

Science

CORE CURRICULUM

twig SCIENCE

Elementary

Phenomena-Based, Digital-Forward, 3-D Learning



“Our district appreciates how unbelievably responsive the Twig Science team has been! We feel we have a true partner in getting the highest quality instructional materials into our young scientists’ hands.”

...
Ryan R., Pre-K-5 Instructional Coach, Los Angeles, CA



Let's Make More Aha! Moments

twig SCIENCE Elementary

Find What Truly Inspires Them

Twig Science Elementary was designed from the ground up for the NGSS/3-D science by award-winning STEM education specialists. Students investigate and make sense of phenomena through multiple modalities — from hands-on activities and digital and video investigations to collaborative projects — empowering each and every student to connect with learning tailored for them.

Stop Finding Time, Start Saving Time

Getting started with Twig Science is easy — and with Twig Science Fast Track, comprehensive yet simple assessment tools, and countless opportunities to integrate with ELA lessons, the time you have for science will be richer than you ever imagined.

Adventures Designed Around Your Students

Alongside some of the world's leading STEM educators, we developed a program that connects everything students do to anchor phenomena and supporting investigative phenomena, providing tangible, real-world examples of science that extend far beyond the classroom.



English/Spanish

Twig Science has more Spanish resources than any other NGSS/3-D science program. All student-facing materials are available in Spanish and with read-aloud technology.

K-5/K-6

Twig Science Elementary is available as a complete K-6 program with the same lesson structure and instructional design. Alternatively, the K-5 program integrates seamlessly with Twig Science Middle School, following the adventure through 6-8.

Program Structure

Twig Science Elementary contains everything you need to teach Next Generation Science Standards and 3-D learning. You can choose between the **Full Course** and **Fast Track**, and teach either in-class, remotely, or in hybrid. Assessment is built in throughout. **Twig Coach** video lessons and **Leveled reader** lessons are also available to support student learning.

Full Course

The Full Course includes every hands-on, digital, and video investigation created for Twig Science Elementary over approximately 90 to 160 hours of instruction per year:

- 4 or 5 modules in each grade
- 3-7 Driving Questions per module
- 2-16 lessons per Driving Question

Lessons are 40 minutes at grades K-1, 45 minutes at grades 2-4, and 50 minutes at grades 5-6. Altogether there are 858 lessons in the Full Course.



Fast Track



Fast Track covers every NGSS/3-D standard and includes the same phenomena and STEM-role narratives as the Full Course ... just at an accelerated pace, taking 25% less time compared to the Full Course.

- Pacing Guide PDFs
- Customized Google Slides
- Assessment Overviews
- Lab Kit and Teacher Provided Materials lists
- Revised Word Walls and Science Tools posters



Twig Coach



On-demand, bite-sized Twig Coach video lessons bring highly engaging phenomena through high-quality, in-class or remote STEM investigations — fully aligned to the NGSS.

- Studio-quality lesson videos presented by experienced teachers
- Self-guided or assigned pace
- Students interact with lessons through rich media and text



Leveled Readers

Magazine-style leveled readers let students explore ideas in depth at their own pace while meeting real-world scientists and engineers. Leveled reader lessons include reading activities and multiple writing opportunities. Readers are available in print and digital at four levels — On-, Above-, and Below-Level, and English Learner — and are ideal for use in differentiated small-group reading time.



1. Exploring Phenomena

Build curiosity about a phenomenon — students will discover what we know and how we know it.

CHAPTER 1 THE CURIOUS SCIENTIST

Today, the idea that loud noises can cause an earthquake makes us laugh. But long ago, people believed it could. In ancient times, people didn't have scientific explanations for what happened in the natural world. Still, they needed to make sense of natural disasters—like earthquakes—that could wipe out a whole town in a matter of minutes. So they came up with some pretty way-out explanations.

It's an EARTHQUAKE!!

Nah, it's just that rock band next door practicing again.

2. STEM Career

Introduce students to real professionals working in STEM careers in fascinating interviews.

CHAPTER 2 STEM CAREER MEET A SEISMOLOGIST

Dr. Rebecca Bell

Many different kinds of scientists study the Earth's activity in and around the Ring of Fire. **Volcanologists** study volcanoes. **Seismologists** study earthquakes. They look at movements, or energy waves, in the Earth's crust. Let's find out more from seismologist Dr. Rebecca Bell.

What does a seismologist do?

We are like detectives. We look for clues about the past in rocks. We study seismic waves. We do experiments and examine data to discover the source, size, and cause of seismic waves. They cause earthquakes.

What do you do your work?

3. Real-World Connection

Showing why students should care about a phenomenon and how it affects them.

CHAPTER 3

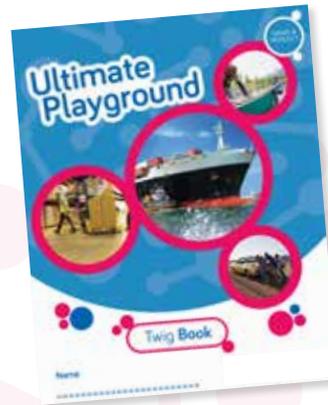
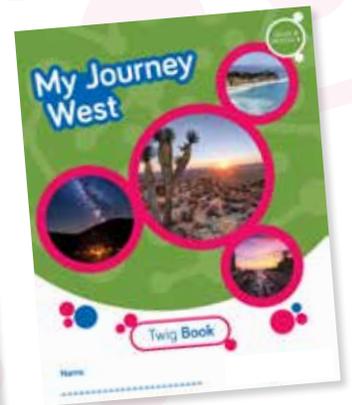
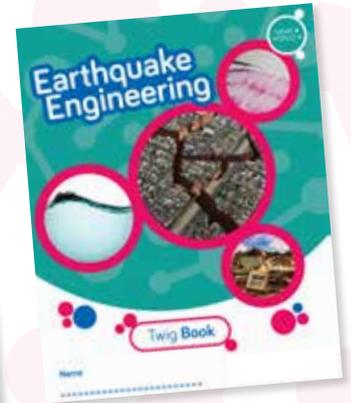
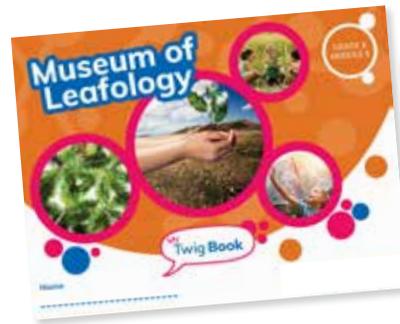
EARTHQUAKE PROOFING: WHAT'S THE COST?



Program Components: Student Experience

Twig Books

Colorful, all-in-one text and investigation student books in digital and print, for modeling, annotation, and sketching, with text-to-speech functionality.



Multimedia Investigations

Theater-quality video content gives students access to high-impact phenomena, while digital interactives based on authentic data let them manipulate real-world phenomena.





Exploring Phenomena

Students use their Twig Books and tools to make sense of phenomena through investigations they carry out in their STEM Roles.



Leveled Readers

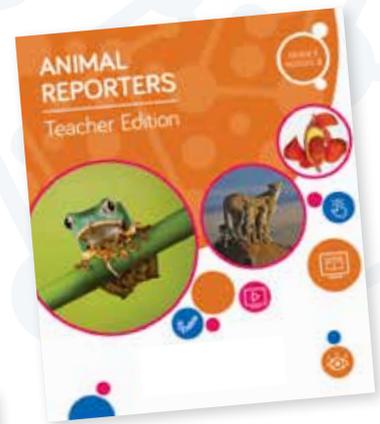
High-interest, magazine-style leveled readers give students the opportunity to explore ideas in greater depth at their own pace while meeting realworld scientists and engineers. They're available in print and digital at four levels — On-Level, Above-Level, Below-Level, and English Learner — and are ideal for use in differentiated small-group reading time.



Program Components: Teacher Experience

Teacher Editions

Modular Teacher Editions with flexible pacing include Fast Track and/or comprehensive lesson planning, with differentiated instruction scaffolds and language routines.



Formative Assessment (Informal Assessment)
Key: Driving Question (DQ) Lesson (L) Teacher Edition (TE) Twig Book (TB)

Page	Assessment / Tool	Description	Type	What's being assessed?
DQ1L1, Reflect (TE p. 11)	Twig Book	Students reflect on what they already know about natural disaster and what they still wonder about.	Self-reflect Filling in a KLEW chart (TB p. 4)	Prior knowledge
DQ1L3, Report (TE p. 25)	Teacher Observation	Students share the results of their investigations.	Class discussion	Student understanding of where the energy of waves comes from.
DQ2L1 (TE p. 54)	Earthquake Patterns Progress Tracker	Students use an interactive map to make observations.	Constructive Filling in a	
DQ2L1 (TE p. 54)	Earthquake Patterns Progress Tracker	Students explore an interactive map.	Constructive Written e 24)	
DQ2L2 (TE p. 62)	Earthquake Patterns Progress Tracker	Students use an interactive to explore seismic plates.	Constructive Filling in a Chart, Ev graphic o	
DQ2L4 (TE p. 78)	Earthquake Patterns Progress Tracker	Students read a text about historical earthquakes in California to obtain information.	Constructive Filling in a organiza Filling in a	



3-D Performance Assessment Suite

Formative and summative assessments measure students' abilities to meet all aspects of Performance Expectations. Rubrics provide clear guidance on how to assess students of all skill levels. Flexible options to monitor student progress are included.

Digital Platform

The innovative, easy-to-use Twig Science digital platform can be used as a stand-alone environment or with print, and it includes presenter tools, automatic rostering, single sign-on, and accessibility tools along with thousands of videos providing access to real-world phenomena for every student.



Module Lab Kits and Essentials Kits

There are two kinds of hands-on kits available for Twig Science Elementary. Module Lab Kits are clearly labeled, simply organized, and available for each module, ensuring efficient use of materials for small or larger groups during hands-on investigations. We offer module replenishment kits for consumable items. At Grades 3–5, optional Science Essentials kits provide high-value, multipurpose equipment.



Video Labs

Students can investigate phenomena anywhere, anytime, and educators can decide whether hands-on or video labs meet their needs.



Assignable Lessons

Assign lessons to students using the digital, interactive version of the Twig Books. Students can upload pictures, drawings, visual observations, and snapshots to build up a digital portfolio. Teachers can provide feedback directly in each student's digital Twig Book.



Model Lessons and Background Knowledge

Every module kicks off with a short teacher introduction film, giving an overview of the Anchor Phenomenon or Investigative Problem, the sequence of learning, and how the Performance Expectations are addressed. Our professional learning materials include teacher background information for every module, unpacking the science in bite-sized chunks, and a digital guide to the Science and Engineering Practices and Crosscutting Concepts.

In-Person and Webinar Training

Our specialist team is there to provide support in-person and/or online for technical, implementation, and science-topic training.



Why Twig Science Elementary?

Drive learning by engaging and exciting students with a series of investigations that use multimedia tools to bring science and engineering to life.

STEM-Role Investigations

Hands-on, digital, and video investigations provide captivating real-world experiences in dozens of STEM roles — from park rangers and earthquake engineers to deep-space explorers and time-traveling tour guides.



Thousands of Award-Winning, Theater-Quality Videos and Interactives

All students regardless of background are transported to gather evidence of both local and global phenomena, experiencing science and engineering careers directly through thousands of high-quality videos and interactives.



Engaging with Phenomena

Phenomena are observable events or features in a natural or designed system. When students experience phenomena, they wonder and ask scientific questions. The process of making sense of, explaining, and predicting phenomena leads to deeper and more transferable knowledge.

Students define, investigate, and explain real-world phenomena.

Driving Questions build in complexity, scaffolding students' acquisition of the three dimensions required to master each Module Anchor Phenomenon.



The Ultimate Playground
How are objects affected by the forces of push and pull?

GRADE 3
MODULE 1

What would your ultimate playground look like?
Welcome to the Twig Science Ultimate Playground module! In this module, students investigate forces and use what they learn to design the most incredible playground ever. As well as regular playground equipment like swings and slides, students incorporate futuristic attractions like test-your-strength games, and even amusement park rides like roller coasters. Through hands-on investigations, texts, and videos, students learn how forces make things move, whether it's making carousel spin or skydivers fall. They investigate how magnets can exert a force without contact—enough to make a train levitate! Students also build their own model swings and gambells, and even take part in games of miniature tag-of-war!

Also included...
The Pet Problem!
Kick off Grade 3 with a fun 3-D Team Challenge. Not all pets like the rain, so students are challenged to design an umbrella for their favorite pet! They work as teams of scientists and engineers, researching ideas, investigating solutions, and improving their designs.
Say goodbye to wet pets!

Hold on tight—it's going to be quite a ride!

Driving Question 1
What happens when several different forces push or pull on an object at once?
47

Performance Expectation: 3-PS2-1 Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
This Driving Question introduces the module challenge of designing the Ultimate Playground. Students study forces and changes in motion as Ultimate Playground. Students study forces and changes in motion as Ultimate Playground. Students study forces and changes in motion as Ultimate Playground. Students study forces and changes in motion as Ultimate Playground.

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Driving Question 4
How can some objects push or pull one another without even touching?
195

Performance Expectation: 3-PS2-3 Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other.
Students explore more forces. Students already know about gravity; now, they learn about static electricity and magnetism. Students begin to design a magnetism game for the Ultimate Playground.

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Lesson 3 Create Magnet Questions	216

Driving Question 5
How can we solve a design problem by using magnets?
231

Performance Expectations: 3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion; 3-PS2-4 Define a simple design problem that can be solved by applying scientific ideas about magnets; 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost; 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem; 3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Students are introduced to an industrial application of magnets: maglev trains, and then go on to design a tabletop game that uses magnets, and a model for a Dragon Ride, the centerpiece of the Ultimate Playground.

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Roller-Coaster Ride: Levelled Reader Lessons
294

Chapter 1 How Do Roller Coasters Work? This chapter focuses on the science of roller coasters, including potential energy, energy of motion, inertia, momentum, and centripetal force. It teaches students strategies that skilled readers use to navigate and comprehend informational texts while reading independently.	294
Chapter 2 STEM Career: Meet a Roller Coaster Designer This chapter focuses on the career of a roller coaster designer. It includes an optional micro-lab in which students create a model roller coaster using magnets.	302
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I can...

- Explore the phenomena of forces
- Observe how playground objects use forces
- Investigate how the size and direction of forces can change a ball's motion
- Use models to show how forces act on and change the motion of objects.

Students use their experiences of figuring out phenomena to build up science skills, knowledge, and understanding.

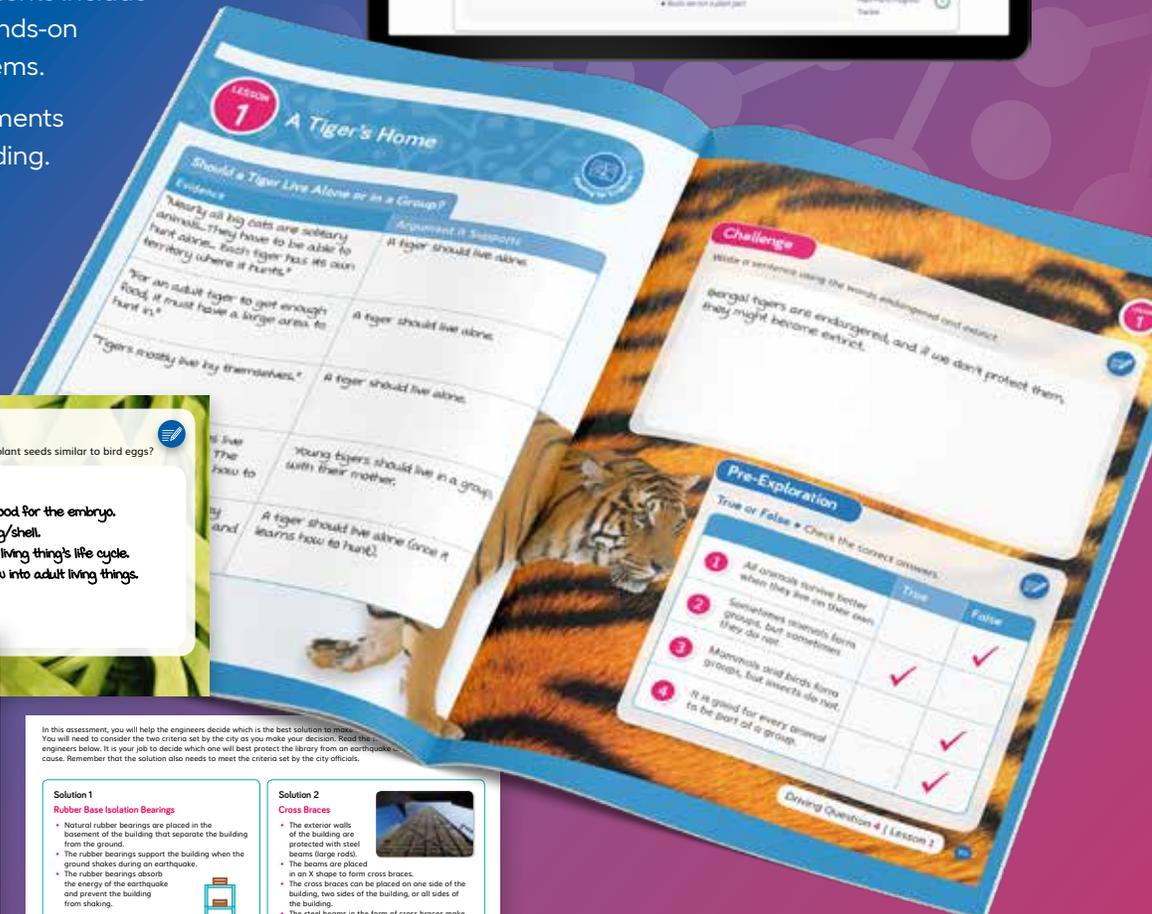
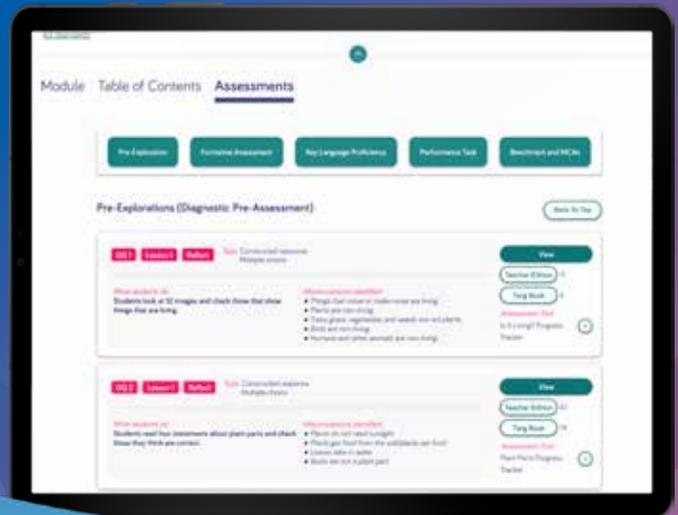
Assessment Platform

Developed in Partnership with Stanford University's SCALE Team

The Twig Science assessment platform enables students to demonstrate thinking, knowledge, and practices to unpack phenomena and solve design challenges.

Assessment Types

- Pre-Explorations identify students' prior-knowledge and misconceptions.
- Formative Assessment includes written responses, discussions, teacher observations, and self and peer assessment.
- Summative Performance Tasks allow students to demonstrate growing mastery of Performance Expectations.
- SCALE Benchmark Assessments include video and data analysis, hands-on activities, and design problems.
- 3-D Multiple Choice Assessments quickly measure understanding.



Reflect

Compare and Contrast • In what ways are plant seeds similar to bird eggs?

- They are both alive.
- They both contain an embryo and food for the embryo.
- They both have a protective covering/shell.
- They are both the first stage in the living thing's life cycle.
- They both have the potential to grow into adult living things.

Driving Question 4: How can our understanding of earthquakes and materials help us build safer buildings?

Formative Assessment (Informal Assessment)

Standard	Description	What's being assessed?	Where is it assessed?
CC.12.1.B.1.1 (12-1)	Students write about or draw and label the features of their own organism and compare it to a picture of a tiger that reflects something they've learned over the past few weeks.	Student ability to compare animals and describe similarities, differences, and functions. They use comparisons to explain the features of organisms as examples.	• 12-1 (1)
CC.12.1.B.1.2 (12-2)	Students describe one way that they have worked with their partner.	Students think about what strategies they find useful when working with their partner.	• 12-2 (2)

Driving Question 4: How can our understanding of earthquakes and materials help us build safer buildings?

In this assessment, you will help the engineers decide which is the best solution to meet the criteria set by the city as you make your decision. Read the engineers' below. It is your job to decide which one will best protect the library from an earthquake. Remember that the solution also needs to meet the criteria set by the city officials.

Solution 1

Rubber Base Isolation Bearings

Natural rubber bearings are placed in the basement of the building that separate the building from the ground.

- The rubber bearings support the building when the ground shakes during an earthquake.
- The rubber bearings absorb the energy of the earthquake and prevent the building from shaking.

Solution 2

Cross Braces

The exterior walls of the building are protected with steel beams (large rods).

- The beams are placed in an X shape to form cross braces.
- The cross braces can be placed on one side of the building, two sides of the building, or all sides of the building.
- The steel beams in the form of cross braces make the walls stronger.
- The steel beams of the cross braces also absorb energy from earthquakes and prevent the building from shaking.

Progress Trackers

Progress Trackers help teachers monitor progression within a module, while data from summative assessments track the direction of travel toward required grade level proficiency for each Performance Expectation.

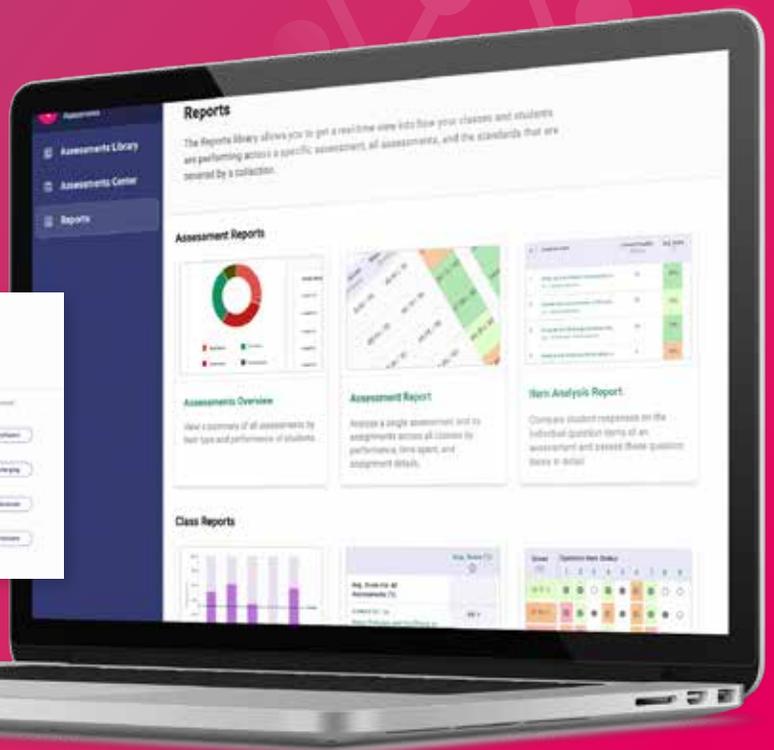


Progress Tracker: Earthquake Patterns twg

Misconception	Tally	Total	Notes
Earthquakes are rare events.			
All earthquakes are caused by erupting volcanoes.			
Earthquakes are most deadly when they cause the ground to open up as people, animals, plants, and buildings can fall into openings and disappear.			
Earthquakes are equally likely to happen anywhere on Earth.			
NGSS	Tally	Total	Notes
Describes that maps can help locate land and water features. (4-ESS2-2)			
Identifies a pattern involving the locations of mountains, earthquakes, and volcanoes. (4-ESS2-2, ESS2.B, SEP-4, CCC-1)			
Describes that earthquakes and volcanoes occur in bands along plate boundaries. (4-ESS2-2, ESS2.B, SEP-4, CCC-1)			
Uses patterns as evidence to support claims. (SEP-6, CCC-1)			

Assessments Center

Quickly check how many students have completed an assignment, then click on a specific assignment for more granular detail. Reports provide real-time insights into student performance.



Supporting Every Learner

Twig Science Elementary promotes equitable, inclusive, and accessible learning environments for all students.

English Learner and Language Development

- English Learner scaffolds for Emerging, Bridging, and Expanding proficiency
- Speaking, listening, reading, and writing language domains
- Linguistic frames, tiered vocabulary support, and Stanford UL-SCALE language routines

English Learners

Brainstorms often pull in dominant speakers. If ELs are challenged to verbalize their ideas, offer sentence frames at their proficiency levels as prompts, encouraging them to build on what others have said during the brainstorm.

Substantial Support (Emerging Proficiency)

One question I have about my design is _____.
Should I _____ or _____?

Moderate Support (Expanding Proficiency)

<Student>'s idea made me think about _____. Now, I am wondering if _____.

Light Support (Bridging Proficient)

In addition to what <Student> said, I think my design _____.
What would be a good recommendation for that?

English Learners

As students reflect, invite English Learners to describe or restate aloud the strategies they noticed other groups using with materials, shapes, loads, and design. Direct students to language posted on the academic word wall to show how their ideas and language have evolved, and to support their writing.

Family Outreach Letter 1

The Red List: Introduction to Science Module 3
Dear Families,

Our science class is getting ready to study a new topic: inherited traits and reproduction. We will study animal behaviors and plant structures that increase the likelihood of successful reproduction. These behaviors and characteristics are called traits, and the class will learn how these traits are passed from parent to offspring. We will investigate how the environment can influence the growth of an organism, and then turn to the development of conservation plans for endangered plants and animals.

Your child will be investigating the ways in which animal parents care for their young in order to increase their chances of survival. They will also investigate plant structures that help the plants reproduce and survive with greater success.

You can enhance your child's learning by connecting the science we will study in the classroom to experiences at home or in the outside world. You may wish to:

- Work with your child to look for signs of animals caring for their young in order to increase their chances of survival. For example, you might see a sparrow dragging a nest of incubating her eggs, a bird feeding her young in the grass, or a mother duck guiding her young through the water.
- Work with your child to find signs of the ways in which plant structures attract animals for pollination and aid seed dispersal. For example, guide your child to think about the structure or scent of a flower, the taste of a fruit, or the sticky barbed shell on the outside of a seed that gets stuck to your clothes.

If you are able to help out with classroom activities, please return the attached form.

I look forward to beginning this exploration with you and your child.

Family Outreach Letter 3

Animal Reporters: Introduction to Driving Question 4
Dear Families,

Our class has been studying how animals and their young communicate. Since sound is a main way to communicate, we will learn more about it. Your student will learn that sound is created by vibrations. They will learn vocabulary related to sound, like pitch and volume. Your student will also explore the relationship between a sound's volume and the size of the vibrations, as well as how sound travels.

You can enhance your student's grasp of sound by doing one or two simple things around the house:

- If you have a power foot that vibrates, let your student (safely) feel the vibrations and connect them to the sound it makes.
- If there are any musical instruments at home, especially stringed instruments, let them feel the instrument vibrating or watch the strings vibrate (open up the piano and let them see the bass strings vibrating!). Also, play different pitches learned.

• If you have wine glasses, then you probably know you can rub a moistened finger around the rim to create a musical note. Put some water in the glasses and run your finger around the rim, asking your student to watch the ripples in the water. The vibrating glass is moving the water!

Your student will complete their article by doing research about the sounds their animal makes. If they bring it home, make sure to read it.

Sincerely,

Family Outreach

Editable family letters in multiple languages and school-to-home connections to extend STEM beyond the classroom.

Special Needs

Strategies to assist in accommodating the learning of students with light to moderate disabilities.

Cross-Curricular Connections

Helpful links to ELA, math, history, social science, and arts, increasing the impact and understanding of science in different contexts.

Accessibility

Text-to-speech functionality plus full customization of platform display, with built-in epilepsy-safe, visually impaired, cognitive disability, and ADHD-friendly profiles.

Language Routines

Science language routines, developed by Stanford University's UL-SCALE team, capture everyday language in Tiers 1 and 2 that students use as a bridge to developing Tier 3 language for scientific discourse.

Collect and Display—Collect (Language Routine)

Note the everyday language that students use to describe wave phenomena. During the demonstration, capture everyday language students are using that is especially relevant. This may include words like *waves*, *ripples*, *force*, *movement*, *motion*, *impact*, *center*, *source*, *starting point*, and *travel*. This output of language is important, as it will be used as a reference that students can build on and connect to as they develop scientific language.

Making Waves

Spark 15 min

Fact Board

Earthquake Fact of the Day

- European settlers experienced their first earthquake in America in 1663.

Special Needs

- Conceptual Processing**
If possible, provide access to at least one computer so that students can watch the video again at their own pace during the activity. They may wish to pause and watch sections of the video again.

Discuss the KLEW Charts

Congratulate students on the interesting questions they asked in their KLEW Charts. Point out that they will learn more about earthquakes and how engineering can help make earthquakes less dangerous.

Ask students to first share something about earthquakes from their KLEW Charts and then share something about waves, if possible.

List on the board any phenomena in the KLEW Charts that relate to waves.

Collect and Display—Collect (Language Routine)

Note the everyday language that students use to describe wave phenomena. During the demonstration, capture everyday language students are using that is especially relevant. This may include words like *waves*, *ripples*, *force*, *movement*, *motion*, *impact*, *center*, *source*, *starting point*, and *travel*. This output of language is important, as it will be used as a reference that students can build on and connect to as they develop scientific language.

Demonstrate Waves—Drop a Rock in Water

Hold up the rock and explain that you are going to drop it into a tub of water.

- What will happen? Why do you think so?
- The rock will make a splash.
- The rock will sink to the bottom.
- The rock will make waves.
- There won't be any waves on the surface of the water because the rock falls to the bottom.

Remind students to pay close attention to the surface of the water.

Drop the rock into the water.

Ask students to turn to page 5 of their Twig Books and describe what they observed. When they are finished, ask one or more students to describe aloud what happened at the surface of the water.

Observe the Video

Introduce the video, which shows a raindrop falling on a pool.

Play the Raindrop video.

Ask a few students to describe what they observed.

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Twig Book, p. 5

Make Observations • Describe what you observed when the rock was dropped in water.

When the rock hit the surface of the water, it caused ripples to go out in circles. They looked like little waves. By the time the rock hit the bottom of the tray, the ripples had faded away and the surface of the water went flat again.

Raindrop video



You've never seen core like this before



imagineD
classroom



·twig·

SCIENCE

Imagine Learning is with you every step of the way.

To learn more or to connect with your local account executive, go to www.imaginelearning.com/contact-us

