poisonous plants, tripping hazards, herbicides and pesticides, trash, and other hazards.

**Procedure**

**Getting Started**

Choose a color that is common in your outdoor environment. Green is a good one to start with, but other colors may work well too, depending on the season and your location. (You can repeat this activity using a different color each time.) Tell the children they are going to look for this color as they go on a walk. Hold up several shades of the color you have chosen. Tell children, “These are all different shades of green, but they are all called green.” Give each child a piece of green paper and start your color walk. Encourage children to look for and describe objects that are green. If available, give children cameras so they can take pictures of the green objects they find.

**Questions to Guide Children**

- What can you find that is green?
- Do all the greens look the same?
- How many different things can you find that are green?

**What Children and Adults Will Do**

Children will find many green objects. They may name something that is not green. In that case, ask them to look at their paper and ask if it is the same color. Many young children will confuse colors and inaccurately match colors. Don’t correct them, but instead point out some of the objects that are...
green that other children are finding (e.g., “Oscar found a green car”).

Closure
When you return to your classroom, ask children to describe what they saw that was the designated color. Make a chart, labeling it “Our Green Walk.” Print out the pictures taken by children or have children draw pictures of the objects they remember seeing. Write children’s words next to their photographs or drawings. Write and draw using a marker that is the same color as the objects children were looking for.

Extending the Activity
Follow-Up Activity
The Color Walk activity can be repeated in different locations, including inside the classroom. Also, you can ask parents to send something that is green to school; children can share their green items and leave them out for others to explore on a “green” table.

Center Connection
Emphasize the same color for a few days in different ways. Add green food coloring to scrambled eggs or other foods. Dress in all green and encourage the children to wear green as well. Have children tape “green” labels on all of the green-colored objects in your room. Encourage children to discuss how to make green paint by mixing primary colors.

Literature Connection
**NGSS Connections and HSELOF Indicators**

**NGSS**

- Matter can be described and classified by its observable properties. (2-PS1-1)

Science and Engineering Practice: Planning and Carrying Out Investigations
- Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.

Science and Engineering Practice: Analyzing and Interpreting Data
- Record information (observations, thoughts, and ideas).
- Use and share pictures, drawings, and/or writings of observations.

**HSELOF**

P-SCI 1. Child observes and describes observable phenomena (objects, materials, organisms, and events).
- Describes observable phenomena using adjectives and labels, such as lemons taste sour and play dough feels sticky.

P-SCI 3. Child compares and categorizes observable phenomena.
- Categorizes by sorting observable phenomena into groups based on attributes such as appearance, weight, function, ability, texture, odor, and sound.

P-SCI 6. Child analyzes results, draws conclusions, and communicates results.
- Communicates results, solutions, and conclusions through a variety of methods, such as telling an adult that plants need water to grow or putting dots on a map that show the number of children from each country.

**What to Look For**

<table>
<thead>
<tr>
<th>Preparing</th>
<th>Child does not notice any objects of the chosen color; shows no interest.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempting</td>
<td>Child watches others and copies them; identifies a small number of objects near the end of the activity; is not very curious or talkative.</td>
</tr>
<tr>
<td>Exploring</td>
<td>Child looks for and finds objects that are the chosen color; describes one or two things about objects; is curious about other objects that are the same color.</td>
</tr>
<tr>
<td>Connecting</td>
<td>Child actively looks for and finds many items that are the chosen color; eagerly responds to what is seen and contributes to the discussion; is curious and eagerly repeats the process with other colors.</td>
</tr>
</tbody>
</table>
Family Science Connection

At home during play time, ask your child if she or he can find an object in the house that is of the color she or he likes best. Talk about why your child likes that color and find other objects in the house or outside that have that same favorite color. Together describe the color of each of the objects that have the same color. For example, if the child picks green as a favorite color and finds a leaf, a sponge, and a toy that are green, talk about how similar the greens are to each other. Point out that there are many different shades of green and that each shade can be called green.

Comments and questions that may add a sense of wonder to this activity:

• What is it that you like about your favorite color?
• Let’s count all the things in the house that have your favorite color in them.

Ciencia en Familia

En casa durante la hora de juego, pídale a su hijo/a que encuentre un objeto en la casa que sea de su color favorito. Pregúntele por qué le gusta ese color y pídale que busque otros objetos dentro y fuera de la casa que sean del mismo color. Describan juntos los diferentes tonos del mismo color de los objetos. Por ejemplo, si su hijo/a escoge el verde como su color favorito y encuentra una hoja, una esponja, y un juguete verde, hablen acerca de cuán semejantes son los diferentes tonos de verde. Explique que existen muchos tonos de verde y a cada tono se le llama verde.

Comentarios y preguntas que pueden despertar curiosidad en esta actividad:

• ¿Qué es lo que te gusta de tu color favorito?
• Contemos todas las cosas en la casa que tienen tu color favorito.
Index

A
absorbing colors. See colors, absorbing
absorbing water. See water, absorbing
activities, guide to using, xviii–xxi
air that moves
extending the activity, 65
family science connection, 67
HSELOF indicators, 66
NGSS connections, 66
procedure, 64
science practices and skills, 64
what to look for, 66
allergies, children with, xxiv
analyzes results, draws conclusions, and communicates results (HSELOF)
air that moves, 66
balancing me, 124
bubbles raising raisins, 149
color walk, 14
feeding the birds, 193
keeping warm: coats, 90
magnet contest: which magnet is stronger?, 111
magnetic force through objects, 104
magnetic scavenger hunt, 101
mealworms, 161
mixing colors, 225
my shadow, 72
observing earthworms, 164
parachutes, 70
ramps, 138
shadows on my playground, 75
shape walk, 18
snow on the go, 86
snow tracks and traces, 84
soaking things, 217
sound walk, 41
tasting, 28
water painting, 202
What’s magnetic?, 98
Where did the shadows go?, 78
Where do seeds come from?, 245
Will it roll?, 135
wind walk, 59
windy day, 62
Analyzing and Interpreting Data (NGSS)
air that moves, 66
balancing me, 124
branch puzzles, 304
bubble makers, 220
building with blocks, 131
color walk, 14
looking through water, 199
my shadow, 72
parachutes, 70
popping up some change, 268
roller coasters, 142
shadows on my playground, 75
shape walk, 18
smelly cans, 31
sound: shake, rattle, and roll, 38
sound walk, 41
What is the weather like today?, 81
Where did the shadows go?, 78
Will it roll?, 135
wind walk, 59
analyzing data (foundation skill)
snow on the go, 86
animals, selection and care of, xxi–xxii
animal walk
extending the activity, 292
family science connection, 294
HSELOF indicators, 293
NGSS connections, 293
procedure, 291
science practices and skills, 291
what to look for, 293
art area materials, xxxiv
Asking Questions and Defining Problems (NGSS)
looking at me, 7
magnetic force through objects, 104
roller coasters, 142
spiderweb collecting, 183
asks a question, gathers information, and makes predictions (HSELOF)
absorbing colors, 209
air that moves, 66
animal walk, 293
bubble makers, 220
building bird nests, 195
camouflage, 179
color designs, 228
feeding the birds, 193
jumping crickets, 172
light to see, 21
looking for birds, 188
looking through water, 199
INDEX

making a giant spiderweb, 185
mealworms, 161
mixing colors, 225
observing earthworms, 164
observing weeds, 289
pondering pumpkins: the insides, 280
roller coasters, 142
roly-poles, 157
seeds as food, 271
seeds in our food, 242
seeds to plant, 259
snails, 168
snow on the go, 86
soaking seeds, 255
soaking things, 217
spiderweb collecting, 183
swimming fish, 176
terrariums, 262
Will it roll?, 135

asthma, children with, xxiv

B

balance
extending the activity, 119–120
family science connection, 122
HSELOF indicators, 121
NGSS connections, 121
procedure, 119
science practices and skills, 119
what to look for, 122
balancing me
extending the activity, 124
family science connection, 125
HSELOF indicators, 124
NGSS connections, 124
procedure, 123
science practices and skills, 123
what to look for, 125
biodiversity and humans (NGSS)
animal walk, 293
looking for birds, 188
nature bracelets, 285
observing earthworms, 164
observing weeds, 289
biogeology (NGSS)
building bird nests, 195
bird nests, building
extending the activity, 195
HSELOF indicators, 195
NGSS connections, 195
procedure, 194
science practices and skills, 194
what to look for, 195

birds, 154
birds, feeding the
extending the activity, 192
HSELOF indicators, 193
NGSS connections, 192
procedure, 191–192
science practices and skills, 191
what to look for, 193
block area materials, xxxiv
blocks, 95–96
blocks, building with
extending the activity, 130–131
family science connection, 132
HSELOF indicators, 131
NGSS connections, 131
procedure, 130
science practices and skills, 130
what to look for, 132
book area materials, xxxv
branch puzzles
extending the activity, 303
family science connection, 305
HSELOF indicators, 304
NGSS connections, 304
procedure, 302–303
science practices and skills, 302
what to look for, 304
bubble makers
extending the activity, 220
HSELOF indicators, 220
NGSS connections, 220
procedure, 219–220
science practices and skills, 219
what to look for, 221
bubbles, 197–198
bubbles raising raisins
extending the activity, 148
family science connection, 149
HSELOF indicators, 149
NGSS connections, 149
procedure, 147–148
science practices and skills, 147
what to look for, 149
bugs, 153–154
camouflage, 154
camouflage, 154
extending the activity, 179
family science connection, 180
HSELOF indicators, 179
NGSS connections, 179
procedure, 178

science practices and skills, 178
what to look for, 180
Carson, Rachel, xiii, xvii
derby, popping up some (heat)
extending the activity, 268
family science connection, 269
HSELOF indicators, 268
NGSS connections, 268
procedure, 267
science practices and skills, 267
what to look for, 269
chemical reactions (NGSS)
popping up some change, 268
snow on the go, 86
water painting, 202
classifying (foundation skill)
absorbing water, 205
all kinds of rocks, 116
building bird nests, 194
camouflage, 178
How are seeds alike?, 251
leaves: falling for you!, 306
matching by touch, 51
nature bracelets, 285
scavenger hunt, 23
smelling flowers, 33
smelly cans, 30
sorting seeds, 247
vibrations, 43
What’s magnetic?, 97
Will it roll?, 133
colored. See warm, keeping: coats
cognitive needs, children with,
xxiv
color, 2
color boards, xxxi
color designs
extending the activity, 228–229
HSELOF indicators, 229
NGSS connections, 229
procedure, 228
science practices and skills, 228
what to look for, 230
colors, absorbing
extending the activity, 208–209
HSELOF indicators, 209
NGSS connections, 209
procedure, 208
science practices and skills, 208
what to look for, 209
color walk
extending the activity, 13
family science connection, 15

314

NATIONAL SCIENCE TEACHERS ASSOCIATION
INDEX

HSELOF indicators, 14
NGSS connections, 14
procedure, 12
science practices and skills, 12
what to look for, 14

communicating (foundation skill)
adopter a tree, 295
all kinds of rocks, 116
animal walk, 291
bubble makers, 219
color walk, 12
feeding the birds, 191
jumping crickets, 170
light to see, 20
looking for birds, 188
looking through water, 199
magnetic scavenger hunt, 100
mealworms, 159
parachutes, 68
popping up some change, 267
prisms, 9
roller coasters, 140
seeds in our food, 241
shape walk, 16
snails, 166
sound walk, 40
swimming fish, 174
What is the weather like
today?, 80
Where do seeds come from?,
244
wind walk, 57

compares and categorizes
observable phenomena
(HSELOF)
absorbing water, 206
adopter a tree, 296
all kinds of rocks, 117
balance, 121
branch puzzles, 304
building bird nests, 195
color walk, 14
How are seeds alike?, 252
leaves: falling for you!, 308
making oobleck, 234
my favorite rock, 114
pondering pumpkins: the
outsides, 277
ramps, 138
roly-poles, 157
sand sculptures, 222
scavenger hunt, 25
shape walk, 18

sound: shake, rattle, and roll, 38
touch collage, 49
towers, 128
water drops, 214
water drops as art, 231
What is the weather like
today?, 81
What's magnetic?, 98
Will it roll?, 135

compares numbers (HSELOF)
feeding the birds, 193
magnet contest: which magnet
is stronger?, 111

comparing (foundation skill)
absorbing colors, 208
absorbing water, 205
adopter a tree, 295
all kinds of rocks, 116
balance, 119
balancing me, 123
branch puzzles, 302
bubble makers, 219
bubbles raising raisins, 147
building bird nests, 194
camouflage, 178
color designs, 228
color walk, 12
feeding the birds, 191
keeping warm: coats, 90
leaves: falling for you!, 306
light to see, 20
looking at me, 6
looking through water, 199
magnet contest: which magnet
is stronger?, 109
magnetic force through
objects, 103
magnifiers, 3
making oobleck, 233
matching by touch, 51
my favorite rock, 112
my shadow, 71
noise makers, 46
observing weeds, 288
pondering pumpkins: the
outsides, 276
popping up some change, 267
ramps, 137
sand sculptures, 222
scavenger hunt, 23

seeds as food, 270
seeds in our food, 241
seeds to plant, 257
seed wreath, 273
shadows on my playground,
74
shape walk, 16
smelling flowers, 33
snails, 166
snow on the go, 86
snow tracks and traces, 83
soaking seeds, 254
soaking things, 216
sorting seeds, 247
sound: shake, rattle, and roll,
36
tasting, 27
terrariums, 261
touch collage, 48
towers, 126
vibrations, 43
visit to a nursery, 299
water drops, 213
water painting, 202
What is the weather like
today?, 80
What's magnetic?, 97
Where did the shadows go?, 77
Where do seeds come from?,
244
Will it roll?, 133
windy day, 61

conservation of energy and energy
transfer (NGSS)
water painting, 202

Constructing Explanations and
Designing Solutions (NGSS)
absorbing colors, 209
absorbing water, 206
air that moves, 66
branch puzzles, 304
bubbles raising raisins, 149
building bird nests, 195
camouflage, 179
color designs, 228
jumping crickets, 172
leaves: falling for you!, 308
looking for birds, 188
magnetic mazes, 107
making oobleck, 234
mealworms, 160
my shadow, 72
observing earthworms, 164
ramps, 138
roly-polies, 157
seeds in our food, 242
snow on the go, 86
snow tracks and traces, 84
swimming fish, 176
vibrations, 44
water drops as art, 231
What’s magnetic?, 98
Where did the shadows go?, 78
Will it roll?, 135
wind walk, 59
windy day, 62

cricket, jumping
extending the activity, 170–171
family science connection, 173
HSELOF indicators, 172
NGSS connections, 172
procedure, 170
science practices and skills, 170
what to look for, 173
crosscutting concepts, xx

D
Developing and Using Models (NGSS)
building bird nests, 195
making a giant spiderweb, 185
dramatic play area materials, xxxiv

E
an ear of corn
extending the activity, 264–265
family science connection, 266
HSELOF indicators, 265
NGSS connections, 265
procedure, 264
science practices and skills, 264
what to look for, 265
earth materials and systems (NGSS)
winding walk, 59
earthworms, observing. See observing earthworms
electromagnetic radiation (NGSS)
light to see, 21
looking through water, 199
magnifiers, 4
prisms, 10
emotional needs, children with, xxiv
engages in scientific talk (HSELOF)
absorbing water, 206
balance, 121
balancing me, 124
camouflage, 179
looking at me, 7
magnetic mazes, 107
magnifiers, 4
making a giant spiderweb, 185
making oobleck, 234
prisms, 10
seeds in our food, 242
smelling flowers, 34
vibrations, 44
What’s magnetic?, 98
Engaging in Argument from Evidence (NGSS)
snow tracks and traces, 84
What’s magnetic?, 98
English language learners, xxiv–xxv
explores the positions of objects in space (HSELOF)
balancing me, 124
branch puzzles, 304
bubbles raising raisins, 149
building with blocks, 131
magnetic mazes, 107
marble painting, 145
parachutes, 70
ramps, 138
roller coasters, 142
sound walk, 41
towers, 128
wind walk, 59
Extending the Activity section, xix

F
feely boxes, xxxii
fish, 154
fish, swimming
extending the activity, 174–175
family science connection, 177
HSELOF indicators, 176
NGSS connections, 176
procedure, 174
science practices and skills, 174
what to look for, 177
flowers, smelling

G
graphing (foundation skill), xxix–xxx
animal walk, 291
balance, 119
feeding the birds, 191
tasting, 27

H
Head Start, xvii
Head Start Early Learning Outcomes Framework (HSELOF) indicators, xx. See also specific indicators
hearing, xxvi–xxvii
hearing challenges, children with, xxiii
How are seeds alike?
   extending the activity, 252
   HSELOF indicators, 252
   NGSS connections, 252
   procedure, 251
   science practices and skills, 251
   what to look for, 253

I
identifies, describes, compares, and composes shapes (HSELOF)
branch puzzles, 304
bubble makers, 220
building with blocks, 131
How are seeds alike?, 252
leaves: falling for you!, 308
scavenger hunt, 25
shape walk, 18
snow tracks and traces, 84
sorting seeds, 248
towers, 128
Will it roll?, 135
identifying patterns (foundation skill)
branch puzzles, 302
building with blocks, 130
information processing (NGSS)
jumping crickets, 172
making a giant spiderweb, 185
mealworms, 160
observing earthworms, 164
roly-polies, 157
snails, 168
swimming fish, 176
Internet resources
animals, 153–154
blocks, 95–96
bubbles, 197–198
bugs, 153–154
magnets, 95
nature walks, 283
pets, 283
plants, 239–240
pumpkins, 240
seeds, 239
senses, 1
shadows, 55
shapes and colors, 2
slime, 198
sound and smell, 2
trees and leaves, 284
water, 197
weather, 55–56
wheels, ramps, and rolling, 96
winter, 56

L
leaves: falling for you!
extending the activity, 306–307
family science connection, 309
HSELOF indicators, 308
NGSS connections, 308
procedure, 306
science practices and skills, 306
what to look for, 308
length boards, xxxi
light to see
extending the activity, 20–21
family science connection, 22
HSELOF indicators, 21
NGSS connections, 21
procedure, 20

M
magnet contest: which magnet is stronger?
extending the activity, 110
HSELOF indicators, 111
NGSS connections, 111
procedure, 109
science practices and skills, 109
what to look for, 111
magnetic force through objects
extending the activity, 104
family science connection, 105
HSELOF indicators, 104
NGSS connections, 104
procedure, 103
science practices and skills, 103
what to look for, 105
magnetic mazes
extending the activity, 106–107
HSELOF indicators, 107
NGSS connections, 107
procedure, 106
science practices and skills, 106
what to look for, 108
magnetic scavenger hunt
extending the activity, 100–101

HSELOF indicators, 101
NGSS connections, 101
procedure, 100
science practices and skills, 100
what to look for, 102
magnets, 95
magnets (What’s magnetic?)
extending the activity, 98
family science connection, 99
HSELOF indicators, 98
NGSS connections, 98
procedure, 97
science practices and skills, 97
what to look for, 99
magnifiers, using
extending the activity, 3–4
family science connection, 5
HSELOF indicators, 4
materials, 3
NGSS connections, 4
procedure, 3
science practices and skills, 3
what to look for, 5
manipulatives area materials, xxxv
marble painting
extending the activity, 144–145
family science connection, 146
HSELOF indicators, 145
NGSS connections, 145
procedure, 144
science practices and skills, 144
what to look for, 146
matching by touch
extending the activity, 51–52
family science connection, 53
HSELOF indicators, 52
NGSS connections, 52
procedure, 51
science practices and skills, 51
what to look for, 52
materials list, basic, xxxii–xxxv
mealworms
extending the activity, 160
HSELOF indicators, 161
NGSS connections, 160
procedure, 159
science practices and skills, 159
what to look for, 161
measures objects by their various attributes using standard and non-standard measurement (HSELOF)
magnet contest: which magnet is stronger?, 109
magnetic force through objects, 103
magnetic mazes, 106
magnetic scavenger hunt, 100
magnifiers, 3
making a giant spiderweb, 185
making oobleck, 233
marble painting, 144
matching by touch, 51
mealworms, 159
mixing colors, 225
my favorite rock, 112
my shadow, 71
nature bracelets, 285
NGSS connections, 52
noise makers, 46
observing earthworms, 162
observing weeds, 288
parachutes, 68
pondering pumpkins: the insides, 279
pondering pumpkins: the outsides, 276
popping up some change, 267
prisms, 9
ramps, 137
roller coasters, 140
roly-poly, 155
sand sculptures, 222
scavenger hunt, 23
seeds as food, 270
seeds in our food, 241
seeds to plant, 257
seed wreath, 273
shadows on my playground, 74
shape walk, 16
smelling flowers, 33
smelly cans, 30
snails, 166
snappy, 236
snow on the go, 86
snow tracks and traces, 83
soaking seeds, 254
soaking things, 216
sorting seeds, 247
sound: shake, rattle, and roll, 36
sound walk, 40
spiderweb collecting, 181
swimming fish, 174
tasting, 27
terrariums, 261
touch collage, 48
towers, 126
vibrations, 45
visit to a nursery, 299
water drops, 213
water drops as art, 231
water painting, 202
What is the weather like today?, 80
What’s magnetic?, 97
Where did the shadows go?, 77
Where do seeds come from?, 244
Will it roll?, 133
wind walk, 57
windy day, 61
observing earthworms extending the activity, 163
HSELOF indicators, 164
NGSS connections, 164
procedure, 162
science practices and skills, 162
what to look for, 165
observing weeds extending the activity, 288–289
family science connection, 290
HSELOF indicators, 289
NGSS connections, 289
procedure, 288
science practices and skills, 288
what to look for, 290
Obtaining, Evaluating, and Communicating Information (NGSS)
adopting a tree, 296
animal walk, 293
balance, 121
bubble makers, 220
jumping crickets, 172
looking for birds, 188
magnetic scavenger hunt, 101
making oobleck, 234
mixing colors, 225
parachutes, 70
roller coasters, 142
scavenger hunt, 25
snappy, 236
swimming fish, 176
What is the weather like today?, 81
Where do seeds come from?, 245
oobleck, making extending the activity, 233–234
family science connection, 235
HSELOF indicators, 234
NGSS connections, 234
procedure, 233
science practices and skills, 233
what to look for, 235
optimizing the design solution (NGSS)
building with blocks, 131
towers, 128
organization for matter and energy flow in organisms (NGSS)
feeding the birds, 192
jumping crickets, 172
making a giant spiderweb, 185
snails, 168
soaking seeds, 255
spiderweb collecting, 183
swimming fish, 176
ornithology, 154
outdoors, materials for, xxxv
P
parachutes extending the activity, 69
HSELOF indicators, 70
NGSS connections, 70
procedure, 68
science practices and skills, 68
what to look for, 70
pets, 283
physical challenges, children with, xxiii
Planning and Carrying Out Investigations (NGSS)
absorbing colors, 209
absorbing water, 206
adopting a tree, 296
air that moves, 66
all kinds of rocks, 117
bubbles raising raisins, 149
color designs, 228
color walk, 14
an ear of corn, 265
feeding the birds, 192
How are seeds alike?, 252
keeping warm: coats, 90
leaves: falling for you!, 308
light to see, 21
looking at me, 7
looking through water, 199
magnet contest: which magnet is stronger?, 111
magnetic force through objects, 104
magnetic mazes, 107
magnetic scavenger hunt, 101
magnifiers, 4
making oobleck, 234
marble painting, 145
mealworms, 160
mixing colors, 225
my favorite rock, 114
nature bracelets, 285
noise makers, 47
observing earthworms, 164
observing weeds, 289
pondering pumpkins: the insides, 280
pondering pumpkins: the outsides, 277
popping up some change, 268
prisms, 10
roly-polies, 157
sand sculptures, 222
scavenger hunt, 25
seeds as food, 271
seeds in our food, 242
seeds to plant, 259
seed wreath, 274
shape walk, 18
smelling flowers, 34
smelly cans, 31
snails, 168
snow on the go, 86
soaking seeds, 255
soaking things, 217
sorting seeds, 248
sound: shake, rattle, and roll, 38
sound walk, 41
tasting, 28
terrariums, 262
touch collage, 49
vibrations, 44
visit to a nursery, 300
water drops, 214
water painting, 202
What’s magnetic?, 98
Where do seeds come from?, 245
Will it roll?, 135
windy day, 62
plans and conducts investigations and experiments (HSELOF)
absorbing colors, 209
bubbles raising raisins, 149
feeding the birds, 193
keeping warm: coats, 90
magnet contest: which magnet is stronger?, 111
magnetic force through objects, 104
magnetic scavenger hunt, 101
marble painting, 145
my shadow, 72
roller coasters, 142
seeds to plant, 259
shadows on my playground, 75
snails, 168
snow on the go, 86
soaking things, 217
water drops, 213
What is the weather like today?, 81
Where did the shadows go?, 78
wind walk, 59
plants, 239–240
predicting (foundation skill)
absorbing colors, 208
air that moves, 64
bubble makers, 219
color designs, 228
looking through water, 199
mealworms, 159
mixing colors, 225
observing earthworms, 162
popping up some change, 267
seeds as food, 270
snow on the go, 86
soaking seeds, 254
soaking things, 216
water painting, 202
Where did the shadows go?, 77
Will it roll?, 133
prisms
extending the activity, 9–10
family science connection, 11
HSELOF indicators, 10
NGSS connections, 10
procedure, 9
science practices and skills, 9
what to look for, 11
pumpkins, 240
pumpkins, pondering: the insides, 280
extending the activity, 280
family science connection, 281
HSELOF indicators, 280
NGSS connections, 280
procedure, 279
science practices and skills, 279
what to look for, 281
pumpkins, pondering: the outsides, 276
extending the activity, 276–277
family science connection, 278
HSELOF indicators, 277
NGSS connections, 277
procedure, 276
science practices and skills, 276
what to look for, 278
Q
questioning (foundation skill)
making a giant spiderweb, 185
pondering pumpkins: the insides, 279
roly-polies, 155
spiderweb collecting, 181
swimming fish, 174
questioning, role of, in science, xiv–xvii
R
ramps, 96
extending the activity, 137–138
family science connection, 139
HSELOF indicators, 138
NGSS connections, 138
procedure, 137
science practices and skills, 137
what to look for, 139
ramps (Will it roll?)
extending the activity, 133–134
family science connection, 136
HSELOF indicators, 135
NGSS connections, 135
procedure, 133
science practices and skills, 133
what to look for, 136
relationship between energy and forces (NGSS)
roller coasters, 142
respect for living things, xxi–xxiii
rock, my favorite
extending the activity, 113
family science connection, 115
HSELOF indicators, 114
NGSS connections, 114
procedure, 112–113
science practices and skills, 112
what to look for, 114
rocks, all kinds of
extending the activity, 116–117
family science connection, 118
HSELOF indicators, 117
NGSS connections, 117
procedure, 116
science practices and skills, 116
what to look for, 118
roller coasters
extending the activity, 141
family science connection, 143
HSELOF indicators, 142
NGSS connections, 142
procedure, 140–141
science practices and skills, 140
what to look for, 143
rolling, 96
roly-polies
extending the activity, 156
family science connection, 158
HSELOF indicators, 157
NGSS connections, 157
procedure, 155
science practices and skills, 155
what to look for, 158
S
safety considerations, xxv–xxvii
sand sculptures
extending the activity, 223
family science connection, 224
HSELOF indicators, 223
NGSS connections, 223
procedure, 222
science practices and skills, 222
what to look for, 224
scavenger hunt
extending the activity, 26
family science connection, 26
HSELOF indicators, 25
NGSS connections, 25
procedure, 23
science practices and skills, 23
what to look for, 26
science education and young children, xiii–xiv
science practices and skills, xvii–xviii
seeds, 239
seeds (Where do seeds come from?)
   extending the activity, 244–245
HSELOF indicators, 245
NGSS connections, 245
procedure, 244
science practices and skills, 244
what to look for, 245
seeds, soaking
   extending the activity, 255
HSELOF indicators, 255
NGSS connections, 255
procedure, 254
science practices and skills, 254
what to look for, 256
seeds, sorting. See sorting seeds
seeds as food
   extending the activity, 270–271
HSELOF indicators, 271
NGSS connections, 271
procedure, 270
science practices and skills, 270
what to look for, 272
seeds in our food
   extending the activity, 242
family science connection, 243
HSELOF indicators, 242
NGSS connections, 242
procedure, 241
science practices and skills, 241
what to look for, 243
seeds to plant
   extending the activity, 258
family science connection, 260
HSELOF indicators, 259
NGSS connections, 259
procedure, 257–258
science practices and skills, 257
what to look for, 260
seed wreath
   extending the activity, 274
family science connection, 275
HSELOF indicators, 274
NGSS connections, 274
procedure, 273
science practices and skills, 273
what to look for, 275
The Sense of Wonder (Carson), xiii
senses, xxv–xxvi, 1–2
shadow, my
   extending the activity, 72
family science connection, 73
HSELOF indicators, 72
NGSS connections, 72
procedure, 71
science practices and skills, 71
what to look for, 73
shadows, 55
shadows (Where did the shadows go?)
   extending the activity, 78
family science connection, 79
HSELOF indicators, 78
NGSS connections, 78
procedure, 77
science practices and skills, 77
what to look for, 79
shadows on my playground
   extending the activity, 74–75
family science connection, 76
HSELOF indicators, 75
NGSS connections, 75
procedure, 74
science practices and skills, 74
what to look for, 76
shape boards, xxxi
shapes, 2
shape walk
   extending the activity, 17
family science connection, 19
HSELOF indicators, 18
NGSS connections, 18
procedure, 16–17
science practices and skills, 16
what to look for, 18
sight challenges, children with, xxiii
sight or seeing, xxvi
size boxes, xxxii
smell, xxvi, 2
smelly cans
   extending the activity, 31
family science connection, 32
HSELOF indicators, 31
NGSS connections, 31
procedure, 30–31
science practices and skills, 30
what to look for, 32
snails
   extending the activity, 167
HSELOF indicators, 168
NGSS connections, 168
procedure, 166–167
INDEX

science practices and skills, 166
what to look for, 169

snappy
extending the activity, 236–237
HSELOF indicators, 237
NGSS connections, 237
procedure, 236
science practices and skills, 236
what to look for, 237

snow on the go
extending the activity, 87
family science connection, 89
HSELOF indicators, 88
NGSS connections, 88
procedure, 86
science practices and skills, 86
what to look for, 89

snow tracks and traces
extending the activity, 84
family science connection, 85
HSELOF indicators, 84
NGSS connections, 84
procedure, 83
science practices and skills, 83
what to look for, 85

soaking things. See also seeds,
soaking
extending the activity, 217
HSELOF indicators, 217
NGSS connections, 217
procedure, 216
science practices and skills, 216
what to look for, 218

sorting boxes, xxxii

sorting seeds
extending the activity, 247–248
family science connection, 250
HSELOF indicators, 248
NGSS connections, 248
procedure, 247
science practices and skills, 247
what to look for, 249

sound, 2
sound: shake, rattle, and roll
extending the activity, 37
family science connection, 39
HSELOF indicators, 38
NGSS connections, 38
procedure, 36–37
science practices and skills, 36
what to look for, 38

sound walk
extending the activity, 41
family science connection, 42
HSELOF indicators, 41
NGSS connections, 41
procedure, 40–41
science practices and skills, 40
what to look for, 42

special needs, children with, xxiii–xxiv

spiderweb, making a giant
extending the activity, 186
HSELOF indicators, 186
NGSS connections, 186
procedure, 185
science practices and skills, 185
what to look for, 186

spiderweb collecting
extending the activity, 182
family science connection, 184
HSELOF indicators, 183
NGSS connections, 183
procedure, 181–182
science practices and skills, 181
what to look for, 183

stewardship, xxii

structure and function (NGSS)
adopter a tree, 296
branch puzzles, 304
camouflage, 179
an ear of corn, 265
How are seeds alike?, 252
jumping crickets, 172
leaves: falling for you!, 308
looking at me, 7
looking for birds, 188
mealworms, 160
observing earthworms, 164
pondering pumpkins: the
insides, 280
pondering pumpkins: the
outsides, 277
roly-poles, 157
seeds as food, 271
seeds in our food, 242
seeds to plant, 259
smelling flowers, 34
snails, 168
soaking seeds, 255
sorting seeds, 248
spiderweb collecting, 183
swimming fish, 176
terrariums, 262
visit to a nursery, 300
Where do seeds come from?,

structure and properties of matter
(absorbing colors, 209
absorbing water, 206
all kinds of rocks, 117
balance, 121
bubble makers, 220
bubbles raising raisins, 149
building with blocks, 131
color designs, 228
color walk, 14
How are seeds alike?, 252
keeping warm: coats, 90
magnet contest: which magnet
is stronger?, 111
magnetic force through
objects, 104
magnetic mazes, 107
magnetic scavenger hunt, 101
making oobleck, 234
mixing colors, 225
my favorite rock, 114
nature bracelets, 285
popping up some change, 268
sand sculptures, 222
scavenger hunt, 25
seeds as food, 271
seed wreath, 274
shape walk, 18
smelling flowers, 34
smelly cans, 31
snappy, 236
snail walk, 38
snow on the go, 86
snow tracks and traces, 84
soaking things, 217
sound: shake, rattle, and roll, 38
sound walk, 41
tasting, 28
taste collage, 49
towers, 128
visit to a nursery, 300
water drops, 213
water drops as art, 231
What's magnetic?, 98
Will it roll?, 135

T

taste, xxvi
tasting
extending the activity, 28
family science connection, 29

NATIONAL SCIENCE TEACHERS ASSOCIATION

Copyright © 2019 NSTA. All rights reserved. For more information, go to www.nsta.org/permissions.
TO PURCHASE THIS BOOK, please visit www.nsta.org/store/product_detail.aspx?id=10.2505/9781681681406398
INDEX

HSELOF indicators, 28
NGSS connections, 28
procedure, 27
science practices and skills, 27
what to look for, 29
teaching aids, xxxi–xxxii
terrariums
  extending the activity, 262
  HSELOF indicators, 262
  NGSS connections, 262
  procedure, 261–262
  science practices and skills, 261
  what to look for, 263
texture boards, xxxii
touch, xxvi.
  See also
  matching by touch
touch collage
  extending the activity, 49
  family science connection, 50
  HSELOF indicators, 49
  NGSS connections, 49
  procedure, 48
  science practices and skills, 48
  what to look for, 50
towers
  extending the activity, 127
  family science connection, 129
  HSELOF indicators, 128
  NGSS connections, 128
  procedure, 126–127
  science practices and skills, 126
  what to look for, 128
tree, adopting a
  extending the activity, 296
  family science connection, 298
  HSELOF indicators, 297
  NGSS connections, 296
  procedure, 295
  science practices and skills, 295
  what to look for, 297
trees and leaves, 284

U
  understands the relationship between numbers and quantities (HSELOF)
    animal walk, 293
    balance, 121
    feeding the birds, 193
    magnet contest: which magnet is stronger?, 111
    roly-poles, 157
    seeds in our food, 242
universe and its stars (NGSS)
  my shadow, 72
  shadows on my playground, 75
Using Mathematics and Computational Thinking (NGSS)
  all kinds of rocks, 117
  animal walk, 293
  balance, 121
  feeding the birds, 192
  magnet contest: which magnet is stronger?, 111
  my favorite rock, 114
  pondering pumpkins: the outsides, 277
  ramps, 138
  scavenger hunt, 25
  sorting seeds, 248
  tasting, 28
  towers, 128
  using tools (foundation skill)
    absorbing water, 205
    all kinds of rocks, 116
    balance, 119
    bubbles raising raisins, 147
    jumping crickets, 170
    looking at me, 6
    magnifiers, 3
    making oobleck, 233
    mealworms, 159
    observing earthworms, 162
    ramps, 137
    roly-poles, 155
    sand sculptures, 222
    snails, 166
    swimming fish, 174
    terrariums, 261
    towers, 126
    water drops, 213
    water drops as art, 231

V
  vibrations
    extending the activity, 43–44
    family science connection, 45
    HSELOF indicators, 44
    NGSS connections, 44
    procedures, 43
    science practices and skills, 43
    what to look for, 45

W
  wait time, for questions, xvi
warm, keeping: coats
  extending the activity, 91
  family science connection, 92
  HSELOF indicators, 92
  NGSS connections, 92
  procedure, 90–91
  science practices and skills, 90
  what to look for, 92
water, 197
water, absorbing
  extending the activity, 206
  family science connection, 207
  HSELOF indicators, 206
  NGSS connections, 206
  procedure, 205
  science practices and skills, 205
  what to look for, 207
water drops
  extending the activity, 214
  HSELOF indicators, 214
  NGSS connections, 214
  procedure, 213
  science practices and skills, 213
  what to look for, 215
water drops as art
  extending the activity, 231–232
  HSELOF indicators, 232
  NGSS connections, 232
  procedure, 231
  science practices and skills, 231
  what to look for, 232
water mixtures
  extending the activity, 210–211
  family science connection, 212
  HSELOF indicators, 211
  NGSS connections, 211
  procedure, 210
  science practices and skills, 210
  what to look for, 212
water painting
  extending the activity, 202–203
  HSELOF indicators, 203
  NGSS connections, 203
  procedure, 202
  science practices and skills, 202
  what to look for, 204
wave properties
  noise makers, 47
  vibrations, 44
weather, 55–56
weather (What is the weather like today?), 80
  extending the activity, 80–81
family science connection, 82
HSELOF indicators, 81
NGSS connections, 81
procedure, 80
science practices and skills, 80
what to look for, 82
weather and climate (NGSS)
air that moves, 66
What is the weather like today?, 81
Where did the shadows go?, 78
windy day, 62
weeds, observing. See observing weeds
wheels, 96
wind walk
extending the activity, 58
family science connection, 59
HSELOF indicators, 59
NGSS connections, 59
procedure, 57
science practices and skills, 57
what to look for, 59
windy day
extending the activity, 61–62
family science connection, 63
HSELOF indicators, 62
NGSS connections, 62
procedure, 61
science practices and skills, 61
what to look for, 63
winter, 56
This thoroughly updated resource is bursting with useful features early childhood educators will love, including learning frameworks, connections, standards, and assessments. But the best part is how stimulating the book can be for young scientists. It builds on children’s innate curiosity through 89 developmentally appropriate, teacher-tested activities in life, Earth, and physical science.

Specifically written to engage children in preK through grade 2, *A Head Start on Science, Second Edition* is

- **Full of fun.** Whether they’re making magnetic mazes or creating sand sculptures, children will love exploring the senses, weather, animals, water and water mixtures, seeds, and nature. Rather than focusing their attention on science facts, the goal is for children to make discoveries on their own.

- **Versatile.** The activities are suitable for preschools, elementary schools, informal science settings, and home schools. Children as young as 3 can observe and explore new and familiar materials. PreK–2 students will enjoy the challenges of investigating, organizing information, and trying out new ways to communicate results.

- **Convenient for teachers.** The book’s introduction is like a short course in how to do science well with children. Each activity provides a follow-up activity, center connection, and literature connection to extend the science learning and link it to other parts of children’s school days. So that both the fun and the learning can continue at home, each activity also provides a family page, written in English and Spanish.

- **Designed to support relevant standards.** Each activity also links to both the 2015 Head Start Early Learning Outcomes Framework and the *Next Generation Science Standards*.

In short, *A Head Start on Science, Second Edition* is a teacher-friendly guide for doing science well with young children. As the editors write, “We hope your ‘sense of wonder’ will be heightened as you interact with children, watching as their curiosity leads them to explore and find answers to their own questions about all that they experience about the natural world.”