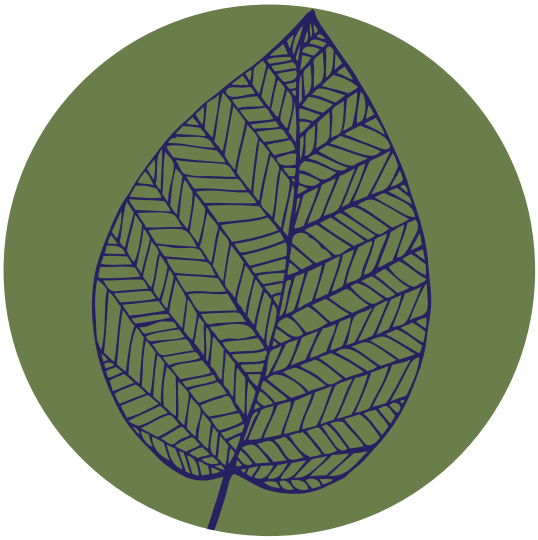

Patterns and the Plant World

STEM Road Map for Elementary School

Grade 1

Edited by Carla C. Johnson,
Janet B. Walton, and Erin Peters-Burton

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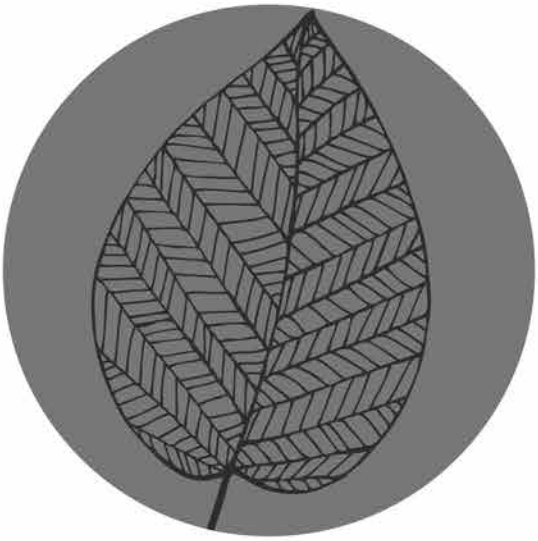

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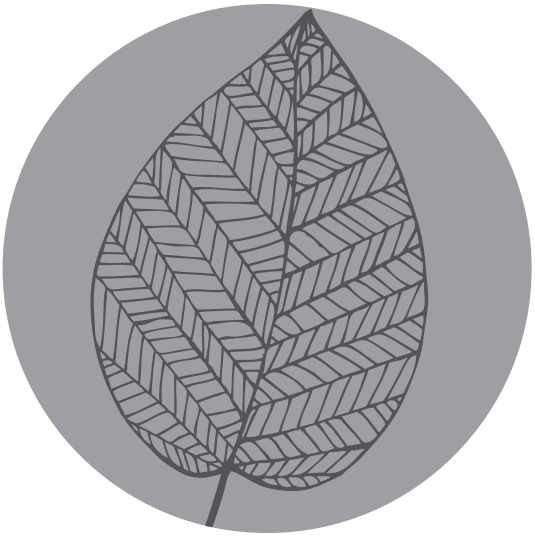

Patterns and the Plant World

STEM Road Map for Elementary School

Edited by Carla C. Johnson, Janet B. Walton, and Erin Peters-Burton

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3

PATTERNS AND THE PLANT WORLD MODULE OVERVIEW

Andrea R. Milner, Vanessa B. Morrison, Janet B. Walton, Carla C. Johnson, and Erin Peters-Burton

THEME: The Represented World

LEAD DISCIPLINES: Mathematics and Science

MODULE SUMMARY

This module focuses on how changes in seasonal weather patterns relate to changes in the plant world. Students explore how Earth's movement around the Sun influences regional weather patterns on Earth and observe the changes in plant life that accompany the changing seasons. The class uses the steps of the engineering design process (EDP) to design and create a container garden in the culminating activity of the module, the Container Garden Design Challenge. Students add plants or seeds to the container they have designed so that they may observe plant growth cycles for an extended period of time. Students also collaboratively design an observation journal in which to record data about their garden, emphasizing observations, data collection, measurements, and graphic presentations of numerical data. Although the module lessons cover a span of five weeks, students will continue to reflect on their garden design, observe plant changes, and collect data after completing the module lessons (adapted from Koehler, Bloom, and Milner 2015).

ESTABLISHED GOALS AND OBJECTIVES

At the conclusion of this module, students will be able to do the following:

- Demonstrate conceptual awareness of how living things grow and change over the course of their lives:
  - Understand that plants change over time because of the changing seasons
  - Understand that certain plants grow in different regions (local and global)

  - Understand that various habitats (local and global) are home to certain plants
- Use technology to gather research information and communicate
- Identify technological advances and tools that scientists use to learn about patterns and plants
- Describe and apply the EDP
- Explain concepts and analyze data they have observed about the life cycle of plants
- Understand local weather patterns and be able to make connections among weather, seasons, habitat, and the life cycle of plants
- Understand the influence gardening has on culture and society

CHALLENGE OR PROBLEM FOR STUDENTS TO SOLVE: CONTAINER GARDEN DESIGN CHALLENGE

As a culminating activity for the module, students participate in the Container Garden Design Challenge. In this challenge, students will design a window box or free-standing container garden, plant several different kinds of plants, and then observe their growth and follow their life cycle over an extended period of time (several months). Using a window box would allow students to easily observe the plants, but attaching a window box to your school structure may not be an option, so a free-standing container garden or raised-bed garden may be more appropriate. The kinds of plants chosen and the purpose of the class garden will vary depending on the geographic location, time of year, and space constraints. Students will make decisions about the plants during the planning process.

CONTENT STANDARDS ADDRESSED IN THIS STEM ROAD MAP MODULE

A full listing with descriptions of the standards this module addresses can be found in Appendix C. Listings of the particular standards addressed within lessons are provided in a table for each lesson in Chapter 4.

STEM RESEARCH NOTEBOOK

Each student should maintain a STEM Research Notebook, which will serve as a place for students to organize their work throughout this module (see p. 12 for more general discussion on setup and use of this notebook). All written work in the module should be included in the notebook, including records of students' thoughts and ideas, fictional accounts based on the concepts in the module, and records of student progress through the EDP. The notebooks may be maintained across subject areas, giving students the

opportunity to see that although their classes may be separated during the school day, the knowledge they gain is connected. The lesson plans for this module contain STEM Research Notebook Entry sections (numbered 1–23) and templates for each notebook entry are included in Appendix A.

Emphasize to students the importance of organizing all information in a Research Notebook. Explain to them that scientists and other researchers maintain detailed Research Notebooks in their work. These notebooks, which are crucial to researchers' work because they contain critical information and track the researchers' progress, are often considered legal documents for scientists who are pursuing patents or wish to provide proof of their discovery process.

MODULE LAUNCH

Following agreed-upon rules for discussions, launch the module by holding a class discussion about plants and the seasons, asking students these questions:

- What are the four seasons?
- What causes the four seasons?
- How do the seasons affect plant development?
- How do plants change during the four seasons?

Then, have students explore the seasons by viewing a video about the seasons such as "The Four Seasons" by ABCmouse.com at *www.youtube.com/watch?v=K2tV69N0X8k*. Tell students that as part of their challenge in this module, they will design and build a class garden and observe the growth of the plants.

PREREQUISITE SKILLS FOR THE MODULE

Students enter this module with a wide range of preexisting skills, information, and knowledge. Table 3.1 (p. 26) provides an overview of prerequisite skills and knowledge that students are expected to apply in this module, along with examples of how they apply this knowledge throughout the module. Differentiation strategies are also provided for students who may need additional support in acquiring or applying this knowledge.

Table 3.1. Prerequisite Key Knowledge and Examples of Applications and Differentiation Strategies

Prerequisite Key Knowledge	Application of Knowledge by Students	Differentiation for Students Needing Additional Knowledge
Science • Understand cause and effect	*Science* • Determine how changes in the plant world and how changes on Earth (the seasons) and in the sky (daylight hours) affect plant development.	*Science* • Provide demonstrations of cause and effect (e.g., dropping egg [cause] and observing breakage [effect]), emphasizing that cause is why something happens, effect is what happens. • Read aloud picture books to class and have students identify cause and effect sequences. • Create a class T-chart to record causes and related effects students observe in the classroom and in literature.
Mathematics • Number sense	*Mathematics* • Record temperatures. • Measure dimensions for container garden. • Measure plant growth.	*Mathematics* • Model measurement techniques using standard and nonstandard units of measurement. • Read aloud nonfiction texts about temperature and measurement to class. • Provide opportunities for students to practice measurement in a variety of settings (e.g., in the classroom and outdoors).
Language and Inquiry Skills • Visualize • Make predictions • Ask and respond to questions	*Language and Inquiry Skills* • Make and confirm or reject predictions. • Share thought processes through notebooking, asking and responding to questions, and use of the engineering design process.	*Language and Inquiry Skills* • As a class, make predictions when reading fictional texts. • Model the process of using information and prior knowledge to make predictions. • Provide samples of notebook entries.

Continued

Table 3.1. (*continued*)

Prerequisite Key Knowledge	Application of Knowledge by Students	Differentiation for Students Needing Additional Knowledge
Speaking and Listening • Participate in group discussions	*Speaking and Listening* • Engage in collaborative group discussions in the development of the container garden and observation journal.	*Speaking and Listening* • Model speaking and listening skills. • Create a class list of good listening and good speaking practices. • Read picture books that feature collaboration and teamwork.

POTENTIAL STEM MISCONCEPTIONS

Students enter the classroom with a wide variety of prior knowledge and ideas, so it is important to be alert to misconceptions, or inappropriate understandings of foundational knowledge. These misconceptions can be classified as one of several types: "preconceived notions," opinions based on popular beliefs or understandings; "nonscientific beliefs," knowledge students have gained about science from sources outside the scientific community; "conceptual misunderstandings," incorrect conceptual models based on incomplete understanding of concepts; "vernacular misconceptions," misunderstandings of words based on their common use versus their scientific use; and "factual misconceptions," incorrect or imprecise knowledge learned in early life that remains unchallenged (NRC 1997, p. 28). Misconceptions must be addressed and dismantled for students to reconstruct their knowledge, and therefore teachers should be prepared to take the following steps:

- *Identify students' misconceptions.*
- *Provide a forum for students to confront their misconceptions.*
- *Help students reconstruct and internalize their knowledge, based on scientific models. (NRC 1997, p. 29)*

Keeley and Harrington (2010) recommend using diagnostic tools such as probes and formative assessment to identify and confront student misconceptions and begin the process of reconstructing student knowledge. Keeley's *Uncovering Student Ideas in Science* series contains probes targeted toward uncovering student misconceptions in a variety of areas and may be a useful resource for addressing student misconceptions in this module.

Some commonly held misconceptions specific to lesson content are provided with each lesson so that you can be alert for student misunderstanding of the science concepts presented and used during this module. The American Association for the Advancement of Science has also identified misconceptions that students frequently hold regarding various science concepts (see the links at *http://assessment.aaas.org/topics*).

SRL PROCESS COMPONENTS

Table 3.2 illustrates some activities in the Patterns and the Plant World module and how they align with the self-regulated learning (SRL) process before, during, and after learning.

Table 3.2. SRL Process Components

Learning Process Components	Example From Patterns and the Plant World Module	Lesson Number and Learning Component
BEFORE LEARNING		
Motivates students	Students document what they want to know about seasons in their STEM Research Notebooks during the group discussion and before viewing the video on the four seasons.	Lesson 1, Introductory Activity/ Engagement
Evokes prior learning	Students hold a class discussion on seasons and plant life cycles.	Lesson 1, Introductory Activity/ Engagement
DURING LEARNING		
Focuses on important features	Students learn about different types of plants through an interactive read-aloud.	Lesson 2, Introductory Activity/ Engagement
Helps students monitor their progress	Document student ideas about container gardening on a Know, Want to Know, Learned (KWL) chart. Students create STEM Research Notebook entries.	Lesson 2, Activity/ Exploration
AFTER LEARNING		
Evaluates learning	Students receive feedback on the rubric for observations on their listening and discussion skills, STEM Research Notebooks, and participation.	Lesson 3, Activity/ Exploration

Continued

Table 3.2. (*continued*)

Learning Process Components	Example From Patterns and the Plant World Module	Lesson Number and Learning Component
Takes account of what worked and what did not work	Students collaboratively decide what observations to make about the garden, using their experiences from observing plants on the school grounds as a guide. Students consider how to organize these observations to track how plants develop throughout the year and use this information to make decisions about the effectiveness of their garden design and possible improvements.	Lesson 3, Activity/ Exploration; Elaboration/ Application of Knowledge

STRATEGIES FOR DIFFERENTIATING INSTRUCTION WITHIN THIS MODULE

For the purposes of this curriculum module, differentiated instruction is conceptualized as a way to tailor instruction—including process, content, and product—to various student needs in your class. A number of differentiation strategies are integrated into lessons across the module. The problem- and project-based learning approach used in the lessons is designed to address students' multiple intelligences by providing a variety of entry points and methods to investigate the key concepts in the module (for example, investigating gardening from the perspectives of science and social issues via scientific inquiry, literature, journaling, and collaborative design). Differentiation strategies for students needing support in prerequisite knowledge can be found in Table 3.1 (p. 26). You are encouraged to use information gained about student prior knowledge during introductory activities and discussions to inform your instructional differentiation. Strategies incorporated into this lesson include flexible grouping, varied environmental learning contexts, assessments, compacting, tiered assignments and scaffolding, and mentoring. The following websites may be helpful resources for differentiated instruction:

- *http://steinhardt.nyu.edu/scmsAdmin/uploads/005/120/Culturally%20Responsive%20Differientiated%20Instruction.pdf*
- *http://educationnorthwest.org/sites/default/files/12.99.pdf*

Flexible Grouping. Students work collaboratively in a variety of activities throughout this module. Grouping strategies you might employ include student-led grouping, grouping students according to ability level or common interests, grouping students randomly, or grouping them so that students in each group have complementary strengths (for instance, one student might be strong in mathematics, another in art, and another in writing).

Varied Environmental Learning Contexts. Students have the opportunity to learn in various contexts throughout the module, including alone, in groups, in quiet reading and research-oriented activities, and in active learning through inquiry and design activities. In addition, students learn in a variety of ways, including through doing inquiry activities, journaling, reading a variety of texts, watching videos, participating in class discussion, and conducting web-based research.

Assessments. Students are assessed in a variety of ways throughout the module, including individual and collaborative formative and summative assessments. Students have the opportunity to produce work via written text, oral presentations, and modeling.

Compacting. Based on student prior knowledge, you may wish to adjust instructional activities for students who exhibit prior mastery of a learning objective. Since student work in science is largely collaborative throughout the module, this strategy may be most appropriate for mathematics, English language arts (ELA), or social studies activities.

Tiered Assignments and Scaffolding. Based on your awareness of student ability, understanding of concepts, and mastery of skills, you may wish to provide students with variations on activities by adding complexity to assignments or providing more or fewer learning supports for activities throughout the module. For instance, some students may need additional support in identifying key search words and phrases for web-based research or may benefit from cloze sentence handouts to enhance vocabulary understanding. Other students may benefit from expanded reading selections and additional reflective writing or from working with manipulatives and other visual representations of mathematical concepts. You may also work with your school librarian to compile a classroom database of research resources and supplementary readings for different reading levels and on a variety of topics related to the module challenge to provide opportunities for students to undertake independent reading. You may find the following website on scaffolding strategies helpful: *www.edutopia.org/blog/scaffolding-lessons-six-strategies-rebecca-alber.*

Mentoring. As group design teamwork becomes increasingly complex throughout the module, you may wish to have a resource teacher, older student, or volunteer work with groups that struggle to stay on task and collaborate effectively.

STRATEGIES FOR ENGLISH LANGUAGE LEARNERS

Students who are developing proficiency in English language skills require additional supports to simultaneously learn academic content and the specialized language associated with specific content areas. WIDA (2012) has created a framework for providing support to these students and makes available rubrics and guidance on differentiating instructional materials for English language learners (ELLs). In particular, ELL students may benefit from additional sensory supports such as images, physical modeling, and graphic representations of module content, as well as interactive support through

collaborative work. This module incorporates a variety of sensory supports and offers ongoing opportunities for ELL students to work collaboratively.

When differentiating instruction for ELL students, you should carefully consider the needs of these students as you introduce and use academic language in various language domains (listening, speaking, reading, and writing) throughout this module. To adequately differentiate instruction for ELL students, you should have an understanding of the proficiency level of each student. The following five overarching preK–5 WIDA learning standards are relevant to this module:

- Standard 1: Social and Instructional language. Distinguish between information provided by pictures or other illustrations and information provided by the words in a text. Use the illustrations and details in a text to describe its key ideas.
- Standard 2: The language of Language Arts. Write opinion pieces in which they introduce the topic or name the book they are writing about, state an opinion, supply a reason for the opinion, and provide some sense of closure. Write informative/explanatory texts in which they name a topic, supply some facts about the topic, and provide some sense of closure. Write narratives in which they recount two or more appropriately sequenced events, include some details regarding what happened, use temporal words to signal event order, and provide some sense of closure.
- Standard 3: The language of Mathematics. Order three objects by length; compare the lengths of two objects indirectly by using a third object.
- Standard 4: The language of Science. An object's motion can be described by tracing and measuring its position over time.
- Standard 5: The language of Social Studies. Describe people, places, things, and events with relevant details, expressing ideas and feelings clearly.

SAFETY CONSIDERATIONS FOR THE ACTIVITIES IN THIS MODULE

Science activities in this module focus on growing plants from seeds and creating a container garden from recycled materials. Students should use caution when handling scissors, bottles, and cans. Sharp points or edges can cut or puncture skin, and bottles can break if not handled carefully. Also caution students not to eat seeds, as they may be treated with toxic chemicals. For more general safety guidelines, see the Safety in STEM section in Chapter 2 (p. 18).

DESIRED OUTCOMES AND MONITORING SUCCESS

The desired outcomes for this module are outlined in Table 3.3, along with suggested ways to gather evidence to monitor student success. For more specific details on desired outcomes, see the Established Goals and Objectives sections for the module and individual lessons.

Table 3.3. Desired Outcomes and Evidence of Success in Achieving Identified Outcomes

Desired Outcomes	Evidence of Success	
	Performance Tasks	Other Measures
Students understand and can demonstrate their knowledge about changes in the plant world and how changes on Earth (the seasons) and in the sky (daylight hours) affect plant development.	• Student teams develop and maintain a container garden. • Students each maintain a STEM Research Notebook with what they want to know, responses to questions, and observations. • Students design an observation journal to be used throughout the module and the rest of the year.	Students are assessed using the Observation, STEM Research Notebook, and Participation Rubric.

ASSESSMENT PLAN OVERVIEW AND MAP

Table 3.4 provides an overview of the major group and individual *products* and *deliverables*, or things that student teams will produce in this module, that constitute the assessment for this module. See Table 3.5 for a full assessment map of formative and summative assessments in this module.

Table 3.4. Major Products and Deliverables in Lead Disciplines for Groups and Individuals

Lesson	Major Group Products and Deliverables	Major Individual Products and Deliverables
1	• Terrific Seasonal Tree team presentations	• Terrific Seasonal Tree models • STEM Research Notebook entries #1–6 • Lesson Assessment questions
2	• Team research and presentations for Container Garden Design Challenge • Class decisions on garden design and final design drawing for garden	• STEM Research Notebook entries #7–15 • Student drawings for Container Garden Design Challenge • Lesson Assessment questions
3	• Completion of Container Garden Design Challenge • Creation of observation journal	• STEM Research Notebook entries #16–23 • Lesson Assessment questions
Ongoing	• Maintenance of garden • Redesign of and improvements to garden • Student presentations of garden design and output	• Data collected in observation journal

Table 3.5. Assessment Map for Patterns in the Plant World Module

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
1	STEM Research Notebook *entries*	Individual	Formative	• Identify the four seasons. • Understand what causes the four seasons. • Describe how seasons affect plant development. • Name and identify the parts of a plant (roots, stem, leaves). • Provide examples of how plants adapt to the four seasons.
1	Participation in class weather observations and analysis *observation and participation rubric*	Individual	Formative	• Chart, graph, identify, describe, and analyze patterns of local weather to make connections among weather, seasons, habitat, and the life cycle of plants.

Continued

Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
1	Terrific Seasonal Tree Activity *performance task*	Group	Formative	• Understand that plants change over time because of the changing seasons. • Understand that certain plants grow in different regions (local and global). • Understand that various habitats (local and global) are home to certain plants.
1	Plant Drawing and Description *end of lesson assessment*	Individual	Summative	• Describe how seasons affect plant development. • Name and identify the parts of a plant (roots, stem, leaves). • Provide examples of how plants adapt to the four seasons.
2	STEM Research Notebook *entries*	Individual	Formative	• List the basic needs of all plants. • Describe the conditions necessary for growing plants in a container garden. • Explain what happens when all five basic needs are not met. • Identify where plants come from. • Recognize what types of plants grow from seeds. • Evaluate the influence plants have on culture and society.
2	Participation in class weather observations and analysis *observation and participation rubric*	Individual	Formative	• Chart, graph, identify, describe, and analyze patterns of local weather to make connections among weather, seasons, habitat, and the life cycle of plants.

Continued

Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
2	Team research *presentation*	Group	Formative	• Use technology tools to gather research information about the life cycle of plants. • Use technology to facilitate deeper conceptual understanding about the life cycle of plants. • Identify technological advances and tools that scientists use to learn about the life cycle of plants. • Design a container garden. • Explain concepts through the design of a journal to make observations of the life cycle of plants.
2	Plant Drawing and Description *end of lesson assessment*	Individual	Summative	• List the basic needs of all plants. • Describe the conditions necessary for growing plants in a container garden. • Explain what happens when all five basic needs are not met. • Identify where plants come from. • Recognize what types of plants grow from seeds.
3	STEM Research Notebook *entries*	Individual	Formative	• Determine what seeds need in order to sprout into seedlings. • Estimate how much time it will take for seeds to sprout into seedlings. • Estimate how much seedlings will grow each week.

Continued

Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
3	Participation in class weather observations and analysis *observation and participation rubric*	Individual	Formative	• Chart, graph, identify, describe, and analyze patterns of local weather to make connections among weather, seasons, habitat, and the life cycle of plants.
3	Observation Journal *performance task*	Group/Individual	Formative	• Explain concepts through the design of a journal to make observations of the life cycle of plants. • Observe, measure, quantify, and analyze data during the life cycle of plants.
3	Container Garden Design *performance task*	Group	Formative	• Construct a container garden.
3	Plant Drawing and Description *end of lesson assessment*	Individual	Summative	• Determine what seeds need in order to sprout into seedlings. • List and define the parts of a plant.

MODULE TIMELINE

Tables 3.6–3.10 (pp. 37–39) provide lesson timelines for each week of the module. These timelines are provided for general guidance only and are based on class times of approximately 30 minutes.

Table 3.6. STEM Road Map Module Schedule for Week One

Day 1	Day 2	Day 3	Day 4	Day 5
Lesson 1 *Earth's Sensational Seasons* • Launch the module by introducing the module challenge with a discussion of seasons and plant life cycles. • Show video on the four seasons. • Begin class weather chart.	*Lesson 1* *Earth's Sensational Seasons* • Show video "One Year in 40 Seconds." • Dissect lima bean seed in the What's in a Seed? activity. • Plant lima bean and sunflower seeds in the How Does Your Garden Grow? activity.	*Lesson 1* *Earth's Sensational Seasons* • Conduct an interactive read-aloud of *Sunshine Makes the Seasons*, by Franklyn M. Branley. • Begin research for Terrific Seasonal Tree activity.	*Lesson 1* *Earth's Sensational Seasons* • Continue research for Terrific Seasonal Tree activity. • Create tree models.	*Lesson 1* *Earth's Sensational Seasons* • Give presentations for Terrific Seasonal Tree activity. • Begin class vocabulary chart.

Table 3.7. STEM Road Map Module Schedule for Week Two

Day 6	Day 7	Day 8	Day 9	Day 10
Lesson 1 *Earth's Sensational Seasons* • Conduct an interactive read-aloud of *Plants Live Everywhere*, by Mary Dodson Wade. • Review measurement skills in For Good Measure activity. • Discuss habitats and plant differences.	*Lesson 1* *Earth's Sensational Seasons* • Discuss the type of gardening students will be doing. • Discuss different types of plants. • Answer the Lesson Assessment questions.	*Lesson 2* *Our Container Garden: Design Time* • Discuss basic needs of living things. • Conduct an interactive read-aloud of *Seeds*, by Vijaya Khisty Bodach.	*Lesson 2* *Our Container Garden: Design Time* • Conduct an interactive read-aloud of *Trees, Weeds, and Vegetables: So Many Kinds of Plants!* by Mary Dodson Wade.	*Lesson 2* *Our Container Garden: Design Time* • Introduce engineering design process (EDP). • Show video "Container Gardening with Kids."

Table 3.8. STEM Road Map Module Schedule for Week Three

Day 11	Day 12	Day 13	Day 14	Day 15
Lesson 2 *Our Container Garden: Design Time* • Brainstorm ideas about assigned topics on container gardens and begin team research on container gardens.	*Lesson 2* *Our Container Garden: Design Time* • Conduct team research on container gardens. • Begin to share team research with the class.	*Lesson 2* *Our Container Garden: Design Time* • Share team research with the class. • Make decisions about the type of garden the class will build. • Create a class list of necessary materials.	*Lesson 2* *Our Container Garden: Design Time* • Create the class container garden design. • Conduct interactive read-aloud of *Plant Secrets,* by Emily Goodman. • Discuss the impact gardening has on culture.	*Lesson 2* *Our Container Garden: Design Time* • Analyze and organize the weather data students have been recording. • Make a supply list for the container garden. • Optional: Design a watering system.

Table 3.9. STEM Road Map Module Schedule for Week Four

Day 16	Day 17	Day 18	Day 19	Day 20
Lesson 2 *Our Container Garden: Design Time* • Make a plan for providing necessary supplies. • Conduct an interactive read-aloud of *Flower Garden*, by Eve Bunting.	*Lesson 2* *Our Container Garden: Design Time* • Show video "Grow—Episode 6: Thrive" from Whole Foods Market. • Continue working on the list of supplies.	*Lesson 2* *Our Container Garden: Design Time* • Come up with ideas about what to do with the garden's harvest. • Discuss philanthropy and cultural and societal implications of gardening.	*Lesson 2* *Our Container Garden: Design Time* • Discuss careers associated with gardening and weather. • Answer the Lesson Assessment questions.	*Lesson 3* *Our Container Garden: Planting Time* • Review progress through the Define, Learn, and Plan phases of the EDP. • Conduct an interactive read-aloud of *From Seed to Plant,* by Gail Gibbons.

Table 3.10. STEM Road Map Module Schedule for Week Five

Day 21	Day 22	Day 23	Day 24	Day 25
Lesson 3 *Our Container Garden: Planting Time* • Make predictions about plant growth.	*Lesson 3* *Our Container Garden: Planting Time* • Start to build the container garden.	*Lesson 3* *Our Container Garden: Planting Time* • Finish building the container garden. • Observe plants on school grounds.	*Lesson 3* *Our Container Garden: Planting Time* • Create observation journal for garden. • Conduct an interactive read-aloud of *How a Seed Grows*, by Helene J. Jordan.	*Lesson 3* *Our Container Garden: Planting Time* • Create a maintenance plan for the garden. • Answer the Lesson Assessment questions. **Ongoing** • Observe and record data about the plants and maintain the garden. • Compare plant growth with predictions, connect plant health and ease of maintenance with garden design, and make design modifications. • Share garden design and plant data with other classes, parents, or community members.

RESOURCES

The media specialist can help you locate resources for students to view and read about plants, weather, and related content. Special educators and reading specialists can help find supplemental sources for students needing extra support in reading and writing. Additional resources may be found online. Community resources for this module may include botanists and horticulturists.

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Grade 1

STEM Road Map for Elementary School

Patterns and the Plant World

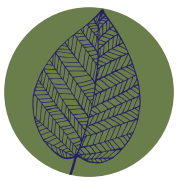
What if you could challenge your first graders to relate changes in seasonal weather patterns to changes in the plant world using a container garden? With this volume in the *STEM Road Map Curriculum Series*, you can!

Patterns and the Plant World outlines a journey that will steer your students toward authentic problem solving while grounding them in integrated STEM disciplines. As are the other volumes in the series, this book is designed to meet the growing need to infuse real-world learning into K–12 classrooms.

This interdisciplinary module uses project- and problem-based learning to help young children make discoveries about a range of natural phenomena. In each lesson, students will draw on Earth and environmental science, mathematics, engineering, English language arts, and social studies to do the following:

- Explore how Earth's movement around the Sun affects regional weather patterns.
- Observe the changes in plant life that come with the changing seasons.
- Use the steps of the engineering design process to design and create a class garden for the Container Garden Design Challenge.
- Design an observation notebook to record data about their garden, with an emphasis on data collection, measurement, and presenting numerical data in graphic form.

The *STEM Road Map Curriculum Series* is anchored in the *Next Generation Science Standards*, the *Common Core State Standards*, and the Framework for 21st Century Learning. In-depth and flexible, *Patterns and the Plant World* can be used as a whole unit or in part to meet the needs of districts, schools, and teachers who are charting a course toward an integrated STEM approach.



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Grade 1

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