

Philosophy

Almost anyone who has spent time with children is struck by the tremendous energy they expend exploring their world. They ask “why” and “how.” They want to see and touch. They use their minds and senses to explore the things they encounter and wonder about. In other words, children are already equipped with the basic qualities that make a good scientist.

The goal of the Science Companion curriculum is to respond to and nourish children’s scientific dispositions by actively engaging their interests and enhancing their powers of inquiry, observation, and reflection. Learning by doing is central to this program.

Each Science Companion lesson incorporates interesting and relevant scientific content, as well as science values, attitudes, and skills that children in the elementary grades should begin to develop. These “habits of mind,” along with science content knowledge, are crucial for building science literacy and they are an integral part of the Science Companion program. Be aware of them and reinforce them as you work with children. With experience, children will develop the ways they demonstrate and use the following scientific habits of mind.

Habits of Mind

Wondering and thinking about the natural and physical world

Children’s curiosity is valued, respected, and nurtured. Their questions and theories about the world around them are important in setting direction and pace for the curriculum. Children are encouraged to revise and refine their questions and ideas as they gain additional information through a variety of sources and experiences.

Seeking answers through exploration and investigation

Children actively seek information and answers to their questions by trying things out and making observations. Children continually revise their understanding based on their experiences. Through these investigations, they learn firsthand about the “scientific method.” They also see that taking risks and making mistakes are an important part of science and of learning in general.

Pursuing ideas in depth

Children have the opportunity to pursue ideas and topics fully, revisiting them and making connections to other subjects and other areas in their lives.

Observing carefully

Children are encouraged to attend to details. They are taught to observe with multiple senses and from a variety of perspectives. They use tools, such as magnifying lenses, balance scales, rulers, and clocks, to enhance their observations. Children use their developing mathematics and literacy skills to describe, communicate, and record their observations in age-appropriate ways.

Communicating clearly

Children are asked to describe their observations and articulate their thinking and ideas using a variety of communication tools, including speaking, writing, and drawing. They learn that record keeping is a valuable form of communication for oneself and others. Children experience that working carefully improves one's ability to use one's work as a tool for communication.

Collaborating and sharing

Children come to know that their ideas, questions, observations, and work have value. At the same time, they learn that listening is vitally important, and that exchanging ideas with one another builds knowledge and enhances understanding. Children discover that they can gain more knowledge as a group than as individuals, and that detailed observations and good ideas emerge from collaboration.

Developing critical response skills

Children ask, "How do you know?" when appropriate, and are encouraged to attempt to answer when this question is asked of them. This habit helps develop the critical response skills needed by every scientist.

Finding What You Need in Science Companion

The following table will help you find the information you need to implement this Science Companion unit.

Go To:	When You Need:
Teacher Lesson Manual	
Suggested Full-Year Schedule	Suggestions for scheduling lessons from multiple units over the course of the school year. Information about which lessons are “core” and which lessons can be taught in conjunction with another subject area.
Welcome to Science Companion	An overview of the philosophy of the Science Companion curriculum and a list of the “habits of mind” that are integral to the program.
Cross-Curricular Integration and Flexible Scheduling	Guidelines for integrating science with other subject areas and tips for making time to teach science.
Differentiating Instruction for Diverse Learners	Strategies for individualizing instruction for diverse learners.
Introduction to the Unit	An explanation of how the lessons in the unit are organized.
Unit Summary	An overview of each lesson cluster in the unit, including information about science content, Science Center suggestions, Further Science Explorations, Cross-curricular extensions, and Family Links.
Lessons at a Glance	A compilation of the Big Ideas and lesson overviews for the unit. Also includes some suggestions for flexible scheduling.
Assessment	An overview of the assessment philosophy, strategies, and tools for the unit.
Science Center	Ideas for setting up and maintaining a Science Center for the unit.
Science Library and Web Links	Recommended resources for the unit, with descriptions and bibliographic information, and recommended web sites.
Before You Begin Teaching	A list of important steps to do to prepare for teaching the unit.
Teacher Background Information	A short course on the science content covered in the unit. Explains the essential concepts in the lessons and offers additional information to help you answer children’s questions and cover topics in more depth.
Standards and Benchmarks	Information about how each lesson aligns with the <i>National Science Education Standards</i> and the <i>Benchmarks for Science Literacy</i> .
Materials	A list of the classroom supplies needed for the lessons as well as information about the ExploraGear materials.
Teacher Glossary	Definitions for many terms that relate to the science content in the unit. Definitions in the teacher glossary are often more advanced than the student definitions provided in the Vocabulary section of the lessons.

Go To:	When You Need:
Teacher Master Packet	Reproducible teacher masters, to be used for one or more of the following: <ul style="list-style-type: none"> • Lesson activities • Family Links or other sheets to send home • Science Center activities, optional activities, and extensions • Displays • Assessments
Visuals and Books Package	Posters, overhead transparencies, books, and other items that support instruction. These items are listed in the “Curriculum Items” section of each lesson’s materials list, along with the science notebook pages and teacher masters for the lesson.
ExploraGear®	Materials listed in the “ExploraGear” section of each lesson’s materials list.
Lesson 0 and “I Wonder” Circle®	
Lesson 0: Doing Science	An introductory lesson appropriate for all grade levels. Lesson 0 helps children recognize their own scientific thinking and serves as an introduction to the Science Companion curriculum, the “I Wonder” circle, and the general topic of science and scientists.
“I Wonder” Circle Poster	A visual representation of many facets of scientific inquiry, exploration, and discovery.
Teacher Reference Materials (www.sciencecompanion.com/TRM)	
Article 1: Welcome to the Science Companion Curriculum	An introduction to the Science Companion materials, including scope and sequence and recommendations for using the <i>Teacher Reference Materials</i> .
Article 2: Setting Up a Science-Friendly Environment	Ideas for setting up your classroom to promote a science-friendly atmosphere.
Article 3: Developing the Child Scientist	Information about presenting scientific processes and skills, discussing science with children, and helping all children be successful in science.
Article 4: Planning a Unit	Suggestions for planning a Science Companion unit.
Article 5: Planning a Lesson	An introduction to the components of a Science Companion lesson and the importance of student science notebooks.
Article 6: Assessing a Child’s Science Abilities	Assessment philosophy and tips for assessing children.
Our Web Site www.sciencecompanion.com	A wide range of helpful information, including printer-friendly book lists, downloadable parent letters, and lists of active links to web sites.

Cross-Curricular Integration and Flexible Scheduling

Integrating Science with Other Subject Areas

The Science Companion program directly supports children's acquisition and development of literacy and mathematics skills by suggesting meaningful ways to integrate science with other subject areas. For example:

- By writing in their science notebooks, children gain writing practice within the context of their science studies, and can do this work during writing or journaling time.
- Most units include one or more excellent, grade-appropriate nonfiction books. Many units feature a “read-aloud” lesson, which is built around a nonfiction book. Each unit also offers an extensive bibliography.
- Mathematics skills—such as counting, measuring, comparing, sorting, classifying, and collecting and analyzing data—are integrated in the lesson activities and extensions, giving children opportunities for practice and real world application of these skills.
- Each lesson features introductory and reflective discussions that emphasize communication and critical-thinking skills.

By integrating science with mathematics, reading, writing, and other subject areas, you will have more time to devote to science, and children's work in other subject areas will be enhanced. Using science as a context for practicing and applying emergent skills in other curricular areas is particularly effective because hands-on science is interesting, appealing, and highly motivating for children—even many children who may otherwise have difficulties in these areas or be reluctant to engage in other activities.

Fitting It All In

Science Companion incorporates several features to help you find or make time for inquiry-based, hands-on science instruction. These include:

- “Flexible scheduling” suggestions for teaching part or all of particular lessons in conjunction with another subject area when the skills and learning goals overlap. These suggestions are indicated in the Key Notes section at the beginning of

each lesson. Some flexible scheduling suggestions are also summarized on the Suggested Full-Year Schedule and in the Lessons at a Glance.

- “Connections” notes that highlight opportunities to use parts of particular lessons to introduce or reinforce concepts or skills from other subject areas. These notes are typically included in margin notes in the lessons.
- Recommendations for extending the lesson into other subject areas, such as language arts or mathematics. These ideas are included in the Extending the Lesson section near the end of each lesson. They are also summarized in the Unit Summary table.
- Indications of “core” lessons. Teachers with limited time for science instruction or first time Science Companion teachers may choose to teach only the core lessons. If necessary, you can also select the lessons and extensions you teach in a unit according to your needs and preferences and those of your school, district, or state. Core lessons are highlighted with an asterisk next to the lesson title in Lessons at a Glance, the Suggested Full-Year Schedule and the Table of Contents.

Tailoring the Lessons

Feel free to tailor and implement lessons in a way that matches your teaching style and schedule. For example, if you teach science primarily through learning centers, most Science Companion lessons can be easily modified to suit this approach.

Similarly, most lessons can be divided and taught over the course of two or more shorter sessions. All Science Companion lessons consist of three major sections:

- Engage—Introduces the lesson
- Exploration—One or more hands-on activities
- Reflect and Discuss—Promotes sharing and synthesizing

It often works well to teach the Engage and Explore sections of a lesson on one day and to conduct the Reflective Discussion on a subsequent day. In some cases, the Engage section can be done on the first day, with the Exploration and follow-up discussion on the next day. You know what will work best for your situation.

Using the Suggested Full-Year Schedule

Keep in mind that the Suggested Full-Year Schedule on the inside front cover is just a *suggestion*. There are many other approaches to organizing the lessons over the course of the year. Be flexible and innovative to find one that works well for you and your class.

Differentiating Instruction for Diverse Learners

Designed to Reach All Learners

The hands-on, inquiry-based approach of the Science Companion curriculum effectively addresses the needs of a diverse range of learners.

Science Companion lessons involve children *doing* science through hands-on activities. In addition to being more engaging and authentic than textbook-based, “read-about” science programs, this active, multi-sensory approach is more accessible for children with a range of learning profiles. Children who are struggling or emergent readers, who are not proficient in English, or who have other learning challenges can thrive when science skills and concepts are introduced and explored through multiple avenues that are not limited to just reading. Many of the explorations in Science Companion lessons can also be carried out with different levels of complexity, depending on the child or the class.

Since Science Companion lessons are inquiry-based, they build from children’s existing ideas about and understanding of the topics that are being studied. Most lessons include open-ended discussion questions and science notebook prompts that invite children to respond at their own level of skill and understanding. This also allows you to gauge children’s knowledge and tailor subsequent instruction and support to the individual needs of your students.

Other Features That Support Individualization

As described above, the overall approach of the Science Companion curriculum makes it accessible and appropriate for a wide range of learners. Science Companion lessons also include the following features that can help you further individualize instruction.

- **Science Center** suggestions that expand upon the ideas in the lessons and invite all children to explore at their own pace. Children can also repeat activities from the lessons or do additional observation or experimentation in the Science Center to practice a skill or solidify their understanding of a concept.

Although Science Companion lessons do not depend on language and literacy skills to convey content, they do offer multiple opportunities for integrating science instruction with instruction in literacy (and other areas) to help children develop these skills in the context of science. See “Cross-Curricular Integration and Flexible Scheduling” on pages 10-11 for more information.

Science Center suggestions are included in the “Ongoing Learning” section of each lesson and summarized for the unit on pages 16-17 and 30-34.

- **Management Notes** and **Teacher Notes** that indicate parts of the lessons where some children may experience difficulty and often include suggestions for addressing the problem. These notes also occasionally highlight places where some children might take the exploration a bit further.
- **Further Science Explorations** that relate to the science content in the lessons, including both reinforcement and enrichment activities. These explorations can be used with the whole class, small groups of children, or individuals.
- **Cross-curricular Extensions** and **Connections** that suggest ways to extend a topic or integrate it with other subject areas. Depending on the activity, they can serve as reinforcement or enrichment and can be done with the whole class, small groups, or individuals. See “Cross-Curricular Integration and Flexible Scheduling” on pages 10-11 for more information about extensions and connections.
- **Skill Building Activities** that introduce and provide practice with specific science skills and processes, such as observing and describing, using a magnifying lens, and measuring length and circumference. Skill building activities can be taught to an entire class prior to a lesson which requires a particular skill. They can also be repeated to provide additional practice for children who would benefit from it. Skill building activities from other grade levels and units can also be a useful tool for differentiating instruction.

Management Notes and Teacher Notes are interspersed throughout the lessons.

Further Science Explorations are located in the “Extending the Lesson” section of each lesson. They are also summarized in the Unit Summary table on pages 16-17.

Cross-curricular extensions are located in the “Extending the Lesson” section of each lesson and are summarized in the Unit Summary table on pages 16-17. Cross-curricular connections are located in margin notes throughout the lessons.

Skill Building Activities for each unit are located at the end of that unit.