twig Science



Designed for the NGSS: Foundations Teacher Support Evidence Chart

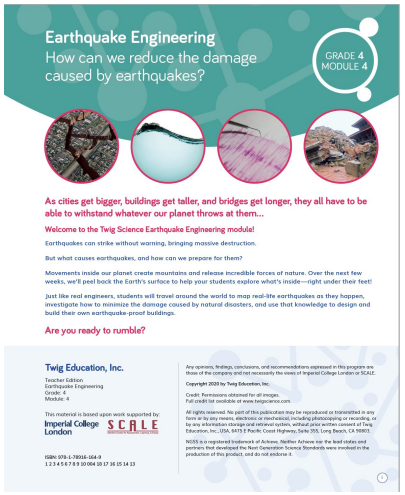
Teacher materials...	Strong	Adequate	Weak
F1. Presence of Phenomena/Problems. Identify and provide background information about the phenomena/problems in the unit and how they match the targeted learning goals.	✓		
F2. Presence of Three Dimensions. Identify and provide background information about the each of the three dimensions in the unit. ● the SEPs ● the DCIs (including engineering) ● the CCCs ● *also note* (NoS/CNS) and Connections to Connections to Engineering, Technology and the Applications of Science (ETS/CETAS)	✓		
F3. Presence of Logical Sequence. Identify and provide background information on the sequence of learning in the unit.	✓		

Strengths related to these Teacher Supports

F1. Presence of Phenomena/Problems.
The program is strong Identifying and provide background information about the phenomena/problems in the unit and how they match the targeted learning goals.

Evidence

- A **Module Overview**, available online and in print (TE p. i), sets out at a high level how students will make sense of the Module Phenomenon or Module Investigative Problem.



Module Overview (TE p. i)

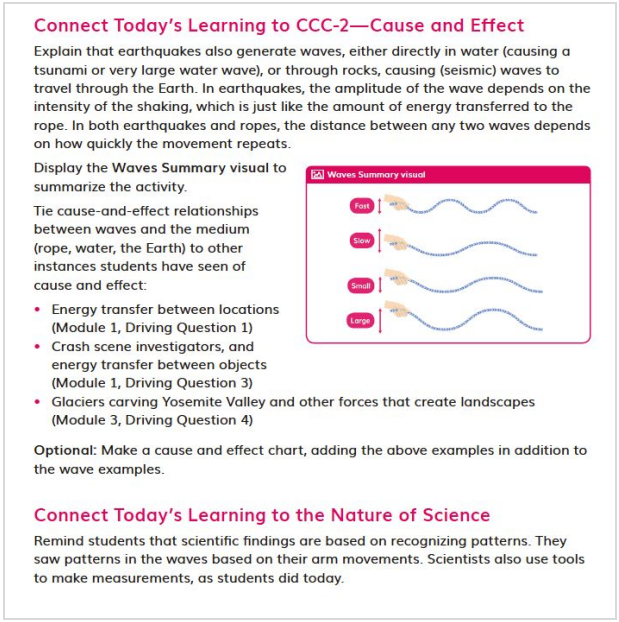
- Teacher Background Information is available for every module online. It provides information on the phenomena/problems and DCIs addressed in every Driving Question (DQ) and is explained simply in Question & Answer format with supporting diagrams and visuals. A glossary of scientific terms is also provided. For example, in Grade 4 Module 4 Earthquake Engineering:
  - DQ1 (How are waves involved in earthquakes?) is provided on seismic waves, earthquake magnitude, and the effects of earthquakes.
  - DQ4 (How can our understanding of earthquakes and materials help us build safer buildings?) explains fair tests.

Grade 4 Module 4 DQ1 Teacher Background Information

F2. Presence of Three Dimensions.
The program is strong at identifying and providing Teacher Background Information about the each of the three dimensions in the unit. It also supports opportunities to connect to the nature of science and engineering, technology, and applications of science.

Evidence

- A digital Guide to SEPs and CCCs provides a clear explanation for each practice and concept, with guidance on what these skills should look like in different grades, and specific references to learning activities in different modules.
- Additional module-specific support is frequently given at point of use in the instructional materials for all dimensions, NoS, and ETS—often in the Connect section of a lesson. For example, in **Grade 4 Module 4 DQ1L3 Connect (TE p. 26)**, support is given on connecting the learning activity to CCC-2 and ETS.



Connect Today's Learning to CCC-2—Cause and Effect

Explain that earthquakes also generate waves, either directly in water (causing a tsunami or very large water wave), or through rocks, causing (seismic) waves to travel through the Earth. In earthquakes, the amplitude of the wave depends on the intensity of the shaking, which is just like the amount of energy transferred to the rope. In both earthquakes and ropes, the distance between any two waves depends on how quickly the movement repeats.

Display the **Waves Summary visual** to summarize the activity.

Tie cause-and-effect relationships between waves and the medium (rope, water, the Earth) to other instances students have seen of cause and effect:

- Energy transfer between locations (Module 1, Driving Question 1)
- Crash scene investigators, and energy transfer between objects (Module 1, Driving Question 3)
- Glaciers carving Yosemite Valley and other forces that create landscapes (Module 3, Driving Question 4)

Optional: Make a cause and effect chart, adding the above examples in addition to the wave examples.

Connect Today's Learning to the Nature of Science

Remind students that scientific findings are based on recognizing patterns. They saw patterns in the waves based on their arm movements. Scientists also use tools to make measurements, as students did today.

Grade 4 Module 4 DQ1L3 Connect TE p. 26

F3. Presence of Logical Sequence.
The program is strong at Identifying and providing background information on the sequence of learning in the unit.

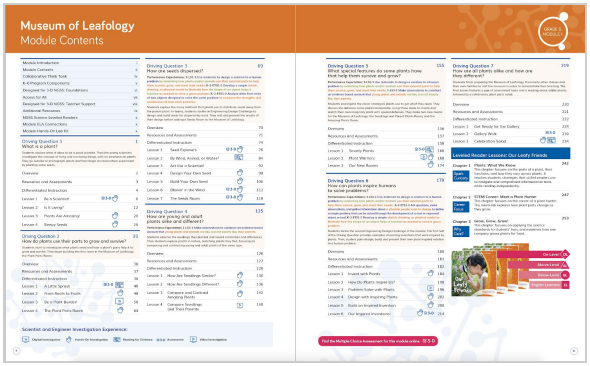
Evidence

- All modules include a Module Introduction video, which gives the teacher an engaging overview of the overarching Module Phenomenon/Investigative Problem that students will explore and investigate, as well as the sequence of learning, and an explanation of how the Performance Expectations (PEs) are addressed and build on each other **(Grade 1 Module 1 Module Introduction video and Kindergarten Module 2 Module Introduction video)**.

Grade 1 Module 1 Museum of Leafology Module Introduction video

Kindergarten Module 2 Marble Run Engineers Module Introduction video

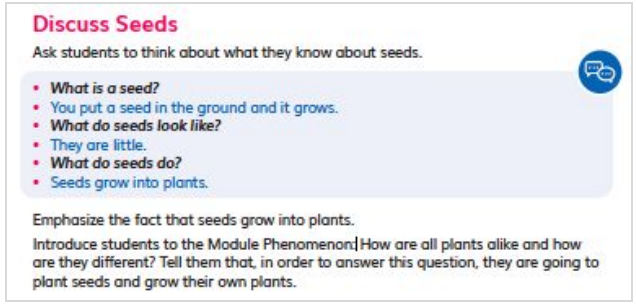
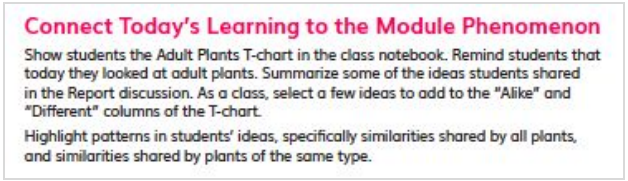
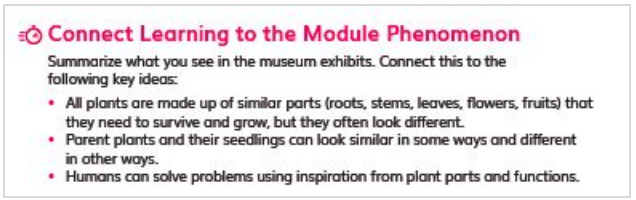
- The Module Contents helps teachers identify the sequence of the three dimensions addressed in each module, and states how they build on each other. For example, in **Grade 1 Module 1 Module Contents (TE pp. ii–iii)**:
    - DQ1: Students review prior knowledge with a class read-aloud about living things, then sort cards into living and non-living things (DQ1L1 and DQ1L2). (K-LS1-1)
    - DQ2: Students observe seedling roots, and learn about the different parts plants have through hands-on, video, close reading, and interactive investigations. They learn a song about plant parts, then write about what each part does. (CCC-1, CCC-6, LS1.1)
    - DQ3: Students compare different seeds and gather information about how they disperse. Then they design, make and text a seed model that can be dispersed by wind.(LS1.A, CCC-6, SEP-2)
    - DQ4: Students compare different plants, listing similarities and differences, through hands-on and video investigations. (LS1.A, 1-LS3-1)
    - DQ5: Students investigate how different plants use their external structures for defense and protection. They use video and close readings to gather information. (LS1.A, SEP-2, CCC-6)
    - DQ6: Students apply what they have learned so far in the module to design a solution to a human problem that mimics the structure of plants. (1-LS1-1, LS1.A, ETS1.A, ETS1.B, SEP-2, SEP-6, CCC-6)
    - DQ7: The module culminates in the class preparing to present their museum rooms to the family and friends, and share what they have learned about plants over the course of the module.



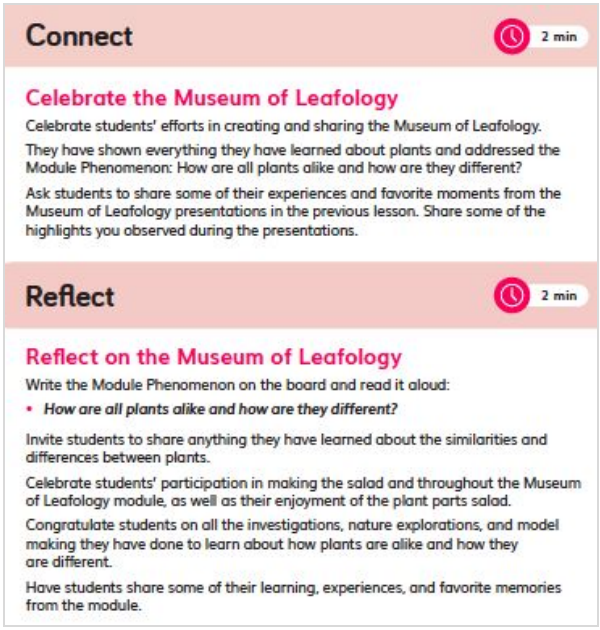
Grade 1 Module 1 Module Contents TE pp. ii–iii

Designed for the NGSS: Student Work Teacher Support Evidence Chart

Teacher materials…	Strong	Adequate	Weak
SW1. Phenomena/Problems. Provide support and strategies for how to help students figure out/solve authentic and relevant phenomena/problems using the three dimensions.	✓		
SW2. Three-dimensional Conceptual Framework. Provide support and strategies for how teachers • help students develop a conceptual framework of scientifically accurate understandings and abilities related to DCIs, SEPs, and CCCs, CNS and CETAS, ELA and math • create a learning environment that values students' ideas, motivates learning, and helps students negotiate new meaning as they interact with others' ideas, new information, and new experiences.	✓		
SW3. Prior Knowledge. Provide support and strategies to leverage students' prior knowledge and experiences to motivate learning.	✓		
SW4. Metacognitive Abilities. Provide support and strategies for how to help students develop metacognitive abilities.	✓		
SW5. Equitable Learning Opportunities. Provide resources and strategies for how to ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences.	✓		

Strengths related to these Teacher Supports	
SW1. Phenomena/Problems. The program is strong at providing support and strategies for how to help students figure out authentic and relevant phenomena using the three dimensions.	
Evidence ● The instructional materials have been designed to support the teacher to guide students on a scaffolded learning journey to solve the Module Phenomenon/Investigative Problem. They figure it out one DQ at a time, applying the three dimensions with increasing sophistication, and building the skills and knowledge they need through a series of investigations. ● The teacher is supported in the instructional material to connect their learning experiences back to the central phenomenon/problem at strategic points, with a culminating class project or discussion where students share their ideas and evidence for how to resolve the Module Phenomenon/Investigative Problem. For example, in Grade 1 Module 1: ○ DQ1L4: Discuss Seeds introduces students to the Module Phenomenon **(DQ1L4 Spark TE p. 28)**	 **Discuss Seeds** Ask students to think about what they know about seeds. • *What is a seed?* • You put a seed in the ground and it grows. • *What do seeds look like?* • They are little. • *What do seeds do?* • Seeds grow into plants. Emphasize the fact that seeds grow into plants. Introduce students to the Module Phenomenon: How are all plants alike and how are they different? Tell them that, in order to answer this question, they are going to plant seeds and grow their own plants. **Grade 1 Module 1 DQ1L4 Spark TE p. 28**
○ DQ4L3: Connect Today's Learning to the Module Phenomenon **(DQ4L3 Connect TE p. 147)**	 **Connect Today's Learning to the Module Phenomenon** Show students the Adult Plants T-chart in the class notebook. Remind students that today they looked at adult plants. Summarize some of the ideas students shared in the Report discussion. As a class, select a few ideas to add to the "Alike" and "Different" columns of the T-chart. Highlight patterns in students' ideas, specifically similarities shared by all plants, and similarities shared by plants of the same type. **Grade 1 Module 1 DQ4L3 Connect TE p. 147**
○ DQ7L2: Connect Today's Learning to the Module Phenomenon **(DQ7L2 Connect TE p. 233)**	 **Connect Learning to the Module Phenomenon** Summarize what you see in the museum exhibits. Connect this to the following key ideas: • All plants are made up of similar parts (roots, stems, leaves, flowers, fruits) that they need to survive and grow, but they often look different. • Parent plants and their seedlings can look similar in some ways and different in other ways. • Humans can solve problems using inspiration from plant parts and functions. **Grade 1 Module 1 DQ7L2 Connect TE p. 233**

- DQ7L3: Celebrate the Museum of Leafology, Reflect on the Museum of Leafology **(DQ7L3 TE p. 239)**



Connect 2 min

Celebrate the Museum of Leafology

Celebrate students' efforts in creating and sharing the Museum of Leafology.

They have shown everything they have learned about plants and addressed the Module Phenomenon: How are all plants alike and how are they different?

Ask students to share some of their experiences and favorite moments from the Museum of Leafology presentations in the previous lesson. Share some of the highlights you observed during the presentations.

Reflect 2 min

Reflect on the Museum of Leafology

Write the Module Phenomenon on the board and read it aloud:

- ***How are all plants alike and how are they different?***

Invite students to share anything they have learned about the similarities and differences between plants.

Celebrate students' participation in making the salad and throughout the Museum of Leafology module, as well as their enjoyment of the plant parts salad.

Congratulate students on all the investigations, nature explorations, and model making they have done to learn about how plants are alike and how they are different.

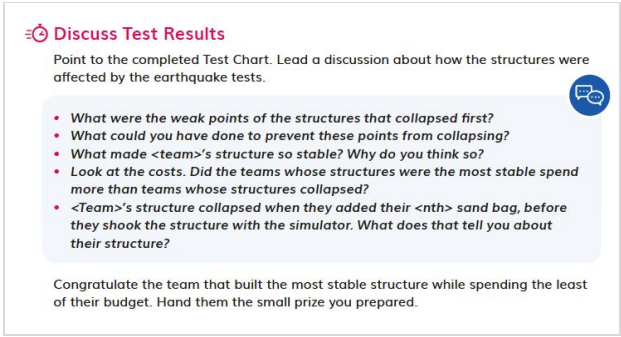
Have students share some of their learning, experiences, and favorite memories from the module.

Grade 1 Module 1 DQ7L3 TE p. 239

SW2. Three-dimensional Conceptual Framework.
The program is strong at providing support for helping students develop a conceptual framework across the dimensions and creating a learning environment that values all students.

Evidence

- The instructional materials are designed to help students build conceptual flow and develop their understanding over time, through hands-on, text, digital, and video investigations. Students follow a sequence of DQs that are designed to progressively build their skills and scientifically accurate understandings.
- Opportunities for students to articulate, question, and revise their conceptual framework are woven into the instructional resources, supporting teachers to assess the progression of their scientifically accurate understandings.
- Strategies on how to tailor instruction for students who require more support is provided for teachers at point of use. For example, in Grade 4 Module 4:
    - DQ3: Students start an engineering project to investigate how the shape, structure, and materials of a building affects its ability to withstand forces (DCI, SEP, CCC, ETS, Math) (TB p. 48). Then, they apply what they learn to an engineering challenge, during which they design, build, and test their own earthquake-resistant structures (DCI, SEP and CCC). They share their designs and problems with their peers, learn from each other, and brainstorm solutions (DCIs, CCC, ELA).
    - DQ4: Students read texts and watch videos to compare and contrast different engineering solutions used by real engineers around the world (ELA, CCC, NoS, HSS, Math, Art).
    - DQ5: Students revisit their earlier designs and apply their new knowledge to make improvements, while still adhering to the criteria for success and constraints (ETS, DCI, SEP, CCC, ELA, HSS).
    - DQ6: Students wrap up with a presentation of their designs, and have a class discussion to summarize their solutions for the Module Investigative Problem: How can we reduce the damage caused by earthquakes? (ETS, DCI's, CCC, SEP, ELA, Art, Math) This final tasks allows teachers and students to celebrate how much progress students have made as scientists and engineers.
- Support is given throughout the program for how to create a positive learning environment, where all contributions are valued along with activities that support teamwork and collaboration. Many of the activities involve students working in pairs and teams. Suggestions for when to emphasize how sharing ideas and receiving feedback from others helps improve designs is provided at point of use in the Teacher Edition, along with suggestions for when to thank students for sharing and when to congratulate them on their success. For example:
    - Grade 4 Module 4, the team that built the most stable structure while spending the least of their budget is congratulated **(DQ4L3 Report TE p. 143)**.



Discuss Test Results

Point to the completed Test Chart. Lead a discussion about how the structures were affected by the earthquake tests.

- *What were the weak points of the structures that collapsed first?*
- *What could you have done to prevent these points from collapsing?*
- *What made <team>'s structure so stable? Why do you think so?*
- *Look at the costs. Did the teams whose structures were the most stable spend more than teams whose structures collapsed?*
- *<Team>'s structure collapsed when they added their <nth> sand bag, before they shook the structure with the simulator. What does that tell you about their structure?*

Congratulate the team that built the most stable structure while spending the least of their budget. Hand them the small prize you prepared.

Grade 4 Module 4 DQ4L3 Report TE p. 143

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Kindergarten Module 2 students are presented with a Marble Run Engineer Certificate at the end of module.
Grade 1 Module 1 students create a celebration salad at the end of the module with plants they have grown!

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Marble Run Engineer Certificate
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Grades 2–6 kick off with a 3-D Team Challenge, during which students develop their teamwork skills and gain understanding of what effective teamwork looks and feels like. For example, The Pet Problem 3-D Team Challenge in Grade 3 Module 1 TE p. 1.

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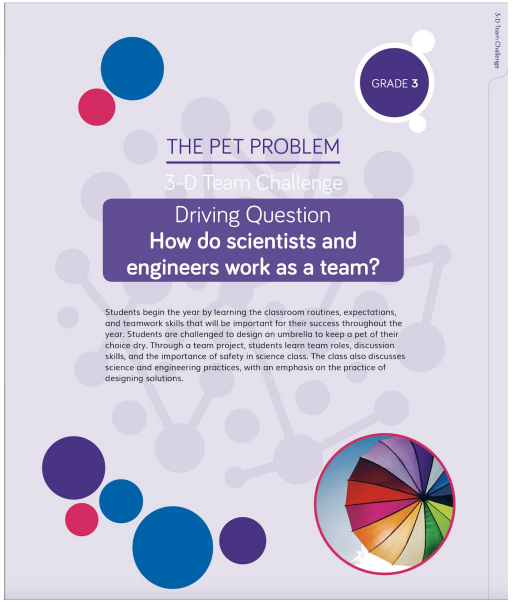

The Pet Problem 3-D Team Challenge in Grade 3 Module 1 TE p. 1
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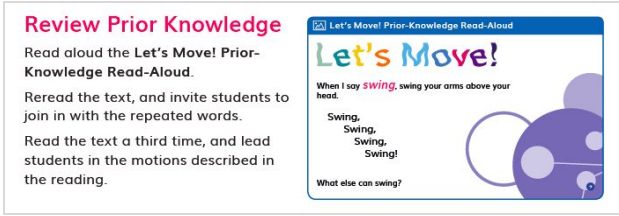
SW3. Prior Knowledge.
The program provides strong support and strategies to leverage students' prior knowledge and experiences to motivate learning.

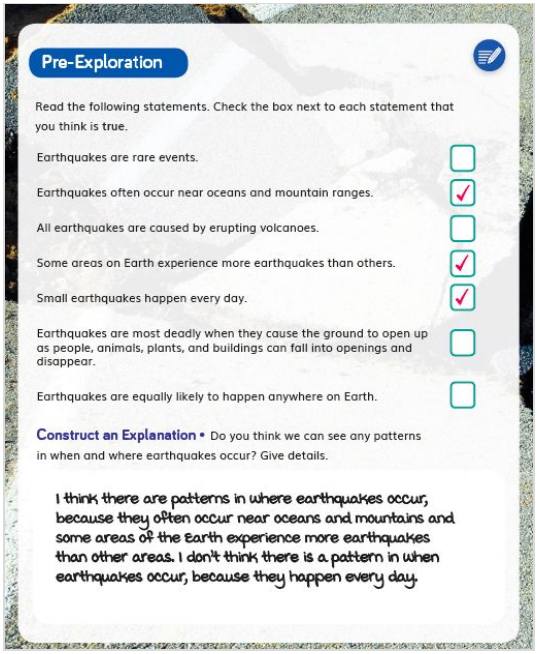
Evidence

- A Prior-Knowledge Read-Aloud is provided at the start of every module to engage students with what they already know about the phenomena explored in the module. For example, **Kindergarten Module 2 DQ1L2 Spark TE p. 16** and Grade 4 Module 4 DQ1L1 TE p. 10.



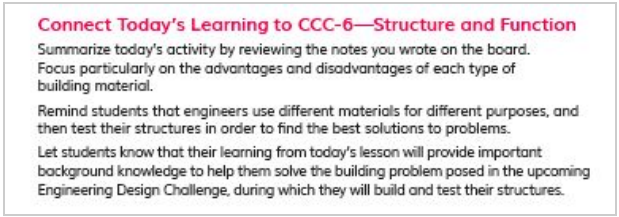
Kindergarten Module 2 DQ1L2 Spark TE p. 16

- Pre-Explorations (diagnostic pre-assessments) help teachers identify students' prior knowledge, as well as any misconceptions they have about the module phenomena/problems. Pre-Explorations are provided at the start of the module and at strategic points in later DQs, so prior knowledge can be activated when most useful. For example, Kindergarten Module 2 DQ1L1 TE Reflect p. 60 and **Grade 4 Module 4 DQ1L5 TB p. 19**/DQ3L1 TB p. 51.



Grade 4 Module 4 DQ1L5 TB p. 19

- The Connect section of each lesson often supports teachers at point of use with strategies to leverage prior knowledge to make sense of the module phenomena/problems. For example, in Kindergarten Module 2, the teacher is prompted to remind students that, in Grade K Module 1, they learned about cause and effect (DQ1L5 TE p. 40) and claims and evidence (DQ2L3 TE p. 100). In **Grade 4 Module 4 DQ3L3 Connect TE p. 115**, the teacher is prompted to remind the students that, what they have learned today provides important background knowledge to solve the upcoming building problem.



Grade 4 Module 4 DQ3L3 Connect TE p. 115

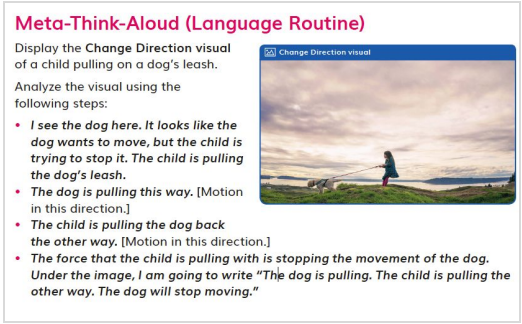
SW4. Metacognitive Abilities.
The program provides strong support and strategies for how to help students develop metacognitive abilities.

Evidence
Each module regularly provides students with explicit opportunities to consider how their learning experiences have changed their thinking.

- Diagnostic pre-assessments (Pre-Explorations) in each module support students to think about the three dimensions they are already familiar with and those they are not.
- "I can…" statements written in grade-appropriate language are provided for each DQ to support student awareness of their growing skills and knowledge of the three dimensions that they will use to figure out the Module Phenomenon/Investigative Problem. For example, "I can… use an interactive to explore earthquakes and volcanoes, and interpret data to understand relationships between earthquakes and tectonic plates **(Grade 4 Module 4 DQ2 "I can…" TB p. 22)**.

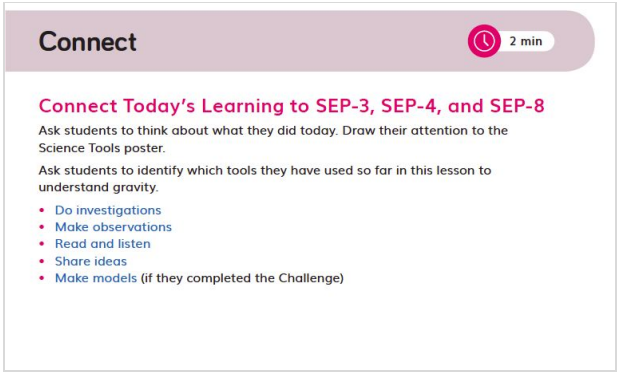
Grade 4 Module 4 DQ2 "I can… statements" TB p. 22

- Meta-Think-Aloud Language Routines support teachers to help students develop an understanding of how they learn particular concepts or why they approach activities in certain ways. For example, in **Kindergarten Module 2 (DQ1L6 TE p. 45)**, guidance is provided to help the teacher describe and analyze the **Change Direction visual**, explicitly pointing out key aspects of the image, so students understand their significance.
- The five-part Twig Science lesson structure has been designed to support students to develop their metacognitive abilities on a daily basis, and monitor *what* and *how* they have learned across the three dimensions.
  - **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.



Kindergarten Module 2 DQ1L6 TE p. 45

- **Connect:** Students make connections to the DQs and Module Phenomenon/Investigative Problem, while building knowledge of CCCs and SEPs. For example, in Kindergarten Module 2, the teacher is supported to help students identify their use of SEP-3, SEP-4, and SEP-8 **(DQ1L8 TE p. 60)**, and students answer the DQ (DQ1L10 TE p. 75). In Grade 4 Module 4, students think about their previous learning and when they have used SEP-2 (DQ1L2 TE p.18), and connect to the DQ by filling in a KLEW chart (DQ1L5 TE p.40).
- **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. For example, in Grade 4 Module 4, students complete the Know and Wonder section of a Know Learned Evidence Wonder (KLEW) chart (DQ1L1 TE p. 11), which they return to later in the module to complete the Learned and Evidence sections (DQ1L5 TE p. 40).



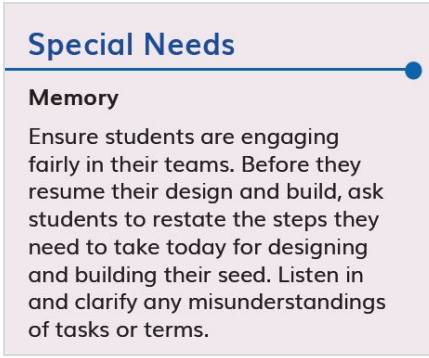
Kindergarten Module 2 DQ1L8 Connect TE p. 60

SW5 Equitable Learning Opportunities

The program provides resources and strategies for how to ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences.

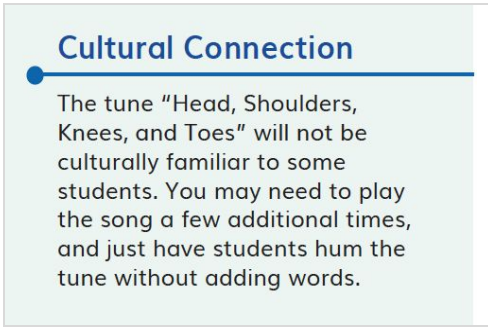
Evidence

- Frequent support is given at point of use in all lessons on strategies to ensure that all students have access to the targeted learning goals. This includes strategies for ELs, students with Special Needs, and GATE students. These supports are included in the sidebars of the Teacher Edition and are present in every single lesson. For example, in Grade 1 Module 1:
  - DQ3L5 Special Needs TE p. 109



Grade 1 Module 1 DQ3L5 Special Needs TE p. 109

  - DQ2L2 Cultural Connection TE p. 52



Grade 1 Module 1 DQ2L2 Cultural Connection TE p. 52

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- DQ3L5 English Learners TE p. 114

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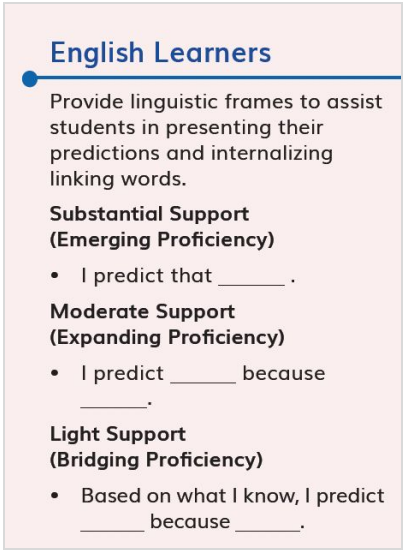

Grade 1 Module 1 DQ3L5 English Learners TE p. 114

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- Every module has Leveled Readers at four levels (Below, On, Above, EL), with lesson instructions in the TE (On-level) and online (Below, Above and EL). The digital versions of the TE and Leveled Readers have text-to-speech function. And there are alt-text descriptions for diagrams and other visuals.

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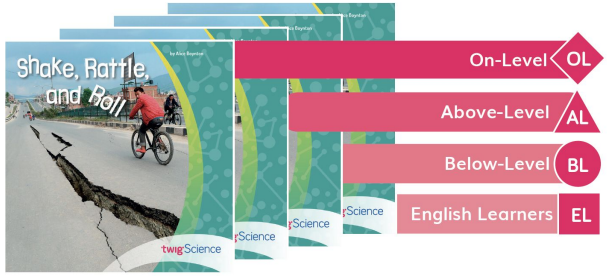

Shake, Rattle, and Roll (Grade 4 Module 4 Leveled Reader)

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- Short, high quality videos, which engage and support learners with diverse learning needs, are frequently provided to spark interest, summarize key science and engineering concepts, and make ideas relevant to the age group. For example:
  - Kindergarten Module 2, the Exploring Forces video (DQ1L4) reinforces key concepts about forces, pushes, and pulls, while the Engineering: Jetpack video (DQ2L2) provides a real-world example of engineering and also gives context to the idea that failure can be a positive learning experience, helping to cultivate student confidence as scientists and engineers.
  - Grade 4 Module 4, the LAX Engineer video (DQ4L2) relates earthquake engineering to a real world example, while the Edison video (DQ4L4) gives context to the idea that failure can be a positive learning experience.

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Designed for the NGSS: Student Progress Teacher Support Evidence Chart

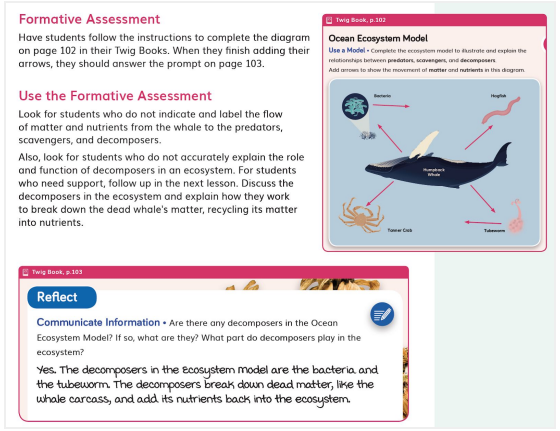
Teacher materials…	Strong	Adequate	Weak
SP1. Three-dimensional Performances. Provide support with a range of sample student responses and/or rubrics for interpreting evidence of student learning across the three dimensions, specific to the element of each dimension, and related to the phenomenon/problem that provides context for the student performance.	✓		
SP2. Variety of Measure. Provide guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.	✓		
SP3. Student Progress Over Time. Provide guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; prompting students to consider what and how they've learned.	✓		
SP4. Equitable Access. Provide support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.	✓		

Strengths related to these Teacher Supports

SP1. Three-dimensional Performances.
The program provides strong support with a range of sample student responses and rubrics for interpreting evidence of student learning across the three dimensions. These are specific to the element of each dimension and related to the Module Phenomenon that provides the context for the student performance.

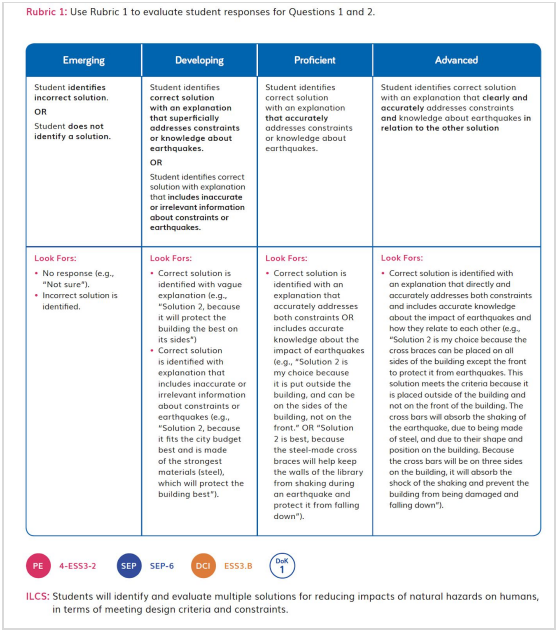
Evidence

- The printed Teacher Edition contains reduxes of the Twig Book with sample student answers, so at a glance teachers have guidance on what student success looks like. A digital version of the TB with sample student answers is available online **(Grade 5 Module 2 DQ5L2 Reflect TE p. 167)**.
- Rubrics are provided for all Performance Tasks. The rubrics are specific to certain PEs and the three dimensions. The assessment tasks are well-connected to the problems, phenomena, and dimensions being assessed.
- Leveled rubrics are provided for the Performance Tasks and Benchmark Assessments in Grades 3–6.



Grade 5 Module 2 DQ5L2 Reflect TE p. 167

- The Benchmark Assessments provide sample answers in the form of “Look Fors,” which support teachers to interpret evidence of student attainment of the four different levels (Emerging, Developing, Proficient, and Advanced). For example, in the Analyzing Maps Benchmark Assessment (Grade 4 Module 4, DQ2 TE pp. 88–91), Rubric 1 assesses SEP-4 and ESS2.B (and part of 4-ESS2-2), while Rubric 2 assesses CCC-1 and ESS2.B. Rubric 1 details that a student developing mastery of these dimensions would identify the accurate location, but would cite little evidence from the map to support their claim, or the evidence would be inaccurate or irrelevant. A sample answer of superficial evidence is given as “because of faults,” while a sample answer of irrelevant evidence is given as “because it is at the bottom of California” **(Grade 6 Module 3 DQ5 Benchmark Teacher Rubric TE p. 237)**.



Rubric 1: Use Rubric 1 to evaluate student responses for Questions 1 and 2.

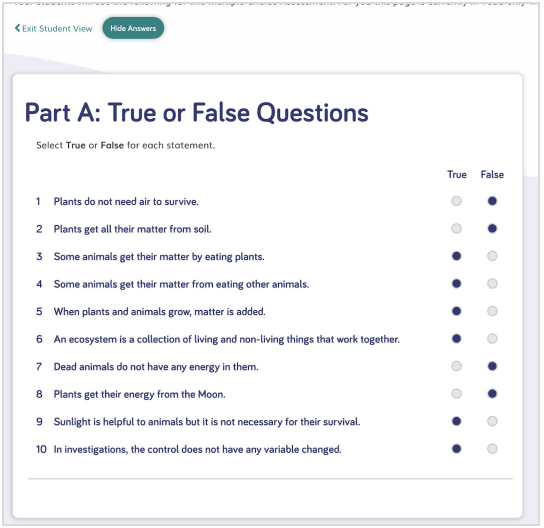
Emerging	Developing	Proficient	Advanced
Student **identifies incorrect solution.** OR Student **does not identify a solution.**	Student identifies **correct solution with an explanation that superficially addresses constraints or knowledge about earthquakes.** OR Student identifies correct solution with explanation that **includes inaccurate or irrelevant information about constraints or earthquakes.**	Student identifies correct solution with an explanation **that accurately** addresses constraints or knowledge about earthquakes.	Student identifies correct solution with an explanation that **clearly and accurately** addresses constraints **and** knowledge about earthquakes in **relation to the other solution**
Look Fors: • No response (e.g., “Not sure”). • Incorrect solution is identified.	**Look Fors:** • Correct solution is identified with vague explanation (e.g., “Solution 2, because it will protect the building the best on its sides”) • Correct solution is identified with explanation that includes inaccurate or irrelevant information about constraints or earthquakes (e.g., “Solution 2, because it fits the city budget best and is made of the strongest materials (steel), which will protect the building best”).	**Look Fors:** • Correct solution is identified with an explanation that accurately addresses both constraints OR includes accurate knowledge about the impact of earthquakes (e.g., “Solution 2 is my choice because it is put outside the building, and can be on the sides of the building, not on the front.” OR “Solution 2 is best, because the steel-made cross braces will help keep the walls of the library from shaking during an earthquake and protect it from falling down”).	**Look Fors:** • Correct solution is identified with an explanation that directly and accurately addresses both constraints and includes accurate knowledge about the impact of earthquakes and how they relate to each other (e.g., “Solution 2 is my choice because the cross braces can be placed on all sides of the building except the front to protect it from earthquakes. This solution meets the criteria because it is placed outside of the building and not on the front of the building. The cross bars will absorb the shaking of the earthquake, due to being made of steel, and due to their shape and position on the building. Because the cross bars will be on three sides on the building, it will absorb the shock of the shaking and prevent the building from being damaged and falling down”).

PE 4-ESS3-2 SEP SEP-6 DCI ESS3.B DoK 1

ILCS: Students will identify and evaluate multiple solutions for reducing impacts of natural hazards on humans, in terms of meeting design criteria and constraints.

Grade 6 Module 3 DQ5 Benchmark Teacher Rubric TE p. 237

- Answer guides are provided for the module Multiple Choice Assessments.



Exit Student View | Hide Answers

Part A: True or False Questions

Select **True** or **False** for each statement.

		True	False
1	Plants do not need air to survive.	○	●
2	Plants get all their matter from soil.	○	●
3	Some animals get their matter by eating plants.	●	○
4	Some animals get their matter from eating other animals.	●	○
5	When plants and animals grow, matter is added.	●	○
6	An ecosystem is a collection of living and non-living things that work together.	●	○
7	Dead animals do not have any energy in them.	○	●
8	Plants get their energy from the Moon.	○	●
9	Sunlight is helpful to animals but it is not necessary for their survival.	●	○
10	In investigations, the control does not have any variable changed.	●	○

Grade 5 Module 2 Multiple Choice Assessment Answer Guide

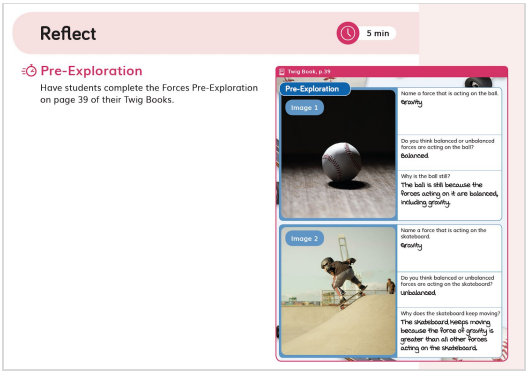
SP2. Variety of Measure.
The program provides strong guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.

Evidence

All modules include assessments in a wide variety of formats, which have clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.

Pre-Explorations (Diagnostic Pre-Assessments)

These pre-assessments include multiple choice and constructed responses (both written and drawn). For example, in **Grade 3 Module 1 (DQ2L1 Reflect TE p. 119 / DQ2L1 Reflect TB p. 39)**.



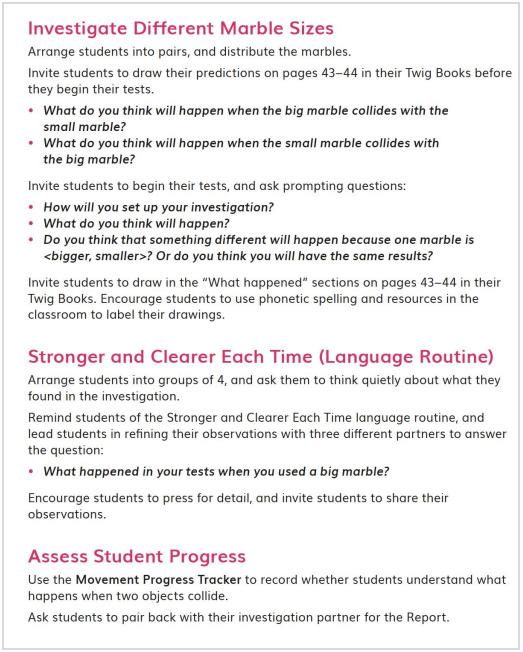
Grade 3 Module 1 DQ2L1 Reflect TE p. 119

Formative Assessment (Informal Assessment)

Quick and easy Formative Assessments, sometimes referred to as Informal Assessments, are embedded into all lessons. They are often found in the Reflect section of the lesson, are designed to support student understanding of how their learning journey is progressing, and they include a wide variety of formats.

Assessments are multimodal and support a variety of learning styles and abilities. For example in Kindergarten Module 2, they include:

- Discussions **(DQ2L6 TE p. 119)**



Investigate Different Marble Sizes

Arrange students into pairs, and distribute the marbles.

Invite students to draw their predictions on pages 43–44 in their Twig Books before they begin their tests.

- ***What do you think will happen when the big marble collides with the small marble?***
- ***What do you think will happen when the small marble collides with the big marble?***

Invite students to begin their tests, and ask prompting questions:

- ***How will you set up your investigation?***
- ***What do you think will happen?***
- ***Do you think that something different will happen because one marble is <bigger, smaller>? Or do you think you will have the same results?***

Invite students to draw in the "What happened" sections on pages 43–44 in their Twig Books. Encourage students to use phonetic spelling and resources in the classroom to label their drawings.

Stronger and Clearer Each Time (Language Routine)

Arrange students into groups of 4, and ask them to think quietly about what they found in the investigation.

Remind students of the Stronger and Clearer Each Time language routine, and lead students in refining their observations with three different partners to answer the question:

- ***What happened in your tests when you used a big marble?***

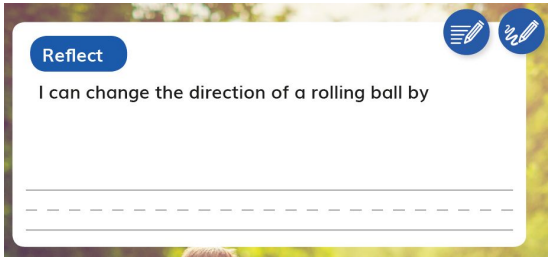
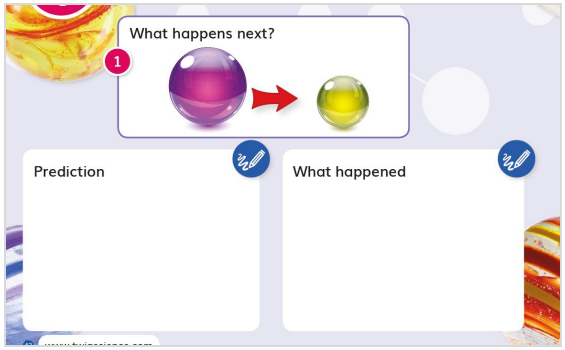
Encourage students to press for detail, and invite students to share their observations.

Assess Student Progress

Use the **Movement Progress Tracker** to record whether students understand what happens when two objects collide.

Ask students to pair back with their investigation partner for the Report.

Kindergarten Module 2 DQ2L6 TE p. 119

○ Multiple choice **(DQ1L6 TE p. 44)**	 **Kindergarten Module 2 DQ1L6 TE p. 44**
○ Constructed responses (written, drawn, and oral) **(DQ1L5 TB p. 14, DQ2L6 TB p. 43)**	 **Kindergarten Module 2 DQ1L5 TB p. 14**  **Kindergarten Module 2 DQ2L6 TB p. 43**

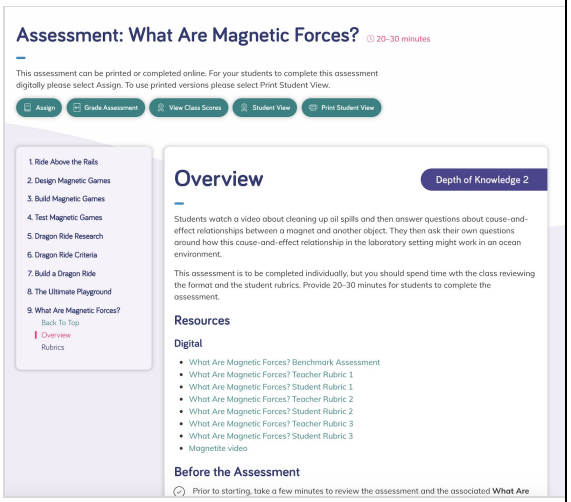
Summative Performance Tasks

These highly engaging assessment tasks include written reports, posters, oral presentations, and collaborative engineering projects. For example, in Grade 4 Module 4, students have followed the engineering design process to investigate and solve the problem of how to reduce the damage caused by earthquakes. They have designed and built their own earthquake-resistant structure and tested it using a shake table. After analyzing the tests, they redesigned their structures and implemented improvements. Here, they communicate their designs in poster and presentation form. They use a rubric to self-assess their designs and posters, and their peers'.

Benchmark Assessments

Designed to assess students' ability to apply the three dimensions in a new context, the Benchmark Assessments include video and data analysis, hands-on activities, as well as design problems to solve.

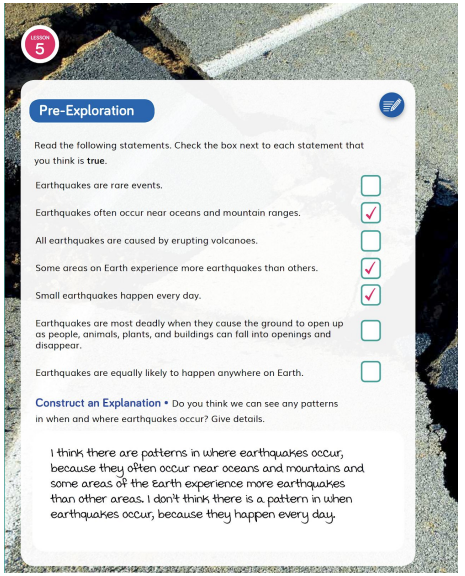
For example, in the Grade 3 Module 1 **What Are Magnetic Forces? Benchmark Assessment**, students are assessed on their ability to use what they have learned throughout the module about magnetism to solve a real-world problem. After watching a video about how magnets can clear up an oil spill in a small laboratory tank, they have to figure out how this cause-and-effect relationship in the laboratory setting might work in an ocean environment.



What Are Magnetic Forces? Benchmark Assessment

SP3. Student Progress Over Time.
The program provides strong guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; prompting students to consider what and how they've learned.

- All modules contain diagnostic pre-assessments called Pre-Explorations at strategic points in the module that assess prior knowledge and enable teachers to identify misconceptions. Notes in the Teacher Edition and the Progress Tracker support teachers to track students' mastery of their misconceptions and the three dimensions throughout the module. Guidance is also given for how to tailor instruction for students whose misconceptions persist. For example, in Grade 4 Module 4, students complete a Pre-Exploration in **DQ1L1 Reflect TB p. 19** and DQ3L1 Reflect TE p. 103.


LESSON 5

Pre-Exploration

Read the following statements. Check the box next to each statement that you think is **true**.

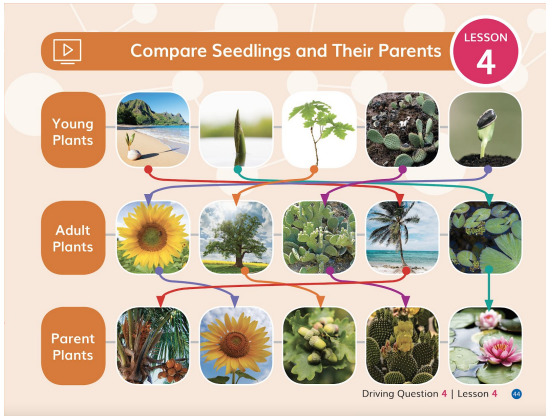
- Earthquakes are rare events. ☐
- Earthquakes often occur near oceans and mountain ranges. ☑
- All earthquakes are caused by erupting volcanoes. ☐
- Some areas on Earth experience more earthquakes than others. ☑
- Small earthquakes happen every day. ☑
- Earthquakes are most deadly when they cause the 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. ☐

Construct an Explanation • Do you think we can see any patterns in when and where earthquakes occur? Give details.

I think there are patterns in where earthquakes occur, because they often occur near oceans and mountains and some areas of the Earth experience more earthquakes than other areas. I don't think there is a pattern in when earthquakes occur, because they happen every day.

Grade 4 Module 4 DQ1L1 Reflect TB p. 19

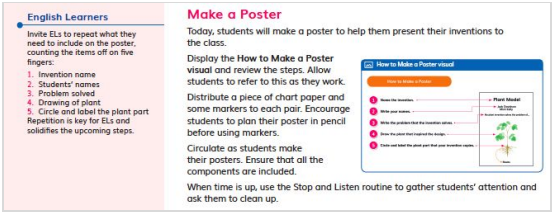
- Ongoing Formative Assessments are embedded in each module and provide frequent informal opportunities to quickly assess how students are progressing, using a variety of means. For example, in **Grade 1 Module 1 (DQ4L4 TB p. 44)**, students connect images of young plants to images of how they will look as adult plants, and then to images of their parent plants. .
- Performance Tasks, Benchmark Assessments, and Multiple Choice Assessments are tied to specific PEs. The rubrics provide clear guidance on how to interpret student results. Data from these assessment items allow teachers to track student mastery of these PEs and their three dimension across the module and across the grade. The Twig platform allows digital feedback to be given to individual students on their performance. Student versions of the rubrics help students to understand what they have learned and where gaps in their learning persist.



Grade 1 Module 1 DQ4L4 TB p. 44

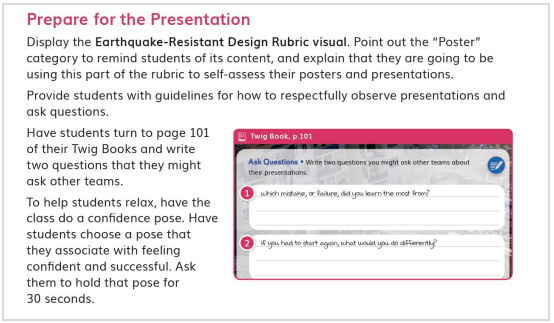
SP4. Equitable Access.
The program provides strong support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.

Evidence
Across all modules, **assessments** of the three dimensions are multimodal and include multiple choice, writing, drawing, physical models, posters, and oral presentations. This allows all students to access a range of assessment types to suit their learning style and/or reading level. For example, the Performance Tasks in Grade 1 Module 1 include written, drawn, and hands-on activities **(DQ3L6 Investigate TE p. 114, DQ6L6 Investigate TE p. 216, DQ7L2 TE p. 232)**.



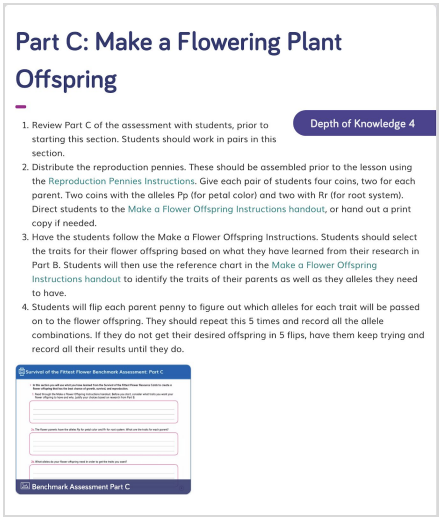
Grade 1 Module 1 DQ6L6 Investigate TE p. 216

Rubrics for the upper grade Performance Tasks and all Benchmark Assessments have four levels: Emerging, Developing, Proficient, and Advanced. This allows all students to demonstrate their current level of attainment. For example, the Grade 4 Module 4 Performance Tasks **(DQ4L3 Spark TE p. 142 and DQ6L5 Spark TE p. 204) and Benchmark Assessments (DQ2 Analyzing Maps TE pp. 88–91, DQ5 Earthquake Solutions TE 174–177, as well as online)**



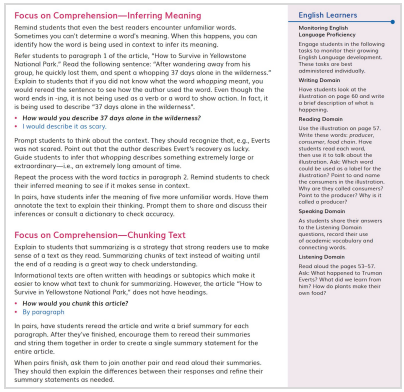
Grade 4 Module 4 DQ6L5 Spark TE p. 204

- The summative Benchmark and Multiple Choice Assessment targeting different DOK levels. Multiple Choice assessments contain an extended Part C to further challenge GATE students **(Grade 6 Module 3 DQ3 Multiple Choice Assessment Part C)**.



Grade 6 Module 3 DQ3 Multiple Choice Assessment Part C

- Writing, Reading, Listening, and Speaking Domain tasks are dedicated to assessing science-relevant English language development, and are integrated into the core instructional resources, e.g., **Grade 5 Module 2 (DQ3L3 TE p. 111** and **DQ4L2 TE p. 137)** and the on-level reader lessons **(Chapter 3 Second Read TE p. 231)**.



Focus on Comprehension—Inferring Meaning

Remind students that even the best readers encounter unfamiliar words. Sometimes you can't determine a word's meaning. When this happens, you can identify how the word is being used in context to infer its meaning.

Refer students to paragraph 1 of the article, "How to Survive in Yellowstone National Park." Read the following sentence: "After wandering away from his group, he quickly lost them, and spent a whopping 37 days alone in the wilderness." Explain to students that if you did not know what the word whopping meant, you would reread the sentence to see how the author used the word. Even though the word ends in -ing, it is not being used as a verb or a word to show action. In fact, it is being used to describe "37 days alone in the wilderness".

- ***How would you describe 37 days alone in the wilderness?***
- I would describe it as scary.

Prompt students to think about the context. They should recognize that, e.g., Everts was not scared. Point out that the author describes Evert's recovery as lucky. Guide students to infer that whopping describes something extremely large or extraordinary—i.e., an extremely long amount of time.

Repeat the process with the word tactics in paragraph 2. Remind students to check their inferred meaning to see if it makes sense in context.

In pairs, have students infer the meaning of five more unfamiliar words. Have them annotate the text to explain their thinking. Prompt them to share and discuss their inferences or consult a dictionary to check accuracy.

Focus on Comprehension—Chunking Text

Explain to students that summarizing is a strategy that strong readers use to make sense of a text as they read. Summarizing chunks of text instead of waiting until the end of a reading is a great way to check understanding.

Informational texts are often written with headings or subtopics which make it easier to know what text to chunk for summarizing. However, the article "How to Survive in Yellowstone National Park," does not have headings.

- ***How would you chunk this article?***
- By paragraph

In pairs, have students reread the article and write a brief summary for each paragraph. After they've finished, encourage them to reread their summaries and string them together in order to create a single summary statement for the entire article.

When pairs finish, ask them to join another pair and read aloud their summaries. They should then explain the differences between their responses and refine their summary statements as needed.

English Learners

Monitoring English Language Proficiency

Engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustration on page 60 and write a brief description of what is happening.

Reading Domain

Use the illustration on page 57. Write these words: producer, consumer, food chain. Have students read each word, then use it to talk about the illustration. Ask: Which word could be used as a label for the illustration? Point to and name the consumers in the illustration. Why are they called consumers? Point to the producer? Why is it called a producer?

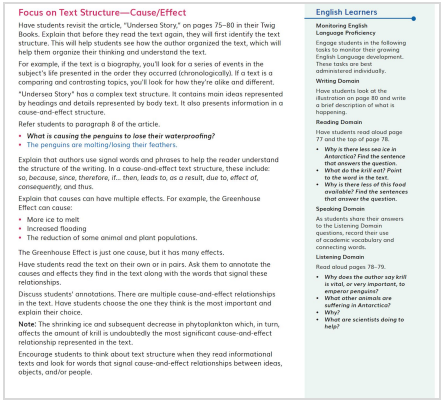
Speaking Domain

As students share their answers to the Listening Domain questions, record their use of academic vocabulary and connecting words.

Listening Domain

Read aloud the pages 53–57. Ask: What happened to Truman Everts? What did we learn from him? How do plants make their own food?

Grade 5 Module DQ3L3 TE p. 111



Focus on Text Structure—Cause/Effect

Have students revisit the article, "Undersea Story," on pages 75–80 in their Twig Books. Explain that before they read the text again, they will first identify the text structure. This will help students see how the author organized the text, which will help them organize their thinking and understand the text.

For example, if the text is a biography, you'll look for a series of events in the subject's life presented in the order they occurred (chronologically). If a text is a comparing and contrasting topics, you'll look for how they're alike and different.

"Undersea Story" has a complex text structure. It contains main ideas represented by headings and details represented by body text. It also presents information in a cause-and-effect structure.

Refer students to paragraph 8 of the article.

- ***What is causing the penguins to lose their waterproofing?***
- The penguins are molting/losing their feathers.

Explain that authors use signal words and phrases to help the reader understand the structure of the writing. In a cause-and-effect text structure, these include: *so, because, since, therefore, if... then, leads to, as a result, due to, effect of, consequently,* and thus.

Explain that causes can have multiple effects. For example, the Greenhouse Effect can cause:

- More ice to melt
- Increased flooding
- The reduction of some animal and plant populations.

The Greenhouse Effect is just one cause, but it has many effects.

Have students read the text on their own or in pairs. Ask them to annotate the causes and effects they find in the text along with the words that signal these relationships.

Discuss students' annotations. There are multiple cause-and-effect relationships in the text. Have students choose the one they think is the most important and explain their choice.

Note: The shrinking ice and subsequent decrease in phytoplankton which, in turn, affects the amount of krill is undoubtedly the most significant cause-and-effect relationship represented in the text.

Encourage students to think about text structure when they read informational texts and look for words that signal cause-and-effect relationships between ideas, objects, and/or people.

English Learners

Monitoring English Language Proficiency

Engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

Writing Domain

Have students look at the illustration on page 80 and write a brief description of what is happening.

Reading Domain

Have students read aloud page 77 and the top of page 78.

- ***Why is there less sea ice in Antarctica? Find the sentence that answers the question.***
- ***What do the krill eat? Point to the word in the text.***
- ***Why is there less of this food available? Find the sentences that answer the question.***

Speaking Domain

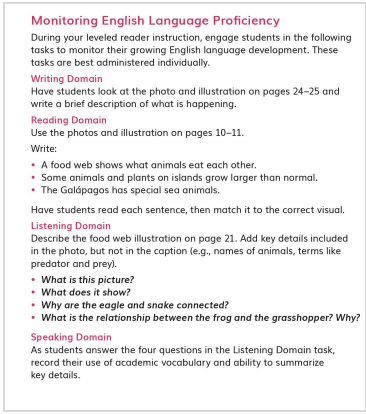
As students share their answers to the Listening Domain questions, record their use of academic vocabulary and connecting words.

Listening Domain

Read aloud pages 78–79.

- ***Why does the author say krill is vital, or very important, to emperor penguins?***
- ***What other animals are suffering in Antarctica?***
- ***Why?***
- ***What are scientists doing to help?***

Grade 5 Module DQ4L2 TE p. 1



Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the photo and illustration on pages 24–25 and write a brief description of what is happening.

Reading Domain

Use the photos and illustration on pages 10–11.

Write:

- A food web shows what animals eat each other.
- Some animals and plants on islands grow larger than normal.
- The Galápagos has special sea animals.

Have students read each sentence, then match it to the correct visual.

Listening Domain

Describe the food web illustration on page 21. Add key details included in the photo, but not in the caption (e.g., names of animals, terms like predator and prey).

- ***What is this picture?***
- ***What does it show?***
- ***Why are the eagle and snake connected?***
- ***What is the relationship between the frog and the grasshopper? Why?***

Speaking Domain

As students answer the four questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize key details.

Leveled Reader Lesson Chapter 3 Second Read TE p. 231

• The Twig Science **Digital Twig Books** and digital assessment items (Benchmark Assessments, Multiple Choice Assessments, and Student Rubrics) have a text-to-speech function, which allows students of all reading levels to access the assessments.	 **Digital Twig Books**

Designed for the NGSS: Foundations Teacher Support	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomenon/Problem Driven Three-Dimensional Learning. Teacher materials provide: ● background information about the phenomena or problems included in the learning sequence and across sequences. ● an explanation of the role of phenomena or problems in driving student learning. ● rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, and CCCs. Refer to F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions.	Materials provide little guidance on developing, using, or integrating them to make sense of phenomena or design solutions to problems.
TS2. Coherence. Teacher materials describe and provide a rationale for: ● the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. ● strategies for linking student experiences across lessons to ensure student sense- making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. ● Connections to other science domains, nature of science, engineering, technology, and applications of science, math, and ELA. Refer to F2, F3, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.
TS3. Effective Teaching. Teacher materials support the use of and provide a rationale and evidence of effectiveness for strategies that: ● support students in learning through authentic and meaningful phenomena or design problems. ● support student learning across the three dimensions. ● make student thinking visible; promote reasoning, sense-making, and problem- solving; challenge student thinking; and develop metacognitive abilities. Refer to SW1, SW2, SW3, SW4, SP3	Materials provide rationale and robust support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide some rationale and support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide little rationale and support for teachers to implement strategies that enhance student performances, thinking, and metacognition.
TS4. Support for Students with Diverse Learning Needs. Teacher materials provide an array of strategies: ● to support student access to the targeted learning goals, experiences, and performances. ● that help teachers differentiate instruction. Refer to SW5, SP4	Materials include robust and comprehensive strategies for supporting learners with diverse needs.	Materials include some robust strategies for supporting learners with diverse needs.	Materials include few robust strategies for supporting learners with diverse needs.
TS5. Support to Monitor Student Progress. Materials provide support for teachers to: ● monitor student learning and progress over time. ● make decisions about instruction and provide feedback to students. Refer to SW3, SW4, SP1, SP2, SP3	Materials provide robust support for interpreting and using data generated from assessments.	Materials provide some support for interpreting and using data generated from assessments.	Materials provide little support for interpreting and using data generated from assessments.

Designed for NGSS: Teacher Support 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

TS1. Phenomenon/Problem Driven Three-Dimensional Learning

The Twig Science materials are High Quality 5 in regards to TS1

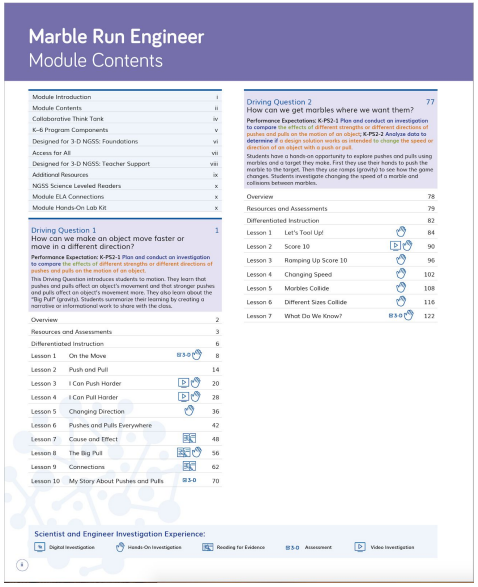
Evidence

- A Module Introduction, available online and in print **(TE p. i)**, outlines at a high level the learning journey students will take as they make sense of the Module Phenomenon or Module Investigative Problem.

Kindergarten Module 2 Module Introduction TE p. i

- The **Module Contents** page in each TE **(pp. i–ii)** identifies the key phenomena/problem addressed in each DQ. The flow of DCIs, SEPs, and CCC's follow a logical sequence in supporting students to gain expertise of the practices and concepts they need. For example, in Kindergarten Module 2, students are introduced to motion and learn about pushes and pulls (DQ1), before they investigate using pushes and pulls to change the speed and direction of an object (DQ2). They then use their learning to predict and test how a marble will move in marble runs that they have designed (DQ3).

- Teacher Background Information is available for every module online. It provides information on the phenomena/problems and DCIs addressed in every DQ and is explained simply in Question & Answer format with supporting diagrams and visuals. A glossary of scientific terms is also provided. For example see Kindergarten Marble Run Engineer and Grade 4 Module 4 Earthquake Engineering.



Kindergarten Module 2 Module Contents TE pp. i–ii

TS2. Coherence

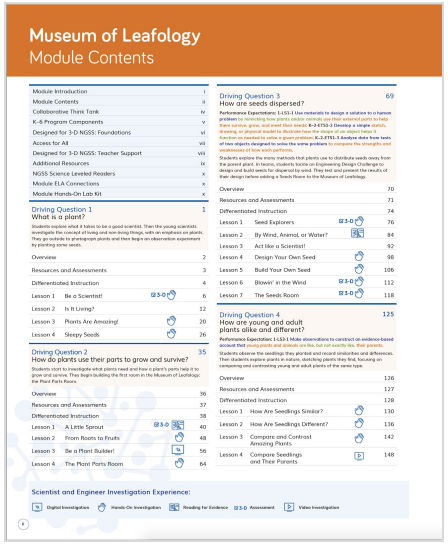
The Twig Science materials are High Quality 5 in regards to TS2

Twig Science materials provide strong support for helping students link experiences to learning across all three dimensions and to phenomena or problems.

The **NGSS Framework Alignment** table identifies the flow of practices across K–6. Every Grade Scope and Sequence clearly identifies the flow of three dimensions across the grade, while the Performance Expectation Progressions table in each Module tells the story of the PEs student have already encountered and where students will revisit dimensions in future grades.

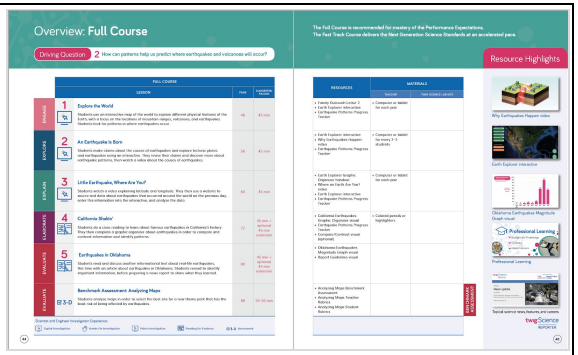
NGSS Framework Alignment

In every module, students follow a sequence of DQs designed to progressively build their skills and scientifically accurate understandings. The flow of DCIs, SEPs and CCC's across the DQs follow a logical sequence supporting students to gain expertise of the practices and concepts they need to address the Module Phenomenon/ Investigative Problem. The Module Contents in every Teacher Edition provides an overview of the module conceptual flow and details the sequence of the PEs addressed **(Grade 1 Module 1 Module Contents)**.



Grade 1 Module 1 Module Contents

More detail on how the sequence of ideas and practices flow across each DQ is provided in every Driving Question Overview, which provides a short summary of the three dimensional activities in each lesson **(Grade 4 Module 4 DQ2 Overview TE pp. 44–45)**.



Grade 4 Module 4 DQ2 Overview TE pp. 44–45

The sequence of learning within each lesson is displayed a simple graphic organizer at the start of each lesson, with a suggested pacing guide to help teachers plan.

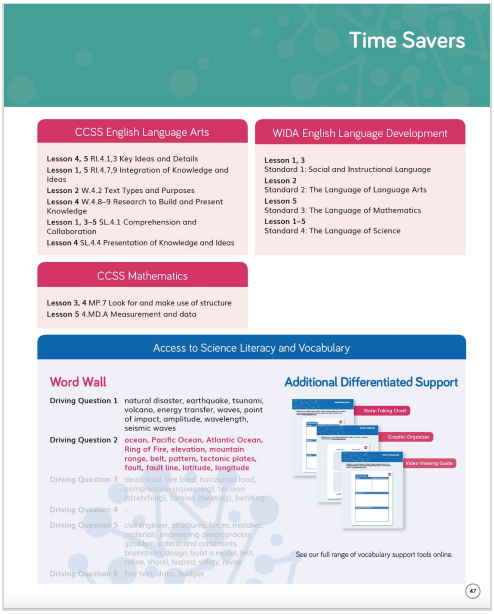
Strategies for linking student experiences across lessons are woven into the instructional design of each module, supporting teachers to link student learning across the dimensions.

For example, in Grade 4 Module 4:

- DQ3: Students start an engineering project to investigate how the shape, structure, and materials of a building affects its ability to withstand forces (DCI, SEP, CCC, ETS, Math) (TB p. 48). Then, they apply what they learn to an engineering challenge, during which they design, build, and test their own earthquake-resistant structures (DCI, SEP and CCC). They share their designs and problems with their peers, learn from each other, and brainstorm solutions (DCIs, CCC, ELA).
- DQ4: Students read texts and watch videos to compare and contrast different engineering solutions used by real engineers around the world (ELA, CCC, NoS, HSS, Math, Art).
- DQ5: Students revisit their earlier designs and apply their new knowledge to make improvements, while still adhering to the criteria for success and constraints (ETS, DCI, SEP, CCC, ELA, HSS).
- DQ6: Students wrap up with a presentation of their designs, and have a class discussion to summarize their solutions for the Module Investigative Problem: How can we reduce the damage caused by earthquakes? (ETS, DCI's, CCC, SEP, ELA, Art, Math) This final tasks allows teachers and students to celebrate how much progress students have made as scientists and engineers.

Connections to Math, ELA, HSS, and Art have been woven into every module. These connections are identified at a Module level in the Grade Scope and Sequence (TE Inside Cover), at a DQ level in the Time Saver **(Grade 4 Module 4 DQ2 Time Savers TE p. 47)**, and at a Lesson level at the start of each lesson **(Grade 4 Module 4 DQ2L2 Lesson Overview TE p. 81)**.

All the grade level, ELA informational text standards are covered across the the year, helping teachers find precious time for science in their ELA lessons. For example, in Grade 4 Module 4 DQ2L5, students explore Sl.4.1 Comprehension and Collaboration and 4.MD.B Represent and interpret data.



Grade 4 Module 4 DQ2 Time Savers TE p. 47

Grade 4 Module 4 DQ2L2 Lesson Overview TE p. 81

TS3. Effective Teaching
The Twig Science materials are High Quality 5 in regards to TS3
● Support students in learning through authentic and meaningful phenomena or design problems. ● Support student learning across the three dimensions. ● Make student thinking visible; promote reasoning, sense-making, and problem-solving; challenge student thinking; and develop metacognitive abilities. Refer to SW1, SW2, SW3, SW4, and SP3.

Materials provide rationale and robust support for implementing strategies that enhance student performances, thinking, and metacognition.

Every module in Twig Science has an overarching Module Phenomenon or Investigative Problem that drives student learning. From curating their own plant museum in Museum of Leafology, to engineering their Ultimate Playground, and designing a conservation plan for species at risk of extinction on The Red List, engaging storylines situate the phenomena and problems in authentic, grade-appropriate contexts, which are designed to captivate students' imaginations and connect their classroom experiences to their daily lives and the world around them. A movie-style Trailer video sets up this at the start of each module, for example, **Museum of Leafology Trailer video** and **The Ultimate Playground Trailer video**.

- Instructional materials support authentic and meaningful learning experiences. 3-D Learning Objectives in each lesson provide teachers with information of how students will learn across the three dimensions, while the Lesson Preparation provides further information on how to support students' learning.
- Teachers are supported at the point of use in each lesson to raise the visibility of student thinking, making the connection for where their prior knowledge and growing mastery of the three dimensions is helping them to make sense of the module phenomena and problems. This point of connection is often made in the Connect section of the lesson. For example, in Grade 4 Module 4, the class has discussions at strategic points where students share their ideas and evidence for how to approach the problem: How do we reduce the damage caused by earthquakes?
    - DQ2L1: Connect Today's Learning to 4-ESS2-2 (TE p. 54)
    - DQ2L6: Connect Today's Learning to The Module Investigative Problem (TE p. 78)
    - DQ3L1: Connect Today's Learning to the Module Phenomenon (TE p. 103)

Throughout every module, teachers are prompted to use their class Science Tools poster to track students' growing use of the SEPs. The poster is blank at the start of the year, and the eight SEPs are added when each one is used for the first time. They also refer back to it when they revisit a SEP. This metacognitive activity helps students to build a growing awareness of their use and mastery of these practices. For example:

- In Grade 3 Module 1, students revisit "Design solutions" (SEP-6), and add "Make models," "Use models" (SEP-2), "Plan investigations" (SEP-3), and "Define problems" (SEP-1) to their poster.
- In Grade 4 Module 4, students revisit "Develop and use models" (SEP-2), and add "Evaluate information" (SEP-8), "Analyze and interpret data" (SEP-4), and "Define problems"(SEP-1) to their poster. In DQ2L3 Connect TE p. 70, students further add "Analyze data" to their Science Tools Poster.

Grade 1 Module 1 Museum of Leafology Trailer video

Grade 3 Module 1 The Ultimate Playground Trailer video

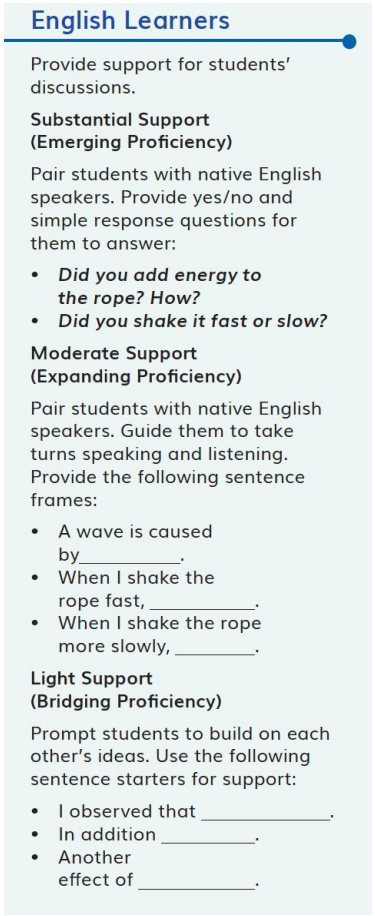
TS4. Support for Students with Diverse Learning Needs

The Module materials are High Quality 5 in regards to TS4
Materials include robust and comprehensive strategies for supporting learners with diverse needs

Evidence

Multimodal and multisensory
The learning experiences include tasks in all domains—writing, reading, listening (in the form of Read-Alouds, Trade Books and videos), speaking (turn-and-talks, class discussions, and presentations), plus drawing and all other manner of investigations (from hands-on to digital; text to video).

Language Support
Point-of-use language scaffolding for English Learners is found in the sidebars of Teacher Editions **(Grade 4 Module 4 DQ1L3 English Learners TE p. 25)**, while research-based language routines are integrated into core instruction supporting all students to "talk science" using grade-appropriate scientific vocabulary. The digital version of the Twig Book includes a text-to-speech function.



English Learners

Provide support for students' discussions.

Substantial Support (Emerging Proficiency)

Pair students with native English speakers. Provide yes/no and simple response questions for them to answer:

- ***Did you add energy to the rope? How?***
- ***Did you shake it fast or slow?***

Moderate Support (Expanding Proficiency)

Pair students with native English speakers. Guide them to take turns speaking and listening. Provide the following sentence frames:

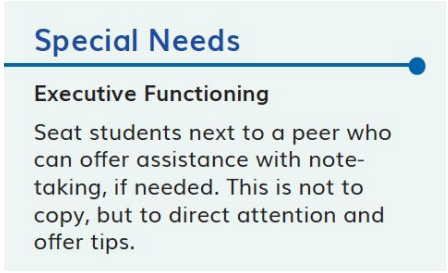
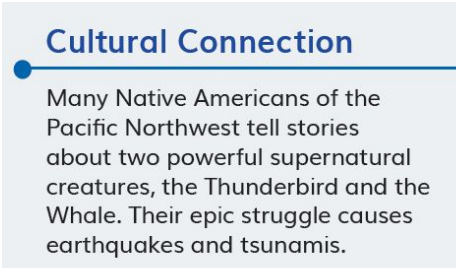
- A wave is caused by_____.
- When I shake the rope fast, _____.
- When I shake the rope more slowly, _____.

Light Support (Bridging Proficiency)

Prompt students to build on each other's ideas. Use the following sentence starters for support:

- I observed that _____.
- In addition _____.
- Another effect of _____.

Grade 4 Module 4 DQ1L3 English Learners TE p. 25

The leveled readers have been designed to capture the imagination of young readers, with jokes and cartoons. They provide an alternative means for students to access the scientific content. Readers are available in four levels (Below, On, Above, and EL) plus Spanish, with complementary lessons to build language acquisition and develop informational text reading skills. On Level lessons are in the printed TE, and the other levels are available digitally. The leveled readers feature many positive role models in the field of science and engineering, which are designed to cultivate interest in STEM careers for all students. Chapter 2 of the leveled reader is always dedicated to an interview with an inspiring role model. ***Shake, Rattle, and Roll* (Grade 4 Module 4 Leveled Reader)**	 ***Shake, Rattle, and Roll* (Grade 4 Module 4 Leveled Reader)**
Special Needs Suggestions for extra access points for students with many special needs are provided frequently at point-of-use in the sidebars of the Teacher Editions **(Grade 4 Module 4 DQ1L3 Special Needs TE p. 25)**. These include physical, emotional, and cognitive disabilities.	 **Grade 4 Module 4 DQ1L3 Special Needs TE p. 25**
Cultural Connections Culturally relevant content is core to the module. For example, in Grade 4 Module 4, students investigate engineering solutions in the US, as well as examples from around the world (including Nepal and Japan), with additional culturally-relevant contexts added at point of use **(Grade 4 Module 4 DQ2L2 Cultural Connection TE p. 58)**.	 **Grade 4 Module 4 DQ2L2 Cultural Connection TE p. 58**

Gate Students
Higher-order Challenge activities, for GATE students who have already met the learning goals, are interspersed throughout the lesson investigations. They can be found in the Twig Books, with instruction in the sidebars of the Teacher Edition **(Grade 4 Module 4 DQ1L2 Challenge TE p. 15)**.

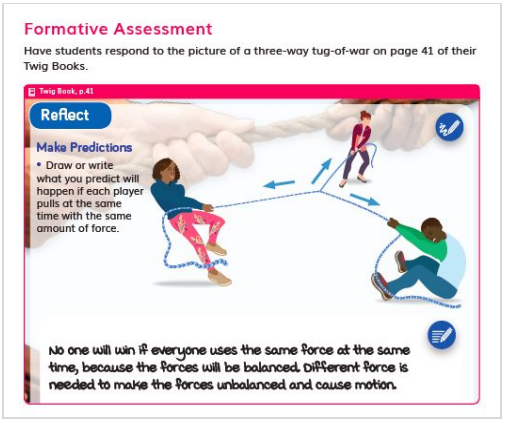
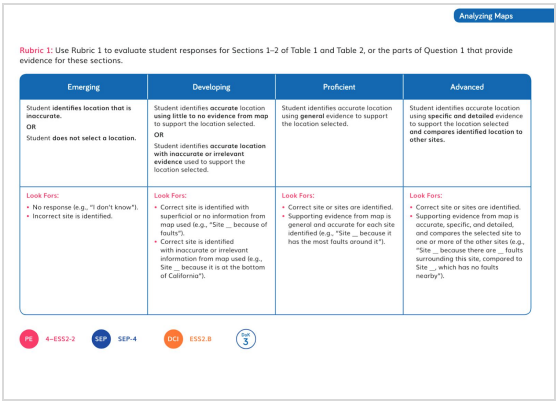
Grade 4 Module 4 DQ1L2 Challenge TE p. 15

Video
The frequent use of high quality videos engages all students of the YouTube generation in varied phenomena and science concepts. Stunning footage and imaginative storytelling bring abstract concepts to life, and captivate even the most disengaged or disruptive student. Key words are overlaid on key images as on-screen text, supporting students to marry visuals with both the spoken and written word. Captions are provided in both English and Spanish.

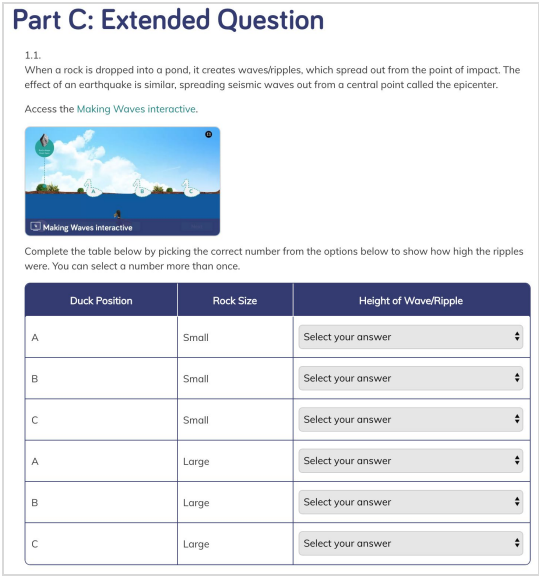
- Videos such as **Building Loads** (Grade 4 Module 4 DQ3L1), **Earthquakes Around the World** (Grade 4 Module 4 DQ3L4), and **LAX Engineer** (Grade 4 Module 4 DQ5L2) bring phenomena and concepts to life for all students.

The Twig Science **Digital Twig Books**, Digital Leveled Readers, and digital assessment items (Student Rubrics, Benchmark Assessments, and Multiple Choice Assessments) have a text-to-speech function, which allows students of all reading levels to access these materials.

Digital Twig Books

Formative Assessments of the three dimensions across all modules are multimodal and include multiple choice, writing, drawing, physical models, posters, and oral presentations. This allow all students to access a range of assessment types to suit their learning style and/or reading level.	 **Formative Assessments**
Rubrics for the upper grade Performance Tasks and all Benchmark Assessments have four levels: Emerging, Developing, Proficient, and Advanced. This allows all students to demonstrate their current level of attainment.	 **Benchmark Assessment Teacher Rubric**

The summative **Multiple Choice Assessment** contains questions that target different DOK levels, with an extended Part C to further challenge GATE students.



Part C: Extended Question

1.1.
When a rock is dropped into a pond, it creates waves/ripples, which spread out from the point of impact. The effect of an earthquake is similar, spreading seismic waves out from a central point called the epicenter.

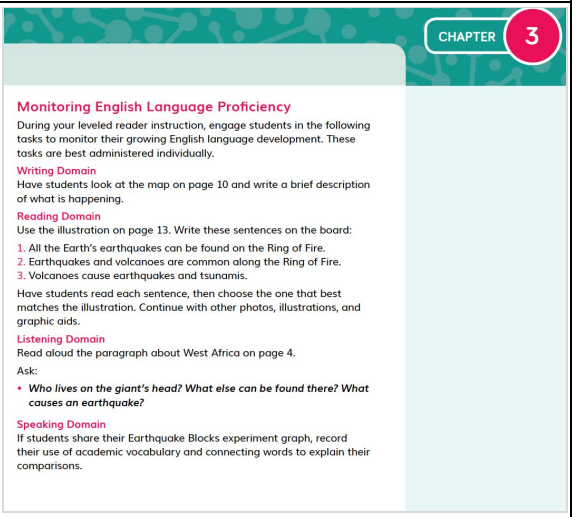
Access the Making Waves interactive.

Complete the table below by picking the correct number from the options below to show how high the ripples were. You can select a number more than once.

Duck Position	Rock Size	Height of Wave/Ripple
A	Small	Select your answer
B	Small	Select your answer
C	Small	Select your answer
A	Large	Select your answer
B	Large	Select your answer
C	Large	Select your answer

Grade 4 Module 4 Multiple Choice Assessment Part C

Writing, Reading, Listening, and Speaking Domain tasks are dedicated to assessing science-relevant English Language Development, and are integrated into the core instructional resources and the Leveled Reader lessons in Chapter 3 Second Read.



CHAPTER 3

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain
Have students look at the map on page 10 and write a brief description of what is happening.

Reading Domain
Use the illustration on page 13. Write these sentences on the board:

1. All the Earth's earthquakes can be found on the Ring of Fire.
2. Earthquakes and volcanoes are common along the Ring of Fire.
3. Volcanoes cause earthquakes and tsunamis.

Have students read each sentence, then choose the one that best matches the illustration. Continue with other photos, illustrations, and graphic aids.

Listening Domain
Read aloud the paragraph about West Africa on page 4.

Ask:

- ***Who lives on the giant's head? What else can be found there? What causes an earthquake?***

Speaking Domain
If students share their Earthquake Blocks experiment graph, record their use of academic vocabulary and connecting words to explain their comparisons.

Writing, Reading, Listening, and Speaking Domain tasks

TS5. Support to Monitor Student Progress

The Twig Science materials are High Quality 5 in regards to TS5

Materials provide robust support for interpreting and using data generated from assessments.

Materials provide robust support for interpreting and using data generated from assessments.

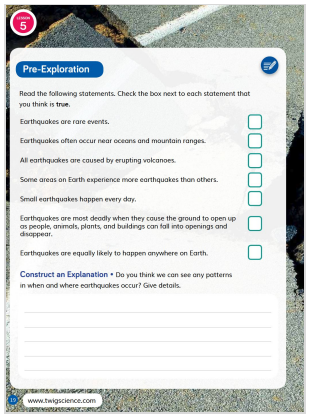
All Twig modules include assessments that offer multiple opportunities—using more than one type of measure—to demonstrate learning, and these measures are strongly connected to show student progress both in and across the three dimensions.

Evidence

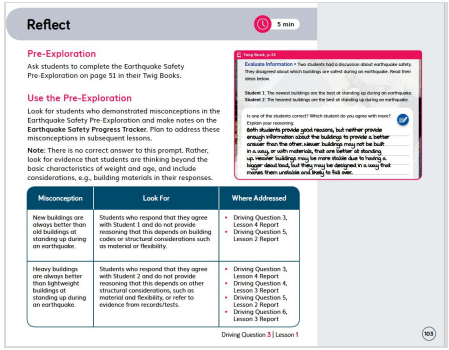
All modules contain diagnostic pre-assessments called Pre-Explorations at strategic points in the module that assess prior knowledge and enable teachers to identify misconceptions. Notes in the Teacher Edition and the Progress Tracker, support teachers to track students' mastery of their misconceptions and the three dimensions throughout the module. Guidance is also given for how to tailor instruction for students whose misconceptions persist.

For example, in Grade 4 Module 4 **(DQ1L1 Reflect TB p. 19)**, students complete a Pre-Exploration.

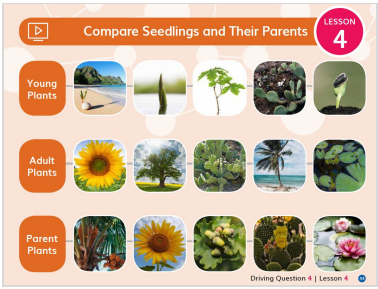
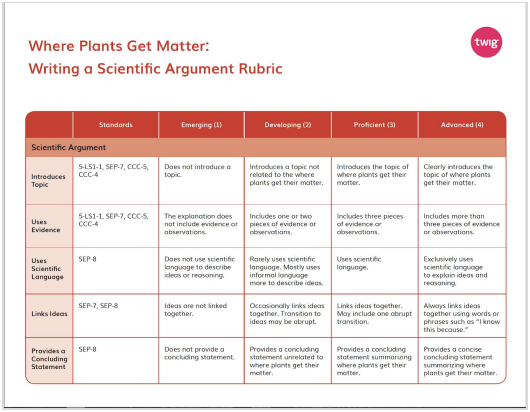
Teachers are prompted to track student progression using the Progress Tracker in Grade 4 Module 4 **(DQ3L1 Reflect TE p. 103)**.



Grade 4 Module 4 DQ1L1 Reflect TB p. 19



Grade 4 Module 4 DQ3L1 Reflect TE p. 103

Ongoing Formative Assessments are embedded in each module and provide frequent informal opportunities to quickly assess how students are progressing, using a variety of means. For example, in Grade 1 Module 1 **(DQ4L4 TB p. 44)**, students connect images of young plants to images of how they will look as adult plants, and then to images of their parent plants.	 **Grade 1 Module 1 DQ4L4 TB p. 44**
Performance Tasks, Benchmark Assessments, and Multiple Choice Assessments are tied to specific PEs. Data from these assessment items allows teachers to track student mastery of these PEs and their three dimension across the module and across the grade.	 **Grade 5 Module 2 Writing a Scientific Argument Rubric**