Teacher Reference Materials

Article 5

Planning a Science Companion Lesson

ScienceCompanion® CHICAGO SCIENCE GROUP

Once you are familiar with the unit you plan to teach and have read the Teacher Background Information, you're ready to prepare the details of the lessons. The information in this article explains the components of a lesson, describes the children's science notebooks, and gives ideas for customizing and enhancing them.

Consider these points as you plan a lesson:

- Read the Quick Look page, the Materials list, and the Preparation section of the lesson at least a day or two before you plan to teach the lesson. In addition to noting important scheduling and preparation considerations, your initial review should focus on the big idea and the lesson goals.
- Prepare lesson specifics. These may include gathering classroom supplies, setting out ExploraGear items, sending home reminder notes, making notes in your plan book, and firming up arrangements with volunteers.
- Scan through the other lessons within the same lesson cluster. Make notes of the shared details within the cluster and plan accordingly. For example, lessons within the same cluster may have the same big ideas or use some of the same materials.
- Carefully reread the lesson you'll teach as close as possible to the day you'll be teaching it.

You'll Find Inside:

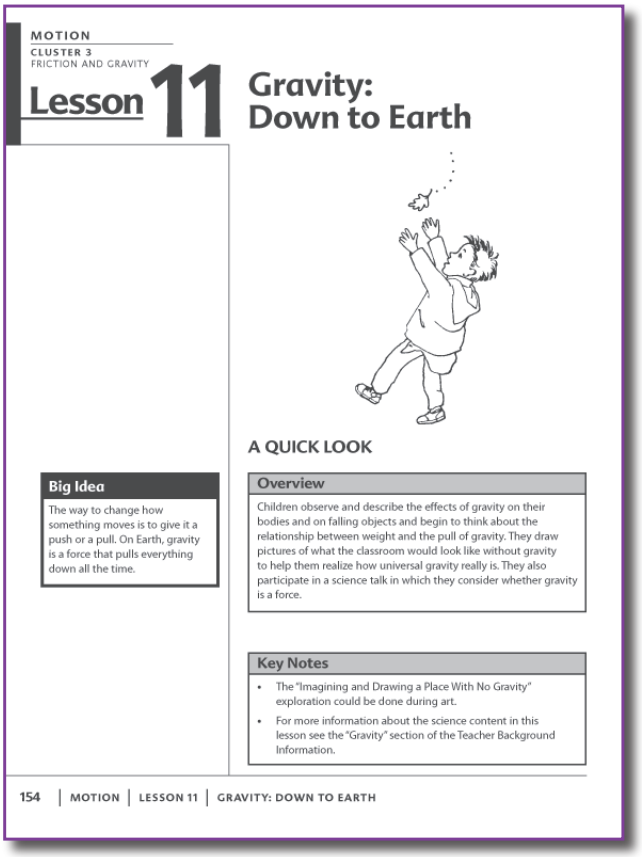
Understanding the Components of a Lesson

Every Science Companion lesson has the same basic components. Once you become familiar with the lesson structure, you will be able to find the information you need quickly and easily, and you will be comfortable using the teacher lesson manual to help you plan, organize, and tailor your science instruction to fit your situation. Use the following information to familiarize yourself with the components and structure of the Science Companion lessons.

Planning the Lesson

The first part of every lesson includes information you'll need for initial planning. The **Quick Look** section, which spans the first two pages of each lesson, consists of the following components:

- **Overview**—A brief description of what the children will do during the lesson.
- **Big Idea**—The important idea to focus and reflect on throughout the lesson.
- **Key Notes**—A list of scheduling considerations and suggestions, important advance preparation steps, links to Skill Building Activities and the Teacher Background Information, and other helpful information to have "at a glance" before teaching the lesson.
- **Standards and Benchmarks**—Information about how the lesson aligns with the *National Science Education Standards* and *Project 2061 Benchmarks for Science Literacy.*
- **Lesson Goals**—What the children should know or be able to do as a result of the lesson.
- **Assessment**—Suggestions for assessing the concepts and skills emphasized in the lesson, including notes about assessment tools, techniques, and opportunities.



MOTION
CLUSTER 3
FRICTION AND GRAVITY

Lesson 11 Gravity: Down to Earth

A QUICK LOOK

Big Idea
The way to change how something moves is to give it a push or a pull. On Earth, gravity is a force that pulls everything down all the time.

Overview
Children observe and describe the effects of gravity on their bodies and on falling objects and begin to think about the relationship between weight and the pull of gravity. They draw pictures of what the classroom would look like without gravity to help them realize how universal gravity really is. They also participate in a science talk in which they consider whether gravity is a force.

Key Notes
- The "Imagining and Drawing a Place With No Gravity" exploration could be done during art.
- For more information about the science content in this lesson see the "Gravity" section of the Teacher Background Information.

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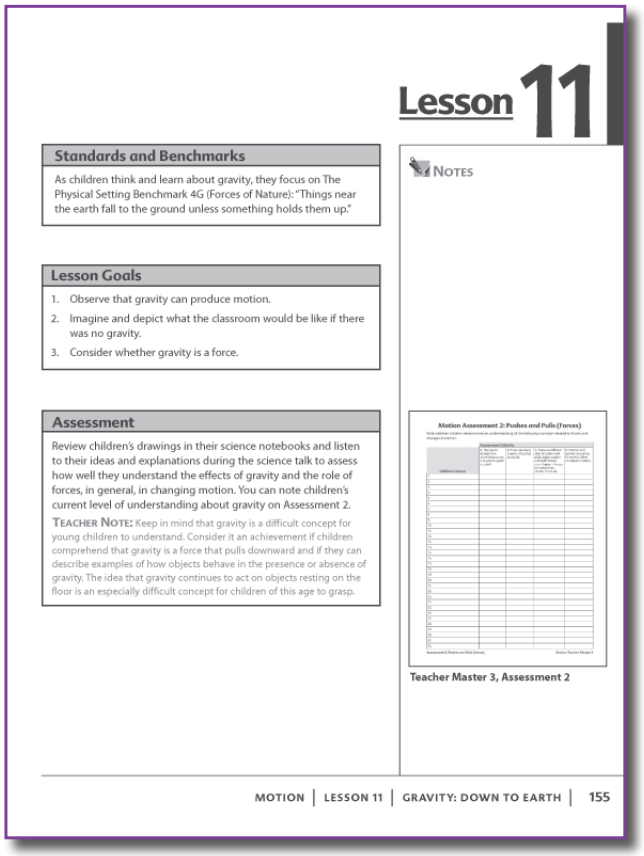

Lesson 11

Standards and Benchmarks
As children think and learn about gravity, they focus on The Physical Setting Benchmark 4G (Forces of Nature): "Things near the earth fall to the ground unless something holds them up."

Lesson Goals
1. Observe that gravity can produce motion.
2. Imagine and depict what the classroom would be like if there was no gravity.
3. Consider whether gravity is a force.

Assessment
Review children's drawings in their science notebooks and listen to their ideas and explanations during the science talk to assess how well they understand the effects of gravity and the role of forces, in general, in changing motion. You can note children's current level of understanding about gravity on Assessment 2.

TEACHER NOTE: Keep in mind that gravity is a difficult concept for young children to understand. Consider it an achievement if children comprehend that gravity is a force that pulls downward and if they can describe examples of how objects behave in the presence or absence of gravity. The idea that gravity continues to act on objects resting on the floor is an especially difficult concept for children of this age to grasp.

NOTES

Teacher Master 3, Assessment 2

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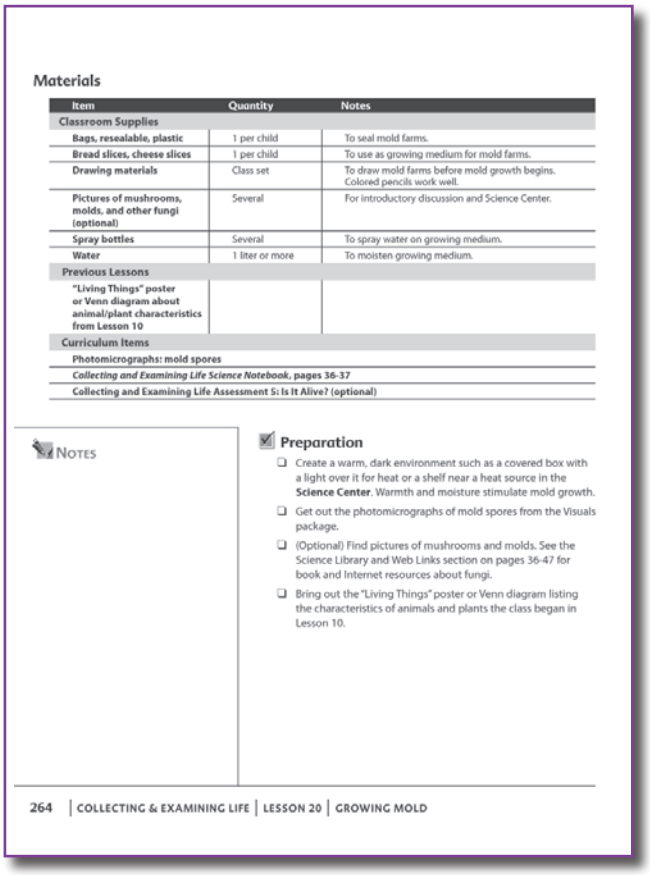
Understanding the Components of a Lesson

There is a **Materials** table after the Quick Look pages. This table lists all of the materials that are needed for the lesson, including ExploraGear, Classroom Supplies, and Curriculum Items, such as science notebook pages, teacher masters, or overhead transparencies.

The **Preparation** section follows the Materials table. It lists the steps you need to do to get ready to teach the lesson. (Preparation steps that require more advance notice are often included in the Key Notes. They are also listed in the Planning Ahead section of a previous lesson.)

The **Vocabulary** section lists important terms used in the lesson and defines them in child-friendly language.



Materials

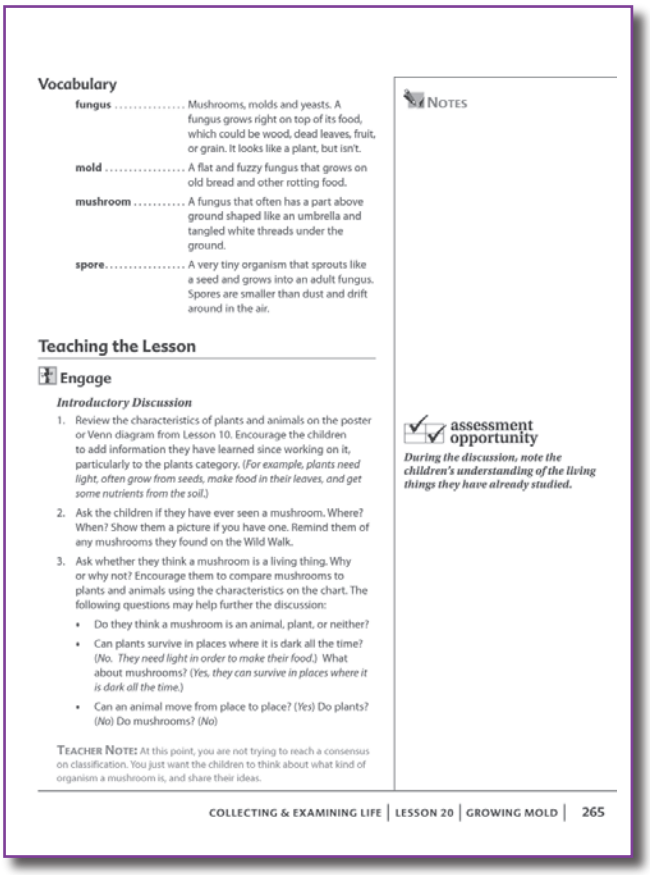
Item	Quantity	Notes
Classroom Supplies		
Bags, resealable, plastic	1 per child	To seal mold farms.
Bread slices, cheese slices	1 per child	To use as growing medium for mold farms.
Drawing materials	Class set	To draw mold farms before mold growth begins. Colored pencils work well.
Pictures of mushrooms, molds, and other fungi (optional)	Several	For introductory discussion and Science Center.
Spray bottles	Several	To spray water on growing medium.
Water	1 liter or more	To moisten growing medium.
Previous Lessons		
"Living Things" poster or Venn diagram about animal/plant characteristics from Lesson 10		
Curriculum Items		
Photomicrographs: mold spores		
Collecting and Examining Life Science Notebook, pages 36-37		
Collecting and Examining Life Assessment 5: Is It Alive? (optional)		

NOTES

Preparation

- ❑ Create a warm, dark environment such as a covered box with a light over it for heat or a shelf near a heat source in the **Science Center**. Warmth and moisture stimulate mold growth.
- ❑ Get out the photomicrographs of mold spores from the Visuals package.
- ❑ (Optional) Find pictures of mushrooms and molds. See the Science Library and Web Links section on pages 36-47 for book and Internet resources about fungi.
- ❑ Bring out the "Living Things" poster or Venn diagram listing the characteristics of animals and plants the class began in Lesson 10.

264 | COLLECTING & EXAMINING LIFE | LESSON 20 | GROWING MOLD



Vocabulary

fungus ..... Mushrooms, molds and yeasts. A fungus grows right on top of its food, which could be wood, dead leaves, fruit, or grain. It looks like a plant, but isn't.

mold ..... A flat and fuzzy fungus that grows on old bread and other rotting food.

mushroom ..... A fungus that often has a part above ground shaped like an umbrella and tangled white threads under the ground.

spore ..... A very tiny organism that sprouts like a seed and grows into an adult fungus. Spores are smaller than dust and drift around in the air.

Teaching the Lesson

Engage

Introductory Discussion

1. Review the characteristics of plants and animals on the poster or Venn diagram from Lesson 10. Encourage the children to add information they have learned since working on it, particularly to the plants category. (*For example, plants need light, often grow from seeds, make food in their leaves, and get some nutrients from the soil.*)
2. Ask the children if they have ever seen a mushroom. Where? When? Show them a picture if you have one. Remind them of any mushrooms they found on the Wild Walk.
3. Ask whether they think a mushroom is a living thing. Why or why not? Encourage them to compare mushrooms to plants and animals using the characteristics on the chart. The following questions may help further the discussion:
   - Do they think a mushroom is an animal, plant, or neither?
   - Can plants survive in places where it is dark all the time? (*No. They need light in order to make their food.*) What about mushrooms? (*Yes, they can survive in places where it is dark all the time.*)
   - Can an animal move from place to place? (*Yes*) Do plants? (*No*) Do mushrooms? (*No*)

TEACHER NOTE: At this point, you are not trying to reach a consensus on classification. You just want the children to think about what kind of organism a mushroom is, and share their ideas.

NOTES

assessment opportunity

During the discussion, note the children's understanding of the living things they have already studied.

COLLECTING & EXAMINING LIFE | LESSON 20 | GROWING MOLD | 265

Understanding the Components of a Lesson

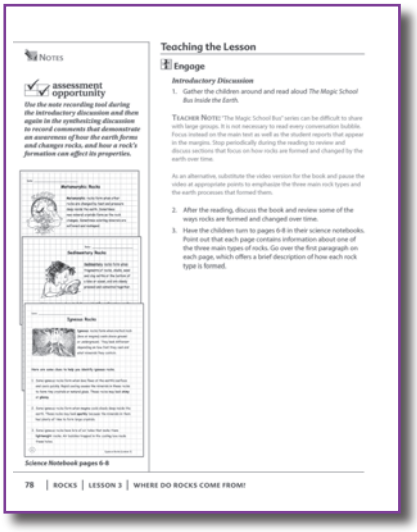
Teaching the Lesson

The core of every Science Companion lesson is the **Teaching the Lesson** section, which outlines what the children do during the lesson. This section is always organized into three parts: Engage, Explore, and Reflect and Discuss.

The **Engage** section introduces the lesson. It typically consists of at least one of the following: an introductory discussion or a science talk, a sensory observation, a demonstration, or a modeling of the exploration. The Engage activity aims to pique children's interests, to assess their prior knowledge, to provide background information, to make connections to previous lessons, and to introduce the exploration.

The **Explore** section usually consists of a hands-on activity that children do individually or in small groups. Directions for the exploration are specified in detail in this section of the lesson. Children often write in their science notebooks to record their ideas, observations, or data from the exploration.

The **Reflect and Discuss** section suggests prompts and questions to facilitate a culminating discussion about the lesson activities. During this discussion, children have opportunities to share their thoughts, observations, and questions; to synthesize their learning and make connections to other lessons; and to reflect on the big idea of the lesson.

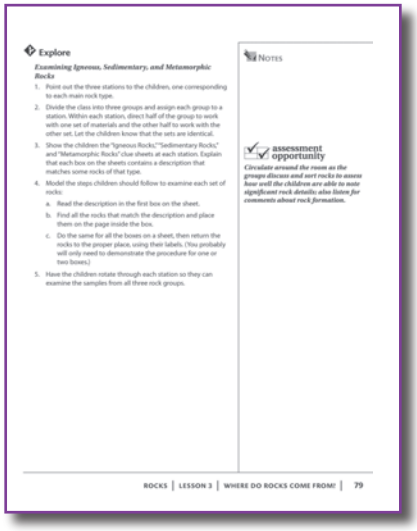

Teaching the Lesson

Engage

Introductory Discussion

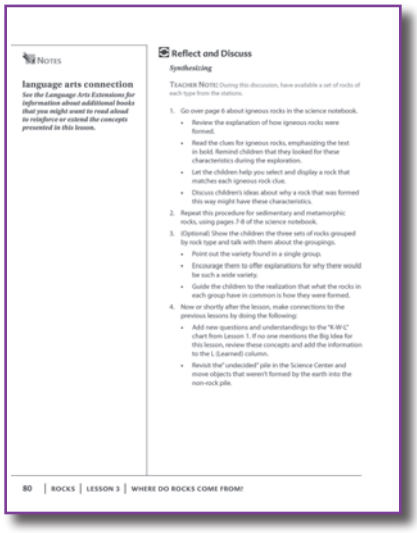
Science Notebook pages 6-8

78 | ROCKS | LESSON 3 | WHERE DO ROCKS COME FROM?


Explore

Examining Igneous, Sedimentary, and Metamorphic Rocks

ROCKS | LESSON 3 | WHERE DO ROCKS COME FROM? | 79


Reflect and Discuss

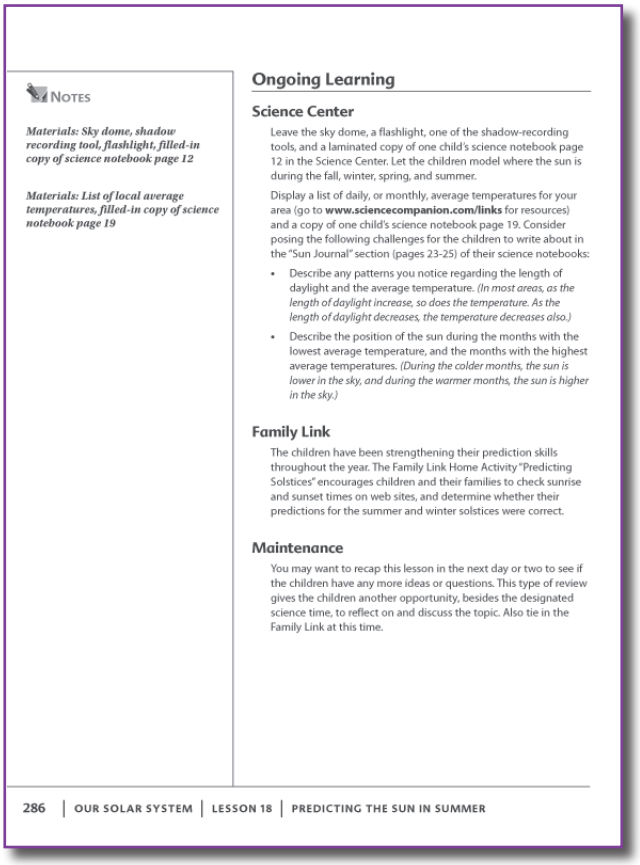
Synthesizing

80 | ROCKS | LESSON 3 | WHERE DO ROCKS COME FROM?

Continuing and Extending the Lesson

The **Ongoing Learning** section of each lesson suggests ways to reinforce the content of the lesson using **Family Links**, when applicable, and your classroom **Science Center**. If the lesson requires ongoing maintenance, such as taking measurements or repeating an observation at various points, this information is also detailed in the **Maintenance** portion of the Ongoing Learning section.

Suggestions for extension activities in math, language arts, and other curricular areas are included in the **Extending the Lesson** section. This section also includes **Further Science Explorations** related to the skills, concepts, and big idea of the lesson. Some Further Science Explorations offer opportunities to reinforce the concepts presented in the lesson; others extend these concepts and are useful enrichment activities for the whole class or a subset of children.



NOTES

Materials: Sky dome, shadow recording tool, flashlight, filled-in copy of science notebook page 12

Materials: List of local average temperatures, filled-in copy of science notebook page 19

Ongoing Learning

Science Center

Leave the sky dome, a flashlight, one of the shadow-recording tools, and a laminated copy of one child's science notebook page 12 in the Science Center. Let the children model where the sun is during the fall, winter, spring, and summer.

Display a list of daily, or monthly, average temperatures for your area (go to **www.sciencecompanion.com/links** for resources) and a copy of one child's science notebook page 19. Consider posing the following challenges for the children to write about in the "Sun Journal" section (pages 23-25) of their science notebooks:

- Describe any patterns you notice regarding the length of daylight and the average temperature. *(In most areas, as the length of daylight increase, so does the temperature. As the length of daylight decreases, the temperature decreases also.)*
- Describe the position of the sun during the months with the lowest average temperature, and the months with the highest average temperatures. *(During the colder months, the sun is lower in the sky, and during the warmer months, the sun is higher in the sky.)*

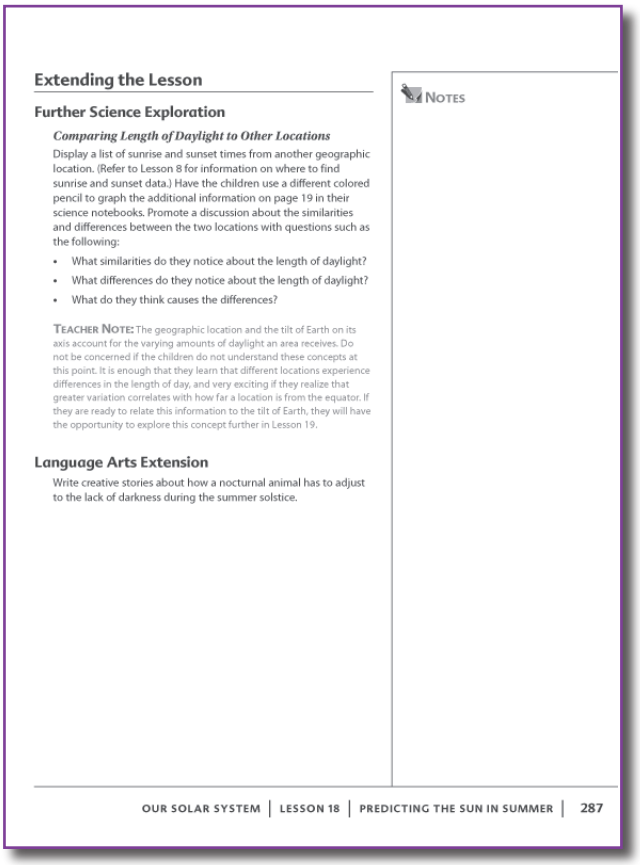
Family Link

The children have been strengthening their prediction skills throughout the year. The Family Link Home Activity "Predicting Solstices" encourages children and their families to check sunrise and sunset times on web sites, and determine whether their predictions for the summer and winter solstices were correct.

Maintenance

You may want to recap this lesson in the next day or two to see if the children have any more ideas or questions. This type of review gives the children another opportunity, besides the designated science time, to reflect on and discuss the topic. Also tie in the Family Link at this time.

286 | OUR SOLAR SYSTEM | LESSON 18 | PREDICTING THE SUN IN SUMMER



Extending the Lesson

Further Science Exploration

Comparing Length of Daylight to Other Locations

Display a list of sunrise and sunset times from another geographic location. (Refer to Lesson 8 for information on where to find sunrise and sunset data.) Have the children use a different colored pencil to graph the additional information on page 19 in their science notebooks. Promote a discussion about the similarities and differences between the two locations with questions such as the following:

- What similarities do they notice about the length of daylight?
- What differences do they notice about the length of daylight?
- What do they think causes the differences?

TEACHER NOTE: The geographic location and the tilt of Earth on its axis account for the varying amounts of daylight an area receives. Do not be concerned if the children do not understand these concepts at this point. It is enough that they learn that different locations experience differences in the length of day, and very exciting if they realize that greater variation correlates with how far a location is from the equator. If they are ready to relate this information to the tilt of Earth, they will have the opportunity to explore this concept further in Lesson 19.

Language Arts Extension

Write creative stories about how a nocturnal animal has to adjust to the lack of darkness during the summer solstice.

NOTES

OUR SOLAR SYSTEM | LESSON 18 | PREDICTING THE SUN IN SUMMER | 287

Understanding the Components of a Lesson

Other Helpful Features

Science Companion lessons include many features designed to facilitate implementation, such as those described below:

Connections

Connections notes highlight opportunities to use parts of the lesson to introduce or reinforce concepts or skills from other subject areas. An example of a mathematics connection appears to the right:

mathematics connection

As they measure, encourage children to approximate partial centimeters, when appropriate.

Management Notes

Management Notes suggest methods to handle children and materials in the most effective way for a given situation.

MANAGEMENT NOTE: To save time during the lesson, you can skip step 7 and have children tape their family link sheets into their science notebooks at another time.

Teacher Notes

These notes give helpful information related to the activities in the lesson.

TEACHER NOTE: The pictures allow the children to see a range of fossil shapes and sizes, including examples of large, well-formed fossils.

Safety Notes

These notes alert you to materials that require special handling or situations that demand special attention in order to keep adults and children safe.

SAFETY NOTE: Make sure all participants wash their hands thoroughly after each investigation.

Assessment Opportunities

These highlight opportune moments for assessing the children's understanding or skills during the course of a lesson.

assessment opportunity

Take notes during this discussion to record a baseline for children's understanding of plants' characteristics. See the assessment section for more details.

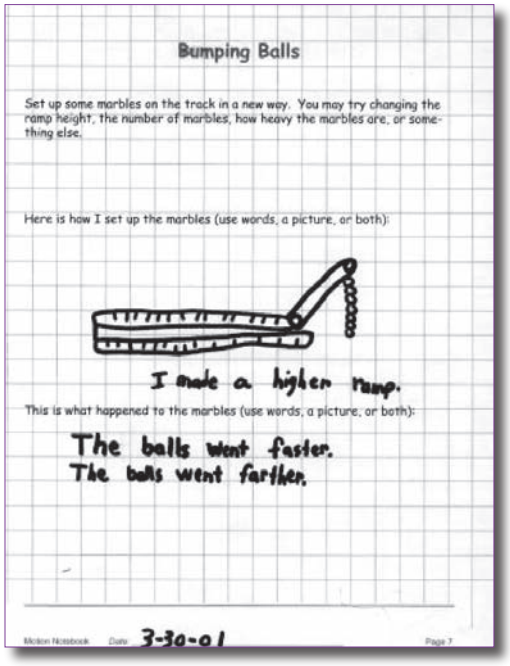
Using the Science Notebooks

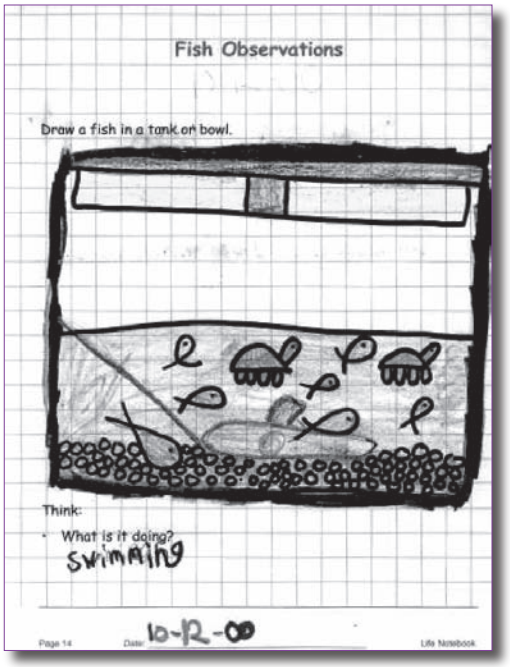
Most scientists keep ongoing records of their methods, thoughts, and observations. In each Science Companion unit, children work as scientists and keep a cumulative notebook to record their thoughts and observations about the activities in the unit. Each science notebook is designed to encourage children to make records using words and drawings in age-appropriate ways.

The science notebook is an excellent place to track the children's observations, data and record keeping, graphing, and their use of words and drawings to convey information. It provides examples of the children's work over time, so you can evaluate progress. The science notebook also allows you to gain insight into children's ideas, strengths, difficulties, and preferences.

Children should feel a sense of ownership over their science notebooks. They should be free to revisit and make changes to earlier pages, and to tape in additional pages. Science notebooks increase children's responsibility and provide material they can use for self-reflection. When you review science notebooks with children, remember to focus first on something positive in their work. The way you pose questions for further research or observation often indicates acceptance or disapproval, so think carefully about ways to encourage further investigation and interest and to help children feel proud of their science notebooks.

The Science Companion science notebook pages are printed on a centimeter grid, which offers lines to write on or over and provides a ready measurement tool and possible sense of scale for drawings. Encourage children to use the grid as a tool for measuring and balancing their drawings rather than a decorative background or a "crossword puzzle" for individual letters. With practice, children will develop skills necessary to produce wonderful notebook entries that they are proud to share. You, in turn, will find the pages useful for discussing, summarizing, and expanding on their science skills.





"I really like the graph paper in the journal. It made it so easy for the children to see how long and how wide their rocks were."

A second grade Science Companion teacher

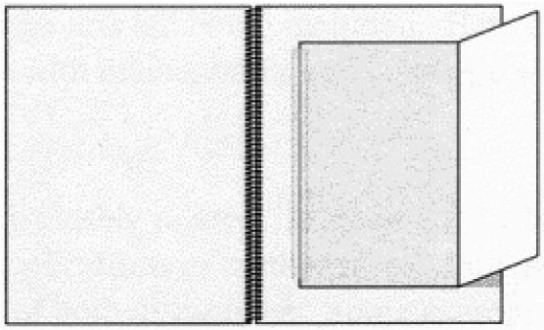
Using the Science Notebooks

Adding Pages

The children's science notebooks include some blank pages to make room for attaching extra observation sheets. Below are a few options for attaching new sheets and collecting information.

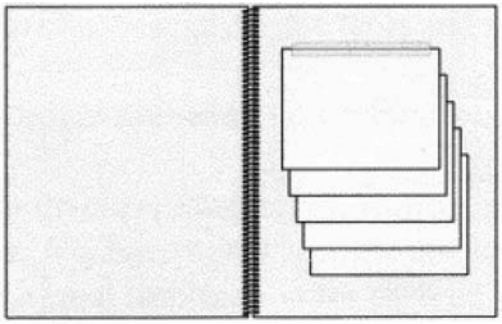
Option 1

Attach new sheets by folding each new sheet in half. Tape the top edge vertically onto the blank sheet. Additional sheets can be taped under the first sheet, making a chronological stack of additions.



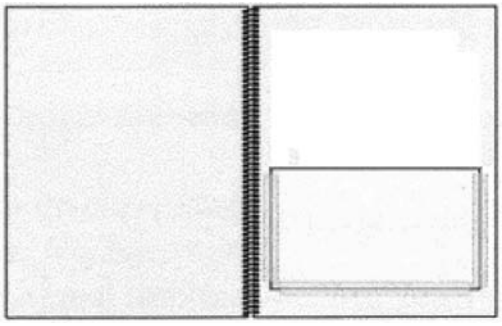
Option 2

Have children use smaller sheets for subsequent observations, using reductions of the Teacher Masters, blank sheets, or cards. These can be taped into the science notebook in a flip page arrangement.



Option 3

Create a pocket by cutting a piece of tag board or stiff paper approximately half of the length of the back cover. Tape the edges to the back cover, leaving the top open for inserted papers and notes.



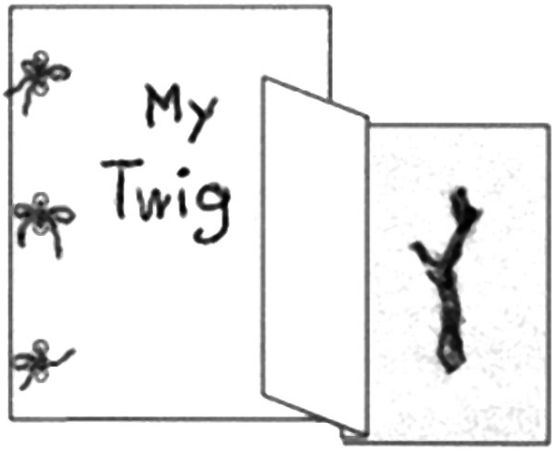
Capturing Observations in Class Books

Making class books helps children focus on a topic while integrating science, language arts, and art. Class books can also be a place to organize and compile additional observation sheets separate from the science notebooks. They can be bound simply with staples or a three-ring folder, or stitched with yarn or ribbons. You may even have access to a binding machine for making more permanent books.

Class books are useful and appealing for a number of reasons. Consider these ideas for using class books:

- Publicize an entire group's work.
- Store work in the Science Center or classroom library.
- Share the class's cumulative unit work outside of the classroom.
- Collect extra projects and assignments in one location.
- Review and evaluate the class books for group assessments.
- Encourage children's sense of ownership for a project by having them contribute to a class book about it.

Numerous science themes or topics make excellent subjects for class books. Many of these are suggested as extensions within Science Companion lessons. For example, you might choose to collect all the weather poems the children create in the Level 1 Weather Unit and title the book, "Our Weather Poems." Drawings, photos, or written descriptions of particular activities, such as the "Wild Walks" or zoo trip activity in the Level 1 Collecting and Examining Life Unit, also make appealing books.



You may also create smaller books reflecting children's independent or cooperative group work, including items such as sketches, notes, or data tables. Third graders or advanced children in lower grades can create individual research books and gather them together to make a class portfolio. Extend this method to the home for children who are interested in pursuing a topic beyond the classroom. A class book created from children's homework might be titled, "Science at Home."

Notes