



## Science made for the Next Generation

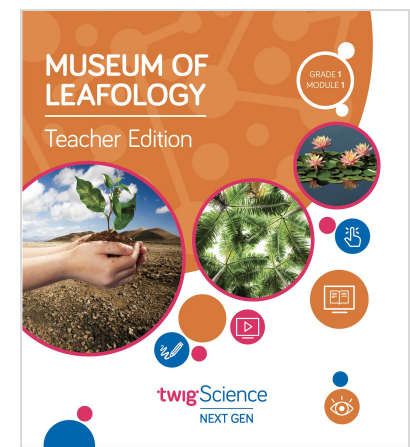
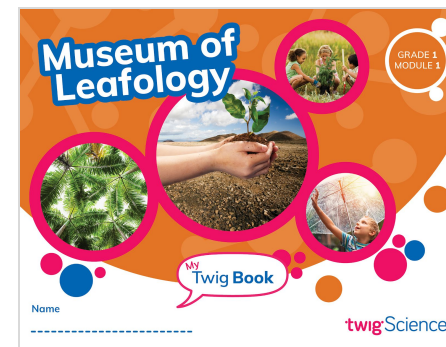
Twig Science was built from the ground up for the NGSS by award-winning STEM education specialists.

Reviewing our program, you'll find:

- A clear conceptual flow across the program, clearly set out in the program NGSS Framework Alignment
- Modules that bundle different scientific disciplines including engineering and environmental principles and concepts (as defined by the CDE), aligned 1:1 with the segments of the NGSS Topic Arrangements
- Phenomena and investigative problems at the heart of each module, with Grade Scope and Sequence tables that show how the dimensions flow and build in sophistication across each grade
- Module Contents that tell the story of how students apply the three dimensions in a module, with Driving Questions that scaffold their learning journey
- Three-dimensional lessons and assessments that clearly outline the dimensions applied.

**This is why we score so highly on NGSS-based rubrics such as NextGen TIME Paper screen evaluation.**

This rubric has been completed at a program level, and is designed to highlight where you can find evidence for the Designed for NGSS: Foundations Rubric in whatever module you choose to evaluate. The rubric includes citations to the printed Teachers Edition and Twig Book (Student Edition).




Designed for the NGSS: Foundations	High Quality 5	Medium Quality 3	Low Quality 1
<b>F1. Presence of Phenomena/Problem.</b> The materials include phenomena/problems that have the <b>potential</b> to drive students learning toward the targeted learning goals in the following ways: <ul style="list-style-type: none"> <li>phenomena/problems in the materials are to be relevant to students;</li> <li>explanations for phenomena connect to the three dimensions;</li> <li>solutions to problems connect to the three dimensions.</li> </ul>	The materials include phenomena/problems that have strong <i>potential</i> to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have some <i>potential</i> to drive student learning toward the targeted learning goals.	The materials include phenomena/problems that have limited <i>potential</i> to drive student learning toward the targeted learning goals.
<b>F2. Presence of Three Dimensions.</b> The materials include opportunities for students to develop and use the three dimensions, such that: <ul style="list-style-type: none"> <li>the DCIs, SEPs, and CCCs are present and have the potential to support student learning toward the targeted learning goals for each dimension;</li> <li>when engineering design is a learning focus, it is integrated with other appropriate dimensions (i.e., engineering is not isolated).</li> </ul>	The materials consistently provide opportunities for students to develop and use the three dimensions.	The materials occasionally provide opportunities for students to develop and use the three dimensions.	The materials rarely provide opportunities for students to use the three dimensions.
<b>F3. Presence of Logical Sequence.</b> Materials demonstrate appropriate sequencing of three dimensions when: <ul style="list-style-type: none"> <li>they include a targeted set of DCIs, SEPs, and CCCs within a sequence;</li> <li>the sequence is clear and logical across the DCIs;</li> <li>the SEPs and CCCs are potentially sufficient and appropriate for students to figure out the phenomena or problems.</li> </ul>	The materials consistently exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials occasionally exhibit a clear, logical, and appropriate sequence across the three dimensions.	The materials rarely exhibit a clear, logical, and appropriate sequence across the three dimensions.

## Designed for NGSS: Foundations Rubric

### Analyze Evidence

#### Directions:

1. Review the Designed for NGSS: Foundations Rubric.
2. Reflect on the evidence (or lack of evidence) that you and your team gathered and represented.
3. Record strengths and limitations for each criterion based on your evidence. Cite specific examples.

Strengths	
F1. Presence of Phenomena /Problems	
Every module in Twig Science has an overarching Module Phenomenon or Investigative Problem that drives student learning.	 <p><b>Grade 3 Module 1 Module Phenomenon</b></p>

Each module is built around an engaging storyline that places the phenomena and problems in real-world contexts. For example, in Grade 1 Module 1, students curate their own Museum of Leafology to explore why some plants are different and others are the same. In Grade 3 Module 1, they make sense of how objects are pushed or pulled by designing their own Ultimate Playground. While in Grade 5 Module 2, students go undercover at Yellowstone National Park to figure out how matter and energy move through an ecosystem. At the start of each module, students are shown a movie-style trailer video, which captivates their imagination for the challenge ahead.



Grade 1 Module 1 Museum of Leafology Trailer video



Grade 3 Module 1 The Ultimate Playground Trailer video



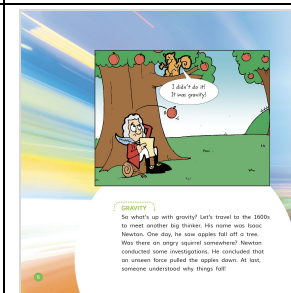
Grade 5 Module 2 Yellowstone: Uncovered Trailer video

Every module is broken down into chapters called Driving Questions, which students complete in a sequence. These are identified at the start of every Teacher Edition in the **Module Contents (TE pp.ii–iii)**. The phenomena and problems that students investigate in each DQ scaffolds their acquisition of the DCIs, SEPs, and CCCs that are required to master the Module Phenomenon or Investigative Problem.

Module Introduction	1	Driving Question 3	69
Module Contents	ii	How are seeds dispersed?	
Collaborative Think Tank	iv	Performance Expectations: EETS-1 Use materials to design a solution to a human problem by identifying how plants and/or animals use their external parts to help them survive, grow, and meet their needs. K-2 EETS-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. K-2 EETS-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	
Built for CA NGSS	v	Students explore the many ways that plants use to distribute seeds away from the parent plant. In science, students tackle an Engineering Design Challenge to design and build seeds for dispersal by wind. They test and present the results of their design before asking a Seeds Room to the Museum of Landology.	
Spark Student Curiosity	vi	Overview	70
K-6 Program Components	vii	Resources and Assessments	71
Access for All	viii	Differentiated Instruction	74
3-D Assessments	ix	Lesson 1 Seed Explorers	76
NGSS Science Levelled Readers	x	Lesson 2 By Wind, Animal, or Water?	84
Module ELA Connections	xi	Lesson 3 Act like a Scientist!	92
Module Hands-On Lab Kit	xii	Lesson 4 Design Your Own Seed	98
		Lesson 5 Build Your Own Seed	106
		Lesson 6 Blowin' in the Wind	112
		Lesson 7 The Seeds Room	118
		Driving Question 4	125
		How are young and adult plants alike and different?	
		Performance Expectations: EETS-1 Use materials to design a solution to a human problem by identifying how plants and/or animals use their external parts to help them survive, grow, and meet their needs. K-2 EETS-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. K-2 EETS-3 Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.	
		Students observe the seedlings they planted and record similarities and differences. Then students explore plants in nature, identifying plants they find, focusing on comparing and contrasting young and adult plants of the same type.	
		Overview	126
		Resources and Assessments	127
		Differentiated Instruction	128
		Lesson 1 How Are Seedlings Similar?	130
		Lesson 2 How Are Seedlings Different?	136
		Lesson 3 Compare and Contrast Amazing Plants	142
		Lesson 4 Compare Seedlings and Their Parents	148
		Scientist and Engineer Investigation Experience:	
		Digital Investigation	
		Guided Investigation	
		Hands-On Investigation	
		Reading for Evidence	
		3-D Assessment	
		Video Investigation	

## Module Contents TE pp.ii–iii

In addition, each module is complemented with a magazine-style **Leveled Reader** (available in four levels, plus Spanish) that provides additional exposure to relevant phenomena/problems, as well as interviews with scientists and engineers from diverse backgrounds. Packed with stunning images, cartoons, and jokes, they are designed to appeal to students from a diverse range of learning abilities.



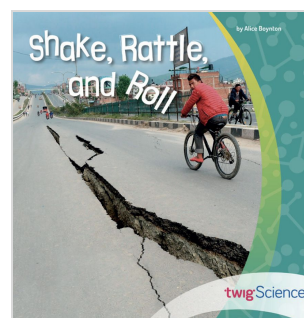
## Roller-Coaster Ride (Grade 3 Module 1 Leveled Reader p.6)



## Our Leafy Friends (Grade 1 Module 1 Leveled Reader Cover)



**Roller-Coaster Ride (Grade 3 Module 1  
Leveled Reader Cover)**



**Shake, Rattle, and Roll (Grade 4 Module 4  
Leveled Reader Cover)**



**Where Are the Bees? (Grade 2 Module 4  
Leveled Reader p. 14)**



## F2. Presence of Three Dimensions

Students are supported to use the three dimensions with increasing sophistication to make sense of the Module Phenomenon, answer the Driving Questions, and complete the learning activities.

Every DCI, SEP, and CCC that is addressed in each lesson is clearly identified in the Teacher Edition at the start of the lesson, as are the **3-D Learning Objectives**.

### 3-D LEARNING OBJECTIVES

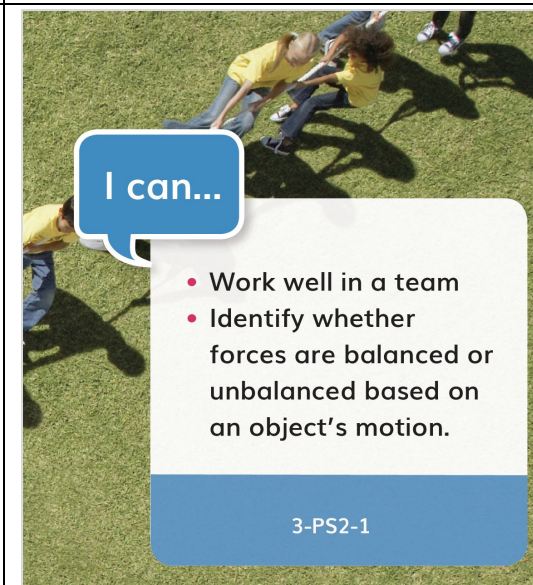
Students will:

- Investigate the effects of magnetic fields and magnetic poles on two magnets
- Understand the interactions between two magnets, use them to locate a hidden magnet, and determine the magnet's orientation
- Summarize ideas about magnetic forces and form a response to the Driving Question.

Grade 3 Module 1 DQ4L4 3-D Learning Objectives TE p. 222

In the Student Edition (called the Twig Book), the **"I can..." statements** for each Driving Question explain the three dimensions in student-friendly language.

Across each full grade, the class creates their own Science Tools poster, which tracks when students first use a SEP and when they later apply it to different contexts. By the time they have completed the last module in the grade, students will have used the SEPs explicitly many times. This metacognitive activity helps students think about the practices they are using and how they help them make sense of phenomena and solve problems.



Grade 3 Module 1 DQ2 "I can..." statements" TB p. 37

The SEPs the students use in each learning activity are labeled at point of use in the Student Edition (called the **Twig Book**), in grade-appropriate language.

**LESSON 3** Stay on Track!

**Challenge**  
**Communicate Information** Write about a ride that uses pushes and pulls.  
 Trace your words on the Ultimate Playground.

**Reflect**  
**Construct Explanations** Draw a picture about how a push or pull changes the direction of the swing.

**Word Wall**  
 • push  
 • pull  
 • direction  
 • force

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Grade 3 Module 1 DQ1L3 Labeled SEPs TB p. 21

**LESSON 4** A Heavyweight Force

**Use Models** Color the hammer. Draw arrows to show the pushes and pulls that cause it to move.

**Word Wall**  
 • gravity

Driving Question 1 | Lesson 4

Grade 3 Module 1 DQ1L4 Labeled SEPs TB p. 22



### F3. Presence of Logical Sequence

The front cover of every Teacher Edition contains the **NGSS Framework Alignment**. It sets out a clear and logical sequence for the Performance Expectations across the Twig Science K–6 modules. It also illustrates how the 29 K–6 modules align directly to the NGSS Topic Arrangements.

The chart displays the alignment of Twig Science modules (K-6) with the NGSS Framework Alignment. It is organized into columns for each grade level (K, 1, 2, 3, 4, 5, 6) and rows for each module. The alignment is indicated by colored boxes corresponding to the NGSS Topic Arrangements.

NGSS Framework Alignment

The cover also contains the grade-specific **Scope and Sequence**, which clearly identifies the sequence of the modules, as well as the three dimensions that each module targets. Cross-curricular connections are also included.

The chart displays the Grade 1 Scope and Sequence. It is organized into columns for each module (1, 2, 3, 4, 5, 6) and rows for each dimension (Science Practices, Cross-Cutting Concepts, and Disciplinary Core Ideas). The sequence of modules is indicated by colored boxes.

Grade 1 Scope and Sequence (TE Inside Cover)

The **Module Contents** of each Teacher Edition (pp.ii–iii) clearly identifies which Performance Expectations are addressed in each Driving Question, and how the three dimensions build on each other.

The chart displays the Grade 1 Module 1 Module Contents. It is organized into columns for each Driving Question (1, 2, 3, 4, 5, 6) and rows for each dimension (Science Practices, Cross-Cutting Concepts, and Disciplinary Core Ideas). The contents are listed in detail.

Grade 1 Module 1 Module Contents

The **Performance Expectation Progressions table** in the back cover of every Teacher Edition highlights prior experience of the three dimensions in earlier grades, as well as future exposure in later grades.

**MUSEUM OF LEAFOLOGY**  
Performance Expectation Progressions  
NGSS Topic Arrangements: Structure, Function, and Information Processing: Engineering Design

Museum of Leafology covers two NGSS Performance Expectations (PEs) in Life Sciences (LS.1.1 and LS.1.2) and three in Engineering Design (E-2-ETS1.1, E-2-ETS1.2, and E-2-ETS1.3).

Together, these PEs explore the structure and function of plants' external parts and the inheritance and variation of traits in plants. These are investigated further in Grade 1, Module 2, *Annual Reporters*, with the focus shifting from plants to animals.

PROGRESSION	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
<b>Module 1</b> The Museum of Leafology Students are introduced to plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 2</b> Annual Reporters Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 4</b> The Museum of Leafology Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 2</b> The Museum of Leafology Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 5</b> The Museum of Leafology Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 1</b> The Museum of Leafology Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.	<b>Module 1</b> The Museum of Leafology Students explore the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems. They learn about the structure and function of plants, identifying parts and structures, and learning about the function of leaves and stems.

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**Grade 1 Module 1 Performance Expectation Progressions table**

An Overview of every Driving Question provided in the Teacher Edition briefly explains how the student experience of the three dimensions progresses across the lessons of that Driving Question.

In addition, every lesson starts with an Overview that adds detail for how the three dimensions build across the five sections of each lesson.

**Spark:** An engaging “hook” activity, which motivates students for the investigations ahead.

**Investigate:** Students think like scientists and design like engineers, through hands-on, digital, video, and informational text Investigations.

**Report:** Students articulate what they’ve learned today, citing evidence and their use of the three dimensions.

**Connect:** Students make connections to the Driving Questions and Module Investigative Problem, while building knowledge of CCCs and SEPs.

**Reflect:** Students use different means to think about what they have learned so far and how they can use their new understandings to better figure out phenomena/problems.

**Earthquakes in Oklahoma**

**OVERVIEW**

<b>Spark</b>	5 min	Students examine a graph showing the growing number of earthquakes in Oklahoma in recent years.
<b>Investigate</b>	15 min	Students read an informational text about earthquakes in Oklahoma using close reading strategies.
<b>Report</b>	18 min	Students write a news report about the change in the number of earthquakes in Oklahoma.
<b>Connect</b>		There is no Connect in this lesson.
<b>Reflect</b>	7 min	Student pairs take turns to read their news reports to one another.

STANDARDS	3-D LEARNING OBJECTIVES
<b>NGSS</b> ESS2.B Plate Tectonics and Large-Scale System Interactions ESS2.B Biogeology SEP-1 Asking Questions and Defining Problems SEP-3 Using Mathematics and Computational Thinking SEP-4 Obtaining, Evaluating, and Communicating Information CCC-3 Patterns CCC-2 Cause and Effect Interdependence of Science, Engineering, and Technology Influence of Science, Engineering, and Technology on Society and the Natural World <b>CROSS-CURRICULAR CONNECTIONS</b> Principle 1 People Depend on Natural Systems Principle 2 People Influence Natural Systems Principle 3 Natural Systems Change in Ways that People Benefit from and can Influence Principle 4 There are no Permanent or Impassable Boundaries that Prevent Matter from Flowing between Systems Principle 5 Decisions Affecting Resources and Natural Systems are Complex and Involve Many Factors Standard 3: The Language of Mathematics (Reading, Writing, Thinking) Standard 4: The Language of Science (Reading)	<b>Students will:</b> <ul style="list-style-type: none"> <li>Obtain and discuss information from a text about earthquakes</li> <li>Analyze a text and a graph to determine patterns and cause and effect relationships</li> <li>Present information in a news report in written and oral form.</li> </ul> <b>RI.4.1, RI.4.3 Key Ideas and Details</b> <b>RI.4.2, RI.4.4 Integration of Knowledge and Ideas</b> <b>W.4.9 Research to Build and Present Knowledge</b> <b>SL.4.1 Comprehension and Collaboration</b> <b>SL.4.4 Presentation of Knowledge and Ideas</b> <b>4.MD.8 Represent and interpret data</b>

**Grade 4 Module 4 DQ2L5 Lesson Overview TE p. 80**