

Introduction to Assessment

The Twig Science Assessment System has been developed in partnership with Stanford University's SCALE team. It is designed to provide a three-dimensional assessment system that allows teachers to evaluate student attainment of the NGSS three dimensions and Performance Expectations.

The assessment strategies measure students' knowledge and ability, favoring Performance Tasks over rote memorization and include a rich variety of measures such as written assignments, collaborative engineering design challenges and oral presentations.

There are also many quick and easy opportunities to evaluate student progress against the dimensions which are detailed in the Earthquake Engineering. Assessment Module Overview provided with this rubric.

Near the start of each module, students complete a Pre-Exploration (diagnostic pre-assessment). Pre-Explorations support teachers and students to identify prior knowledge and misconceptions about the dimensions addressed in the module. Teachers are supported to track how students address their misconceptions, gaining new understanding as the module unfolds. Additional Pre-Explorations are integrated at strategic points through the module where they add most value.

Ongoing Formative Assessment opportunities, sometimes referred to as informal assessments, are woven into each lesson. They are simple to implement, require little or no grading, and support teachers in tailoring their instruction to the requirements of the class. They include class discussions, constructed responses (written and drawn), self- and peer assessment, and teacher observations.

Summative Performance Tasks are rich and highly engaging activities, designed to allow students to demonstrate their attainment level of the Module Performance Expectations. Leveled rubrics are provided to support assessment. They include student sample answers in the form of 'look fors'. Student versions of these rubrics (without the look fors) are provided from Grade 2, to give students a clear understanding of what success looks like.

Earthquake Engineering also includes two summative Benchmark Assessments developed in partnership with SCALE. They allow students to apply the knowledge and skills gained in this module to new contexts, giving them exposure to the types of assessment items they will face in the Grade 5 state test.

In addition, a summative Multiple Choice Assessment gives teachers the opportunity to quickly assess student understanding of a range of dimensions covered in this module. An extended section C has been designed to engage GATE students.

Earthquake Engineering Assessment Story

In this module, students solve the Investigative Problem: How do we reduce the damage caused by earthquakes? Using an interactive map, students make sense of why earthquakes appear in patterns along plate boundaries, and how those patterns help earthquake engineers plan how and where to build. Students are assessed on their ability to analyze data in maps, to identify Earth's features, and to notice patterns where earthquakes occur.

Through a series of investigations, students build understanding of how the shape, structure, and properties of materials affect buildings' ability to withstand forces. They use this knowledge to design, build, and test their first earthquake-resistant structures. Students continue to make observations and obtain information from physical models, informational texts, and videos, all of which inform their design revisions.

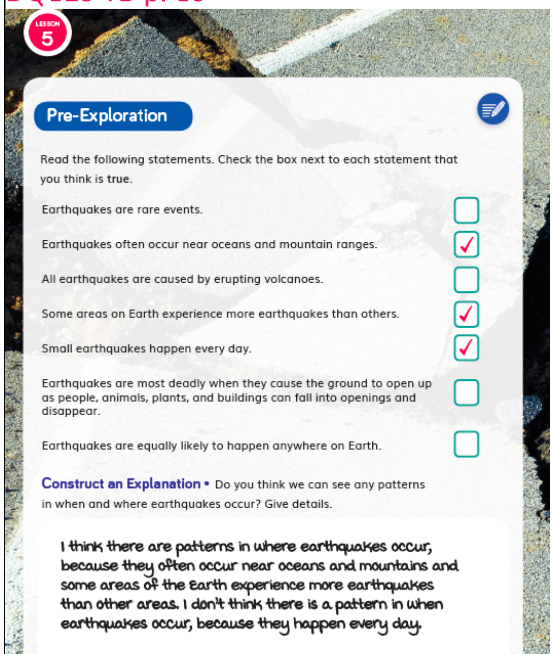
In the final presentation of their engineering designs, students explain how decisions about building characteristics, such as materials' flexibility, shape, and symmetry, address the Module Investigative Problem. Students are assessed on their ability to evaluate multiple design solutions for making buildings more earthquake-resistant, and ensuring the solutions meet the design criteria and constraints.

Designed for the NGSS: Student Progress

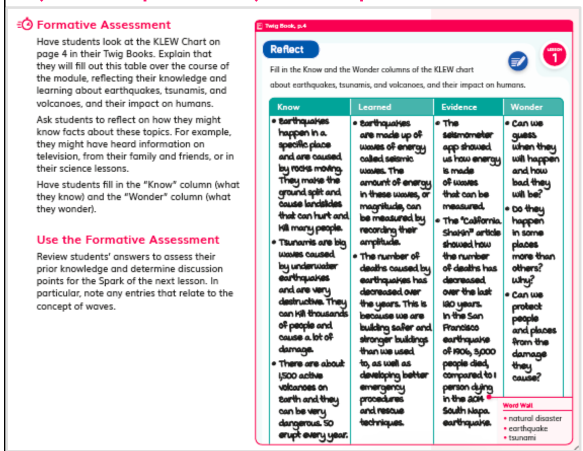
Evidence Chart

Directions

1. Review your assigned materials to identify assessments of and for learning. Complete an evidence chart for each identified assessment.
2. Respond to the prompts or answer the questions in the space provided.
3. Be prepared to represent your responses visually on a public chart.

<table>
<tr><th colspan="5">Assessment Description</th></tr>
<tr><td rowspan="2">DQ1L5 TB p. 19

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 mountain ranges 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.</td><td>Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).</td><td>Purpose of Assessment (i.e., peer, self, formative, summative, per/post)</td><td>Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)</td><td>Note evidence of bias or problems with accessibility.</td></tr>
<tr><td>Students complete a Pre-Exploration (Diagnostic Pre-Assessment). Seven True or False statements. One constructed response.</td><td>Pre-assessment</td><td>Multiple Choice and constructed response</td><td>No Bias. Text to Speech function available for students that require language support.</td></tr>
</table>

<table>
<tr><th colspan="2">Match among Assessment, Phenomena/Problem, and Three Dimensions</th></tr>
<tr><td>What phenomenon or problem, if any, are students trying to figure out in this assessment?</td><td>What is the 2-3 dimensional learning goal assessed in this task?</td></tr>
<tr><td>Students are assessing their prior knowledge/misconceptions of the phenomenon of earthquakes.</td><td>There is no learning goal assessed in this pre-assessment. It is assessing prior knowledge of DCI ESS2-B and CCC-1.</td></tr>
</table>

Assessment Description				
DQ1L1 TE p. 11, DQ1L1 TB p. 4	Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).	Purpose of Assessment (i.e., peer, self, formative, summative, per/post)	Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)	Note evidence of bias or problems with accessibility.
	Students fill in a KLEW chart (Know, Learn, Evidence, Wonder) to reflect on what they already know about natural disasters and what they wonder about. (DQ1L1 TB p. 4)	Self	Written Formative Assessment	Free from bias. All students able to self-reflect. Text to Speech function available for students that require language support.

Text of the reproduced pages (image 1):

Formative Assessment

Have students look at the KLEW Chart on page 4 in their Twig Books. Explain that they will fill out this table over the course of the module, reflecting their knowledge and learning about earthquakes, tsunamis, and volcanoes, and their impact on humans.

Ask students to reflect on how they might know facts about these topics. For example, they might have heard information on television, from their family and friends, or in their science lessons.

Have students fill in the "Know" column (what they know) and the "Wonder" column (what they wonder).

Use the Formative Assessment

Review students' answers to assess their prior knowledge and determine discussion points for the Spark of the next lesson. In particular, note any entries that relate to the concept of waves.

Twig Book, p.4

Reflect

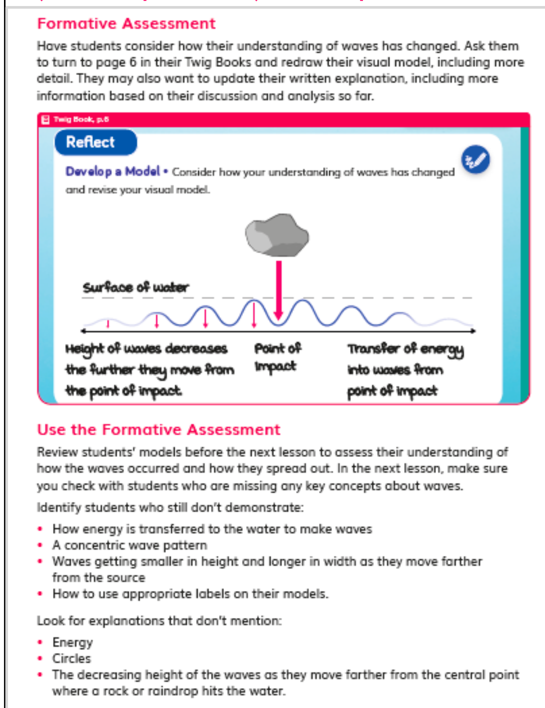
LESSON 1

Fill in the Know and the Wonder columns of the KLEW chart about earthquakes, tsunamis, and volcanoes, and their impact on humans.

Know	Learned	Evidence	Wonder
• Earthquakes happen in a specific place and are caused by rocks moving. They make the ground split and cause landslides that can hurt and kill many people. • Tsunamis are big waves caused by underwater earthquakes and are very destructive. They can kill thousands of people and cause a lot of damage. • There are about 1,500 active volcanoes on Earth and they can be very dangerous. 50 erupt every year.	• Earthquakes are made up of waves of energy called seismic waves. The amount of energy in these waves, or magnitude, can be measured by recording their amplitude. • The number of deaths caused by earthquakes has decreased over the years. This is because we are building safer and stronger buildings than we used to, as well as developing better emergency procedures and rescue techniques.	• The seismometer app showed us how energy is made of waves that can be measured. • The "California Shakin'" article showed how the number of deaths has decreased over the last 100 years. In the San Francisco earthquake of 1906, 3,000 people died, compared to 1 person dying in the 2014 South Napa earthquake.	• Can we guess when they will happen and how bad they will be? • Do they happen in some places more than others? Why? • Can we protect people and places from the damage they cause?

Word Wall
• natural disaster
• earthquake
• tsunami

Match among Assessment, Phenomena/Problem, and Three Dimensions	
What phenomenon or problem, if any, are students trying to figure out in this assessment?	What is the 2-3 dimensional learning goal assessed in this task?
Students are assessing their prior knowledge of earthquakes, tsunamis and volcanoes and the problem of their impact on humans.	Students are defining the problem (SEP-1) of natural hazards (DCI ESS3-B) and how earthquakes can change landscapes (CCC-7).

<table>
<tr><th colspan="5">Assessment Description</th></tr>
<tr><td rowspan="2">DQ1L2 TE p. 19, DQ1L2 TB p. 6

Formative Assessment
Have students consider how their understanding of waves has changed. Ask them to turn to page 6 in their Twig Books and redraw their visual model, including more detail. They may also want to update their written explanation, including more information based on their discussion and analysis so far.
Twig Book, p.6
Reflect
Develop a Model • Consider how your understanding of waves has changed and revise your visual model.
Surface of water
Height of waves decreases the further they move from the point of impact.
Point of impact
Transfer of energy into waves from point of impact
Use the Formative Assessment
Review students' models before the next lesson to assess their understanding of how the waves occurred and how they spread out. In the next lesson, make sure you check with students who are missing any key concepts about waves.
Identify students who still don't demonstrate:
• How energy is transferred to the water to make waves
• A concentric wave pattern
• Waves getting smaller in height and longer in width as they move farther from the source
• How to use appropriate labels on their models.
Look for explanations that don't mention:
• Energy
• Circles
• The decreasing height of the waves as they move farther from the central point where a rock or raindrop hits the water.</td><td>Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).</td><td>Purpose of Assessment (i.e., peer, self, formative, summative, per/post)</td><td>Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)</td><td>Note evidence of bias or problems with accessibility.</td></tr>
<tr><td>Students redraw their models of waves adding more detail. They also update their written explanation including more information gained from discussion and analysis.</td><td>Formative</td><td>Constructed response (drawn and written)</td><td>Free from bias. Students able to draw or write answers. Text to Speech function available for students that require language support.</td></tr>
</table>

<table>
<tr><th colspan="2">Match among Assessment, Phenomena/Problem, and Three Dimensions</th></tr>
<tr><td>What phenomenon or problem, if any, are students trying to figure out in this assessment?</td><td>What is the 2-3 dimensional learning goal assessed in this task?</td></tr>
<tr><td>Students are figuring out the phenomenon of how waves in water occur and how they spread out.</td><td>Students are using models (SEP-2) to understand the properties of waves (DCI PS4.A) and the concepts of Patterns and Energy and Matter (CCC-1, CCC-5).</td></tr>
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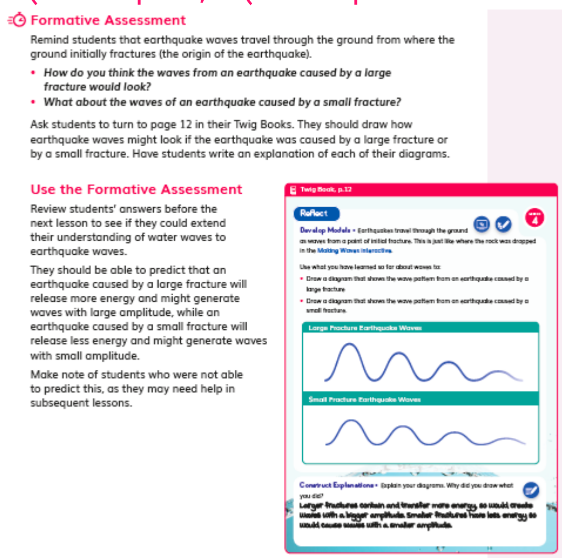
<table>
<tr><th colspan="5">Assessment Description</th></tr>
<tr>
<td rowspan="2">DQ1L3 TE p. 25

Discuss Observations
Have the students you selected share the results of their investigations. Encourage them to discuss their observations in terms of cause and effect.
What causes a wave?
What causes the rope to move?
What are the effects of shaking the rope?
Is the effect always the same?
Students should have discovered two measurable characteristics of waves—amplitude and wavelength. Note: Students will not use these terms at this point; they will be introduced during the Display portion of the Collect and Display Language Routine.
Ensure students realize that amplitude and wavelength are not connected. They can increase or decrease one without changing the other.
Assess students' understanding of where the energy that makes waves comes from.
What is the source of the energy that creates the waves?
The energy comes from the hand motion.
What do you need to do to put more/less energy into the rope?
To put more energy into the rope, you shake the rope more quickly. To put less energy into the rope, you shake the rope more slowly.
What do the waves look like when more energy is transferred to the rope?
When more energy is transferred to the rope, the height of the waves increases.
What do the waves look like when energy is transferred to the rope more quickly?
When energy is transferred to the rope more quickly, there are more waves.
Students may notice that the height of a wave (amplitude) decreases as it moves along the rope. Explain that the wave transfers energy along the rope and some of the energy transfers away from the wave into the surrounding air, decreasing the energy carried in the wave.</td>
<td>Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).</td>
<td>Purpose of Assessment (i.e., peer, self, formative, summative, per/post)</td>
<td>Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)</td>
<td>Note evidence of bias or problems with accessibility.</td>
</tr>
<tr>
<td>Students discuss with the class their observation from the investigation about the cause and effect of waves.</td>
<td>Self and Peer</td>
<td>Discussion</td>
<td>No Bias. All students able to offer up their observations.</td>
</tr>
<tr><th colspan="5">Match among Assessment, Phenomena/Problem, and Three Dimensions</th></tr>
<tr>
<td colspan="2">What phenomenon or problem, if any, are students trying to figure out in this assessment?</td>
<td colspan="3">What is the 2-3 dimensional learning goal assessed in this task?</td>
</tr>
<tr>
<td colspan="2">Students are figuring out where the energy comes from that makes waves in the ropes and how and why the size and frequency of waves change.</td>
<td colspan="3">Students need to carry out an investigation (SEP 3), using CCC-1 and CCC-2 to understand the properties of waves—amplitude and wavelength (PS4.A).</td>
</tr>
</table>

Assessment Description

DQ1L4 TE p. 33, DQ1L4 TB p. 12



Formative Assessment

Remind students that earthquake waves travel through the ground from where the ground initially fractures (the origin of the earthquake).

- *How do you think the waves from an earthquake caused by a large fracture would look?*
- *What about the waves of an earthquake caused by a small fracture?*

Ask students to turn to page 12 in their Twig Books. They should draw how earthquake waves might look if the earthquake was caused by a large fracture or by a small fracture. Have students write an explanation of each of their diagrams.

Use the Formative Assessment

Review students' answers before the next lesson to see if they could extend their understanding of water waves to earthquake waves.

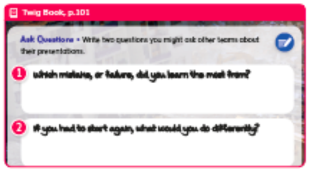
They should be able to predict that an earthquake caused by a large fracture will release more energy and might generate waves with large amplitude, while an earthquake caused by a small fracture will release less energy and might generate waves with small amplitude.

Make note of students who were not able to predict this, as they may need help in subsequent lessons.

Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).	Purpose of Assessment (i.e., peer, self, formative, summative, per/post)	Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)	Note evidence of bias or problems with accessibility.
Students draw diagrams of what large fracture and small fracture earthquake waves will look like, and write an explanation for what they have drawn.	Formative Assessment	Constructed response (drawn and written)	No bias. Text to Speech function available for students that require language support. Students can draw diagrams and write explanations if appropriate.

Match among Assessment, Phenomena/Problem, and Three Dimensions

What phenomenon or problem, if any, are students trying to figure out in this assessment?	What is the 2-3 dimensional learning goal assessed in this task?
Students are applying what they have learned so far about waves in water to earthquake waves. They are figuring out what the waves from earthquakes that release small and large amounts of energy will look like. They are connecting their growing knowledge of waves to the Driving Question: How are waves involved in earthquakes?	They are developing a model of waves (SEP-2) to describe patterns (CCC-1) in terms of amplitude and wavelength (PS4.A), and that waves cause objects to move (CCC-5).

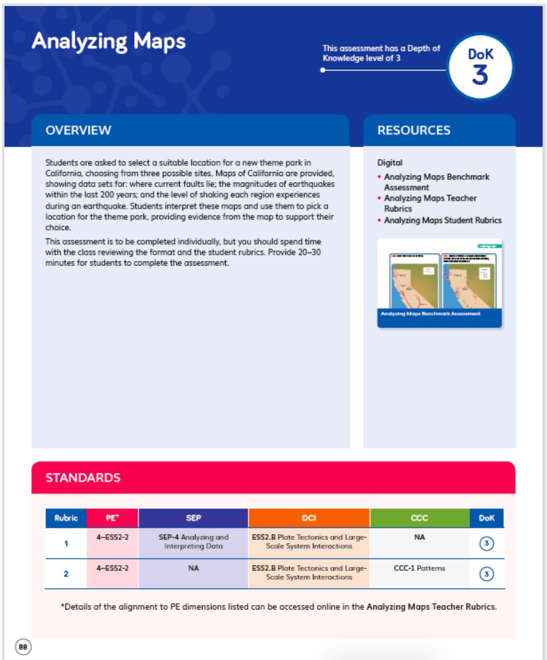
<table>
<tr><th colspan="5">Assessment Description</th></tr>
<tr><td>DQ6L5 TE p. 204, DQ6L5 TB pp. 100-101</td><td>Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).</td><td>Purpose of Assessment (i.e., peer, self, formative, summative, per/post)</td><td>Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)</td><td>Note evidence of bias or problems with accessibility.</td></tr>
<tr><td>
Prepare for the Presentation
Display the Earthquake-Resistant Design Rubric visual. Point out the "Poster" category to remind students of its content, and explain that they are going to be using this part of the rubric to self-assess their posters and presentations.
Provide students with guidelines for how to respectfully observe presentations and ask questions.
Have students turn to page 101 of their Twig Books and write two questions that they might ask other teams.
To help students relax, have the class do a confidence pose. Have students choose a pose that they associate with feeling confident and successful. Ask them to hold that pose for 30 seconds.


</td><td>Students complete the final stage of the Performance Task as they communicate information about the engineering process in visual and oral presentations.</td><td>Self and summative</td><td>Performance Task</td><td>Free from bias. All students are able to take part in this Performance Task.</td></tr>
</table>

Match among Assessment, Phenomena/Problem, and Three Dimensions	
What phenomenon or problem, if any, are students trying to figure out in this assessment?	What is the 2-3 dimensional learning goal assessed in this task?
Students have followed the engineering design process to solve the problem of how to reduce the damage caused by earthquakes. They have designed and built their own earthquake-proof structure and tested it on a shake table. After analyzing the tests, they redesigned their structure with improvements. Here, they communicate their designs in a poster and presentation. They use a rubric to self-assess their design and poster, as well as their peers' work.	To define a problem that includes specified criteria for success and constraints (3-5 ETS1-1), to generate and compare multiple solutions (3-5 ETS1-2) and then carry out tests to identify aspects of the design that can be improved (3-5 ETS1-3).

Assessment Description

TE pp. 88-91



Analyzing Maps

This assessment has a Depth of Knowledge level of 3

DoK 3

OVERVIEW

Students are asked to select a suitable location for a new theme park in California, choosing from three possible sites. Maps of California are provided, showing data sets for: where current faults lie; the magnitudes of earthquakes within the last 200 years; and the level of shaking each region experiences during an earthquake. Students interpret these maps and use them to pick a location for the theme park, providing evidence from the map to support their choice.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital

- Analyzing Maps Benchmark Assessment
- Analyzing Maps Teacher Rubrics
- Analyzing Maps Student Rubrics

Analyzing Maps Benchmark Assessment

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4–ESS2-2	SEP-4 Analyzing and Interpreting Data	ESS2.B Plate Tectonics and Large-Scale System Interactions	NA	3
2	4–ESS2-2	NA	ESS2.B Plate Tectonics and Large-Scale System Interactions	CCC-1 Patterns	3

*Details of the alignment to PE dimensions listed can be accessed online in the **Analyzing Maps Teacher Rubrics**.

88

Describe the assessment (e.g., how many questions, presence of tables/charts, graphs).	Purpose of Assessment (i.e., peer, self, formative, summative, per/post)	Type of Measure (e.g., Performance Task, discussion, multiple choice, constructed response)	Note evidence of bias or problems with accessibility.
Students analyse the data in a series of maps of California Performance task- constructed response showing the occurrence and magnitude of earthquakes. They complete a series of scaffolded questions.	Benchmark Assessment: Summative	Performance Task: constructed response	No Bias. Text to Speech function available for students that require language support. Questions are scaffolded so all students will be able to demonstrate their understanding. Rubrics support teachers to assess all levels of ability.

Match among Assessment, Phenomena/Problem, and Three Dimensions

What phenomenon or problem, if any, are students trying to figure out in this assessment?	What is the 2-3 dimensional learning goal assessed in this task?
Students take on the role of engineers to analyze earthquake data in maps to solve the problem of choosing the safest location for building a theme park.	PE 4-ESS2-2 is assessed in this task. Students need to analyze data from maps to identify the locations and types of earth's features on a map and interpret data maps to identify patterns where earthquakes occur.

Designed for the NGSS: Foundations	High Quality 5	Medium Quality 3	Low Quality 1
SP1. Three-dimensional Performances. Materials include assessments designed to: • match the targeted learning goals; • elicit observable evidence of students' use of grade-appropriate elements of the three dimensions to make sense of phenomena and/or to design solutions to problems.	Materials include assessments that are consistently designed to connect to learning goals and require students to apply appropriate elements of the three dimensions to make sense of the phenomenon/solve the problem.	Materials include assessments that are sometimes designed to connect to learning goals and require students to apply appropriate elements of the three dimensions to make sense of the phenomenon/solve the problem.	Materials include assessments that are designed such that they have limited connection to learning goals and/or they require students to apply elements of only one dimension to demonstrate their understanding of the phenomenon/solve the problem.
SP2. Variety of Measures. Assessments within a unit of instruction are matched to the targeted learning goals and elicit a full range of student thinking through: • use of a variety of measures (e.g., Performance Tasks, discussion questions, constructed response questions, project- or problem- based tasks, portfolios, justified multiple choice); • multiple assessment opportunities so that students can demonstrate their understanding of the same learning goals in a variety of ways.	Materials include assessments that include a wide variety of formats with clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.	Materials include assessments that include some variety of formats with clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.	Materials include assessments that use just one format and/or the expectations for students to demonstrate their knowledge are absent or unclear.

SP3. Student Progress Over Time. The unit of instruction includes assessments that serve a variety of purposes (e.g., pre/post; Formative, Summative, peer, self) to measure students' progress over time. The assessments: • provide opportunities to see growth and development in the use of the dimensions over time; • allow students to reflect on and monitor their sense-making/problem-solving over time.	Materials 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.	Materials include assessments that offer multiple opportunities, using more than one type of measure to demonstrate learning, and these measures are somewhat connected to show student progress in or across the three dimensions.	Materials include assessments that offer limited opportunities for students to demonstrate progress on the three dimensions.
SP4. Equitable Access. Assessments within the unit of instruction are designed to: • be free from bias (e.g., gender, racial, socioeconomic status, cultural, etc.); • be accessible to all students (e.g., reading level, accommodations).	Most assessments in the materials are free from bias and are accessible.	Some assessments in the materials are free from bias and are accessible.	Few assessments in the materials are free from bias and are accessible.

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Designed for the NGSS: Student Progress Analyze Evidence

Directions

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

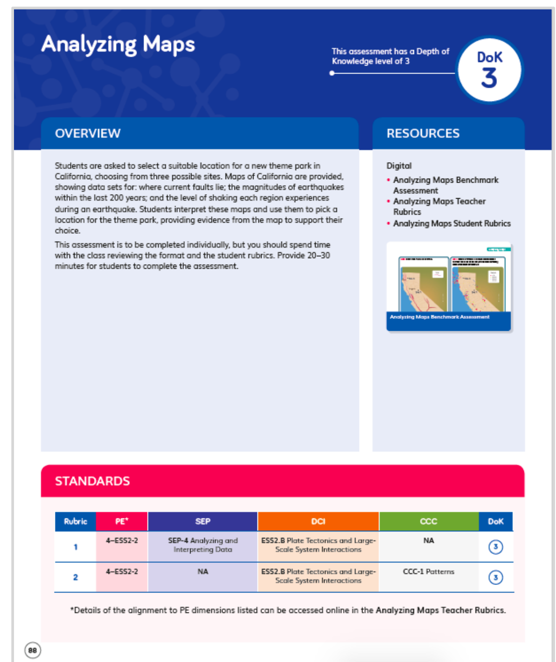
Strengths

SP1: Three-Dimensional Performance

The materials are High Quality 5 in regards to SP1.
They include assessments that are consistently designed to connect to learning goals and require students to apply appropriate elements of the three dimensions to make sense of the Module Phenomenon.

Evidence

Benchmark Assessment: Analyzing Maps (DQ2 TE pp. 88-91 and online). Students take on the role of engineers to analyze earthquake data in maps to solve the problem of where to build a theme park that is at a low risk of damage from earthquakes. PE 4-ESS2-2 is assessed in this task. Students use the three dimensions to analyze data from maps to identify the locations and types of earth's features on a map and interpret data maps to identify patterns where earthquakes occur.



Analyzing Maps

This assessment has a Depth of Knowledge level of 3

DoK 3

OVERVIEW

Students are asked to select a suitable location for a new theme park in California, choosing from three possible sites. Maps of California are provided, showing data sets for: where current faults lie; the magnitudes of earthquakes within the last 200 years; and the level of shaking each region experiences during an earthquake. Students interpret these maps and use them to pick a location for the theme park, providing evidence from the map to support their choice.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital
- Analyzing Maps Benchmark Assessment
- Analyzing Maps Teacher Rubrics
- Analyzing Maps Student Rubrics

Analyzing Maps Benchmark Assessment

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4–ESS2-2	SEP-4 Analyzing and Interpreting Data	ESS2.B Plate Tectonics and Large-Scale System Interactions	NA	3
2	4–ESS2-2	NA	ESS2.B Plate Tectonics and Large-Scale System Interactions	CCC-1 Patterns	3

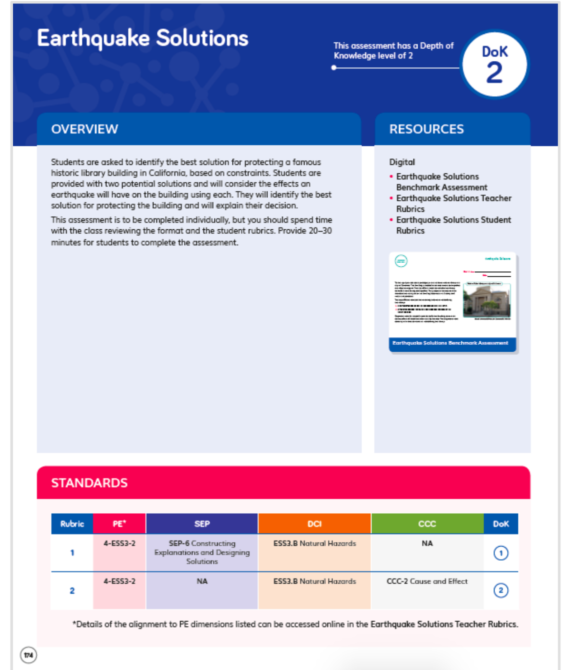
*Details of the alignment to PE dimensions listed can be accessed online in the **Analyzing Maps Teacher Rubrics**.

88

DQ2 TE pp. 88-91

Benchmark Assessment Earthquake Solutions (DQ5 TE p. 174 and online). Students have to compare and contrast engineering solutions to retrofit a historical building to make it more earthquake-resistant. The solution needs to meet specific criteria and constraints.

In DQ6, students draw the module engineering performance task to a close in the culminating DQ: How can we redesign our buildings to make them safer during earthquakes? Over several weeks they have followed the engineering design process to to design, build, test and revise an earthquake-proof structure that meets specific criteria and constraints. They need to make a poster that explains their design and give an oral presentation (DQ6). They use a rubric to self-assess their own work.). The three dimensions being assessed here are define a problem that includes specified criteria for success and constraints (3-5 ETS1-1), to generate and compare multiple solutions (3-5 ETS1-2), and then carry out tests to identify aspects of the design that can be improved (3-5 ETS1-3).



Earthquake Solutions

This assessment has a Depth of Knowledge level of 2

DoK 2

OVERVIEW

Students are asked to identify the best solution for protecting a famous historic library building in California, based on constraints. Students are provided with two potential solutions and will consider the effects an earthquake will have on the building using each. They will identify the best solution for protecting the building and will explain their decision.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital
- Earthquake Solutions Benchmark Assessment
- Earthquake Solutions Teacher Rubrics
- Earthquake Solutions Student Rubrics

Earthquake Solutions Benchmark Assessment

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4-ESS3-2	SEP-6 Constructing Explanations and Designing Solutions	ESS3.B Natural Hazards	NA	1
2	4-ESS3-2	NA	ESS3.B Natural Hazards	CCC-2 Cause and Effect	2

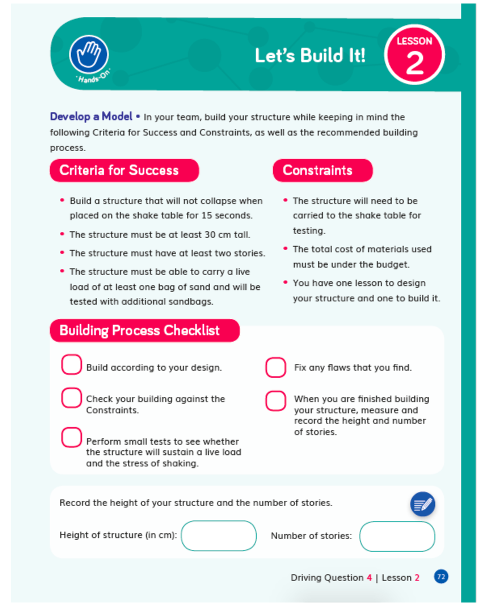
*Details of the alignment to PE dimensions listed can be accessed online in the **Earthquake Solutions Teacher Rubrics**.

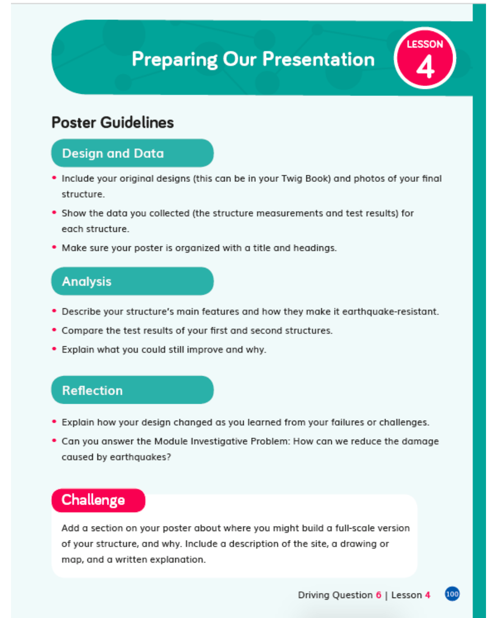
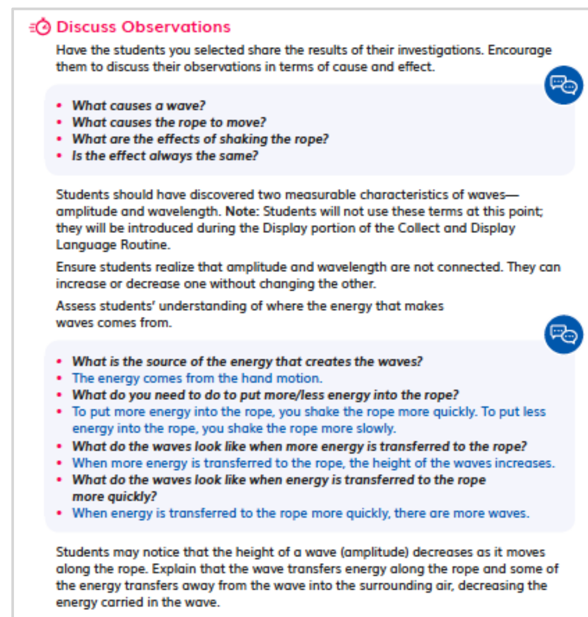
174

DQ5 TE p. 174

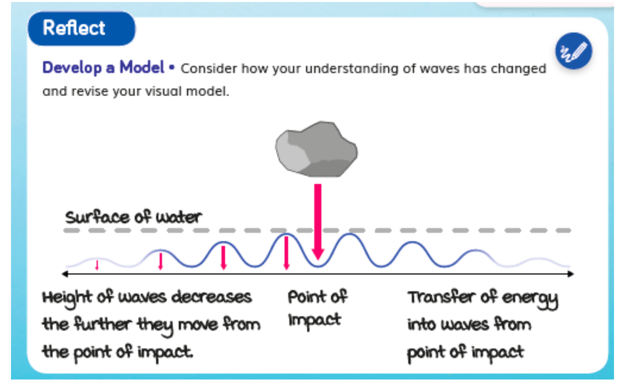
SP2: Variety of Measures

The materials are High Quality in regards to SP2.
Materials include assessments that include a wide variety of formats with clear expectations that allow students to demonstrate their understanding of the learning goals in multiple ways.

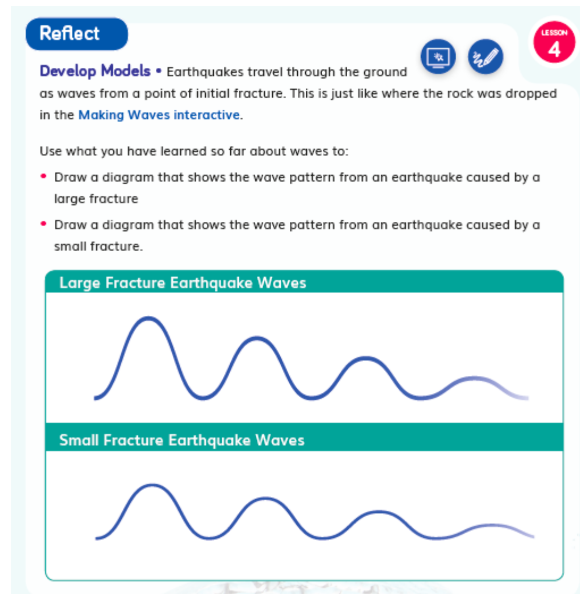
Evidence Assessments allow students to demonstrate their understanding of the learning goals in a variety of way including: • Performance Tasks (physical, oral and written DQ4L2 TB p. 72, DQ6L4 TB pp. 100–101)	 Hands-On Let's Build It! LESSON 2 **Develop a Model** • In your team, build your structure while keeping in mind the following Criteria for Success and Constraints, as well as the recommended building process. **Criteria for Success** • Build a structure that will not collapse when placed on the shake table for 15 seconds. • The structure must be at least 30 cm tall. • The structure must have at least two stories. • The structure must be able to carry a live load of at least one bag of sand and will be tested with additional sandbags. **Constraints** • The structure will need to be carried to the shake table for testing. • The total cost of materials used must be under the budget. • You have one lesson to design your structure and one to build it. **Building Process Checklist** ☐ Build according to your design. ☐ Check your building against the Constraints. ☐ Perform small tests to see whether the structure will sustain a live load and the stress of shaking. ☐ Fix any flaws that you find. ☐ When you are finished building your structure, measure and record the height and number of stories. Record the height of your structure and the number of stories. Height of structure (in cm): Number of stories: Driving Question 4 | Lesson 2 72 DQ4L2 TB p. 72

	 Preparing Our Presentation LESSON 4 **Poster Guidelines** Design and Data • Include your original designs (this can be in your Twig Book) and photos of your final structure. • Show the data you collected (the structure measurements and test results) for each structure. • Make sure your poster is organized with a title and headings. Analysis • Describe your structure's main features and how they make it earthquake-resistant. • Compare the test results of your first and second structures. • Explain what you could still improve and why. Reflection • Explain how your design changed as you learned from your failures or challenges. • Can you answer the Module Investigative Problem: How can we reduce the damage caused by earthquakes? Challenge Add a section on your poster about where you might build a full-scale version of your structure, and why. Include a description of the site, a drawing or map, and a written explanation. Driving Question 6 | Lesson 4 100 DQ6L4 TB pp. 100–101
• Discussions (DQ1L3 Report TE p. 25),	 Discuss Observations Have the students you selected share the results of their investigations. Encourage them to discuss their observations in terms of cause and effect. • *What causes a wave?* • *What causes the rope to move?* • *What are the effects of shaking the rope?* • *Is the effect always the same?* Students should have discovered two measurable characteristics of waves—amplitude and wavelength. **Note:** Students will not use these terms at this point; they will be introduced during the Display portion of the Collect and Display Language Routine. Ensure students realize that amplitude and wavelength are not connected. They can increase or decrease one without changing the other. Assess students' understanding of where the energy that makes waves comes from. • *What is the source of the energy that creates the waves?* • The energy comes from the hand motion. • *What do you need to do to put more/less energy into the rope?* • To put more energy into the rope, you shake the rope more quickly. To put less energy into the rope, you shake the rope more slowly. • *What do the waves look like when more energy is transferred to the rope?* • When more energy is transferred to the rope, the height of the waves increases. • *What do the waves look like when energy is transferred to the rope more quickly?* • When energy is transferred to the rope more quickly, there are more waves. Students may notice that the height of a wave (amplitude) decreases as it moves along the rope. Explain that the wave transfers energy along the rope and some of the energy transfers away from the wave into the surrounding air, decreasing the energy carried in the wave. DQ1L3 Report TE p. 25

- Constructed response (written and drawn DQ1L2 TB p. 6, DQ1L4 TB p. 12, DQ2L2 TB p. 28),

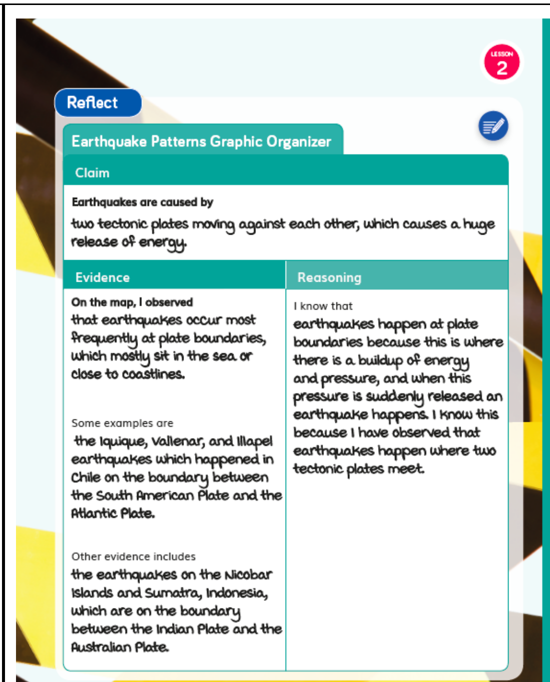


DQ1L2 TB p. 6



DQ1L4 TB p. 12

twig Science



LESSON 2

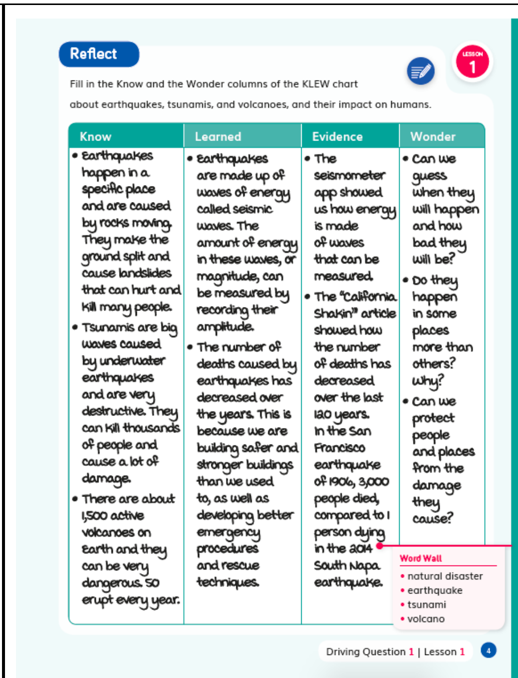
Reflect

Earthquake Patterns Graphic Organizer

Claim	
Earthquakes are caused by two tectonic plates moving against each other, which causes a huge release of energy.	
Evidence	**Reasoning**
On the map, I observed that earthquakes occur most frequently at plate boundaries, which mostly sit in the sea or close to coastlines. Some examples are the Iquique, Vallenar, and Illapel earthquakes which happened in Chile on the boundary between the South American Plate and the Atlantic Plate. Other evidence includes the earthquakes on the Nicobar Islands and Sumatra, Indonesia, which are on the boundary between the Indian Plate and the Australian Plate.	I know that earthquakes happen at plate boundaries because this is where there is a buildup of energy and pressure, and when this pressure is suddenly released an earthquake happens. I know this because I have observed that earthquakes happen where two tectonic plates meet.

DQ2L2 TB p. 28

- Self- and peer assessment (DQ1L1 TB p. 4, DQ3L3 TB p. 57, DQ4L3 Investigate TE p. 142),



Reflect

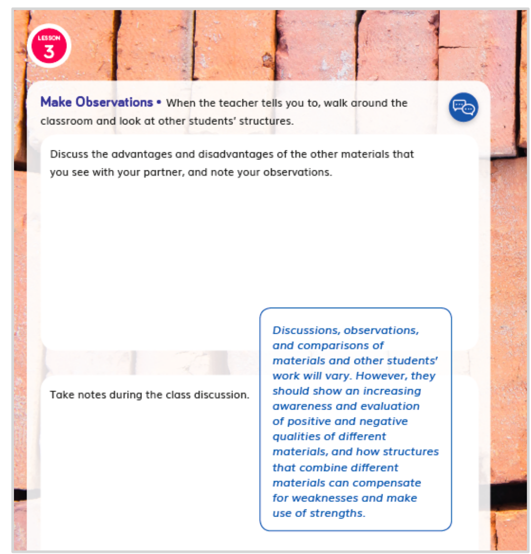
Fill in the Know and the Wonder columns of the KLEW chart about earthquakes, tsunamis, and volcanoes, and their impact on humans.

Know	Learned	Evidence	Wonder
• Earthquakes happen in a specific place and are caused by rocks moving. They make the ground split and cause landslides that can hurt and kill many people. • Tsunamis are big waves caused by underwater earthquakes and are very destructive. They can kill thousands of people and cause a lot of damage. • There are about 1,500 active volcanoes on Earth and they can be very dangerous. 50 erupt every year.	• Earthquakes are made up of waves of energy called seismic waves. The amount of energy in these waves, or magnitude, can be measured by recording their amplitude. • The number of deaths caused by earthquakes has decreased over the years. This is because we are building safer and stronger buildings than we used to, as well as developing better emergency procedures and rescue techniques.	• The seismometer app showed us how energy is made of waves that can be measured. • The "California Shakin'" article showed how the number of deaths has decreased over the last 120 years. In the San Francisco earthquake of 1906, 3,000 people died, compared to 1 person dying in the 2014 South Napa earthquake.	• Can we guess when they will happen and how bad they will be? • Do they happen in some places more than others? Why? • Can we protect people and places from the damage they cause?

Word Wall
- natural disaster
- earthquake
- tsunami
- volcano

Driving Question 1 | Lesson 1 4

DQ1L1 TB p. 4



Make Observations • When the teacher tells you to, walk around the classroom and look at other students' structures.

Discuss the advantages and disadvantages of the other materials that you see with your partner, and note your observations.

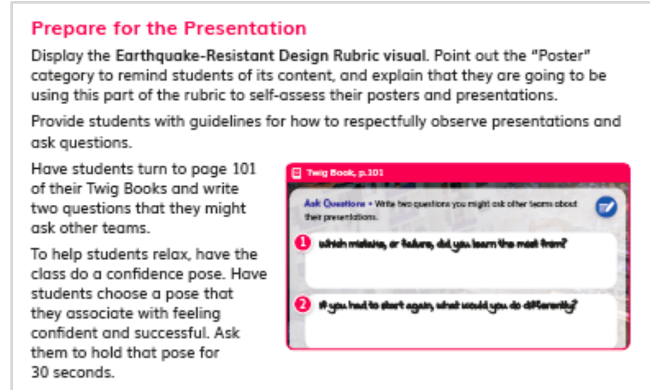
Take notes during the class discussion.

Discussions, observations, and comparisons of materials and other students' work will vary. However, they should show an increasing awareness and evaluation of positive and negative qualities of different materials, and how structures that combine different materials can compensate for weaknesses and make use of strengths.

DQ3L3 TB p. 57

	Introduce the Activity Today, students will test the structure they built in the previous lesson and record their results. **Test Structures** Display the Test Chart and go over its categories with students. Attach the photos you printed of each team's structure and your demonstration structure. Ask each team to fill in the first three columns of the chart. Demonstrate how to use the earthquake simulator (by rapidly moving the tray between the two pieces of tape for 15 seconds). Show your structure to students and run through the testing steps on page 74 in the Twig Book. Have teams come up one at a time and test their structures while other teams note observations on page 75 in their Twig Books. Since each team will run their own tests, different students will be activating the simulator, which may lead to discrepancies in results. Consider establishing a Fair Test Controller as you did in Module 1. Ask students to try as much as possible to work the simulator the same way, but do not strictly enforce this. Take notes about any differences and use these a discussion point during the Report. Twig Book, p. 75 **Make Observations** • As you observe the tests, take notes on what happens to each structure. *Good observations of structures will comment on:* *The shape of the structure and if it stands up by itself.* *How the structure moves when the earthquake hits, and whether the design accounts for and offsets this new horizontal load.* *How the structure withstands the live load of the sandbags, and how many it can hold without breaking.* *What happens to the build materials under increasing live and horizontal loads.* *Whether the structure collapsed because of the live load or the horizontal load.* After each test, ask the team members to self-evaluate using the **Earthquake-Resistant Design Rubric visual.** They should record these self-evaluations on a separate piece of paper and hand these to you at the end of class. Assess students' work with the **Earthquake-Resistant Design Rubric.** DQ4L3 Investigate TE p. 142
• Multiple choice (digital, DQ6 MCA).	**Part B: Multiple Choice Questions** 1. What is an earthquake? Select your answer from the options below. A An earthquake is the movement of the Earth's tectonic plates making seismic waves. B An earthquake is the eruption of molten rock from the inside of the Earth's crust. C An earthquake is the creation of new land formed by molten rock pushing through gaps in the Earth's crust. D An earthquake is a huge wave of water that can wash away whole cities. 2.1. When engineers plan their designs for any building they have to be sure that it won't fall down. Look at the diagram below. From your experiences in the classroom when you built structures to support sandbags, which shape do you think engineers would find helps to give the most strength and stability to their designs for buildings? Multiple choice (digital, DQ6 MCA
Student versions of rubrics for the Performance Tasks and Benchmark Assessments are shared with the class so they have a clear understanding of what success looks like (available online: Performance Tasks DQ4L3 Spark TE p. 142, DQ6L5 Spark p. 204, Benchmark: DQ2, DQ5).	**Review the Rubric** Have students review the Criteria for Success and Constraints on page 69 of their Twig Books. Display the **Earthquake-Resistant Design Rubric visual.** Read it as a class so that all students are clear on what the aim of the activity is. Explain that students will use the rubric to self-assess after they test their structures.

DQ4L3 Spark TE p. 142



Prepare for the Presentation

Display the **Earthquake-Resistant Design Rubric visual.** Point out the "Poster" category to remind students of its content, and explain that they are going to be using this part of the rubric to self-assess their posters and presentations.

Provide students with guidelines for how to respectfully observe presentations and ask questions.

Have students turn to page 101 of their Twig Books and write two questions that they might ask other teams.

To help students relax, have the class do a confidence pose. Have students choose a pose that they associate with feeling confident and successful. Ask them to hold that pose for 30 seconds.

DQ6L5 Spark p. 204

SP3: Student Progress Over Time

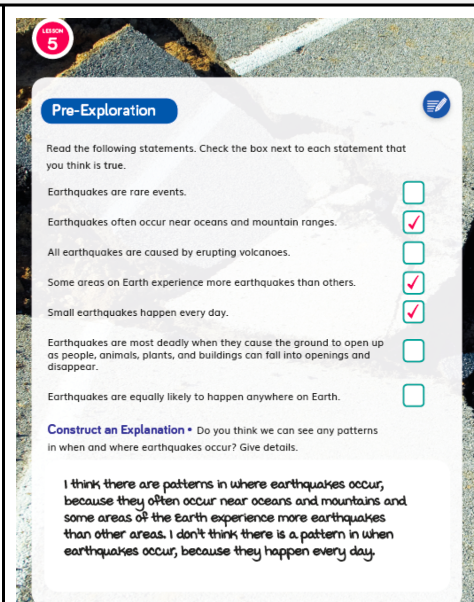
The materials are High Quality in regards to SP3.

Materials 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

There are two diagnostic pre-assessments called Pre-Explorations at strategic points in the module that assess prior knowledge and misconceptions (DQ1L5 TB p. 19, DQ3L1 TB p. 51). Notes in the TE and the Progress Tracker support teachers in monitoring students' mastery of their misconceptions and the three dimensions and give suggestions for how to tailor instruction accordingly (DQ3L1 Reflect TE p. 103, DQ3L4 Report TE p. 121, DQ5L4 Reflect TE p. 173).

Formative Assessments are frequent and varied, supporting students and teachers to understand how their learning journey is progressing.



DQ1L5 TB p. 19

LESSON 1

Pre-Exploration

Evaluate Information • Two students had a discussion about earthquake safety. They disagreed about which buildings are safest during an earthquake. Read their ideas below.

Student 1: The newest buildings are the best at standing up during an earthquake.
Student 2: The heaviest buildings are the best at standing up during an earthquake.

Is one of the students correct? Which student do you agree with more? Explain your reasoning.

Both students provide good reasons, but neither provide enough information about the buildings to provide a better answer than the other. Newer buildings may not be built in a way, or with materials, that are better at standing up. Heavier buildings may be more stable due to having a bigger dead load, but they may be designed in a way that makes them unstable and likely to fall over.

DQ3L1 TB p. 51

Pre-Exploration

Ask students to complete the Earthquake Safety Pre-Exploration on page 51 in their Twig Books.

Use the Pre-Exploration

Look for students who demonstrated misconceptions in the Earthquake Safety Pre-Exploration and make notes on the **Earthquake Safety Progress Tracker**. Plan to address these misconceptions in subsequent lessons.

Note: There is no correct answer to this prompt. Rather, look for evidence that students are thinking beyond the basic characteristics of weight and age, and include considerations, e.g., building materials in their responses.

Twig Book, p.51

Evaluate Information • Two students had a discussion about earthquake safety. They disagreed about which buildings are safest during an earthquake. Read their ideas below.

Student 1: The newest buildings are the best at standing up during an earthquake.
Student 2: The heaviest buildings are the best at standing up during an earthquake.

Is one of the students correct? Which student do you agree with more? Explain your reasoning.

Both students provide good reasons, but neither provide enough information about the buildings to provide a better answer than the other. Newer buildings may not be built in a way, or with materials, that are better at standing up. Heavier buildings may be more stable due to having a bigger dead load, but they may be designed in a way that makes them unstable and likely to fall over.

Misconception	Look For	Where Addressed
New buildings are always better than old buildings at standing up during an earthquake.	Students who respond that they agree with Student 1 and do not provide reasoning that this depends on building codes or structural considerations such as material or flexibility.	• Driving Question 3, Lesson 4 Report • Driving Question 5, Lesson 2 Report
Heavy buildings are always better than lightweight buildings at standing up during an earthquake.	Students who respond that they agree with Student 2 and do not provide reasoning that this depends on other structural considerations, such as material and flexibility, or refer to evidence from records/tests.	• Driving Question 3, Lesson 4 Report • Driving Question 4, Lesson 3 Report • Driving Question 5, Lesson 2 Report • Driving Question 6, Lesson 3 Report

DQ3L1 Reflect TE p. 103

	(see excerpts below)

Discuss the Video

Explain that students are going to watch a video about two different earthquakes—one in Chile and one in Nepal. Ask them to listen for how the effects of these earthquakes on people varied and why.

Play the **Earthquakes Around the World video.**

Ask students to consider how the video compares to the articles they read.

Earthquakes Around the World video

Misconceptions from the Pre-Exploration

Refer to the **Earthquake Safety Progress Tracker** and provide the following clarification for students who demonstrated misconceptions:

Misconceptions	What to Do
New buildings are always better than old buildings at standing up during an earthquake.	When students discuss how differences in building codes may have led to differences in the extent of deaths and damage caused, ask whether a building's age determines its safety during an earthquake.
Heavy buildings are always better than lightweight buildings at standing up during an earthquake.	Explain that the construction of the building and adherence to building codes, not the weight of the building or the time that it was built, determine the building's stability during an earthquake.

DQ3L4 Report TE p. 121

Formative Assessment

Ask students to create a short newspaper headline on page 92 in their Twig Books about what will change in their building design project.

Twig Book, p.92

Reflect

Communicate Information • Write a newspaper headline about what will change in your building design project. Be creative!

Headlines will vary, but should be enthusiastic and excited, to highlight how change is a good thing.

Use the Formative Assessment

Read students' newspaper headlines as well as the tables they completed with their teams. Determine which groups may need support in thinking of additional ways to improve their structures.

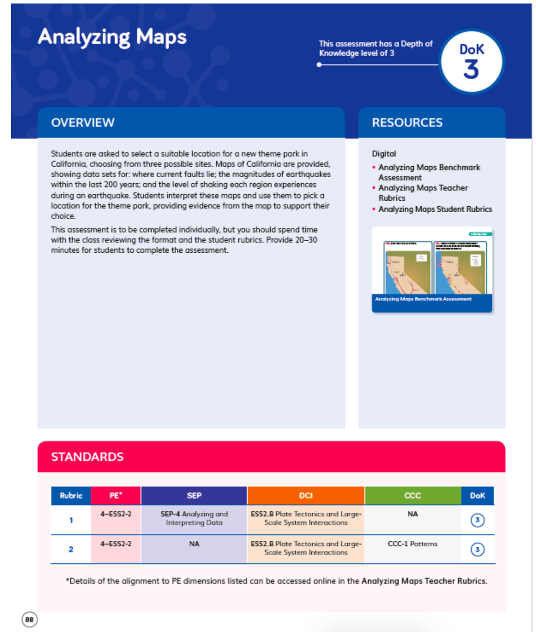
Use the **Earthquake Safety Progress Tracker** to note if, in their headlines, students acknowledge that designs should be tested to identify failure points and that, most of the time, multiple tries are necessary to succeed.

DQ5L4 Reflect TE p. 173

Two summative Benchmark Assessments (TE p. 88-91, TE p. 174 and online DQ2 and DQ5) allow students to demonstrate their ability to apply their growing skills and knowledge to new contexts.

The culminating Performance Task allows students to demonstrate their attainment of the engineering Performance Expectations in a variety of ways.

A module level Multiple Choice assessment available digitally (DQ6) supports teachers to assess all the three dimensions targeted in the module.



Analyzing Maps

This assessment has a Depth of Knowledge level of 3

DoK 3

OVERVIEW

Students are asked to select a suitable location for a new theme park in California, choosing from three possible sites. Maps of California are provided, showing data sets for: where current faults lie; the magnitudes of earthquakes within the last 200 years; and the level of shaking each region experiences during an earthquake. Students interpret these maps and use them to pick a location for the theme park, providing evidence from the map to support their choice.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital
- Analyzing Maps Benchmark Assessment
- Analyzing Maps Teacher Rubrics
- Analyzing Maps Student Rubrics

Analyzing Maps Benchmark Assessment

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4–ESS2-2	SEP-4 Analyzing and Interpreting Data	ESS2.B Plate Tectonics and Large-Scale System Interactions	NA	3
2	4–ESS2-2	NA	ESS2.B Plate Tectonics and Large-Scale System Interactions	CCC-1 Patterns	3

*Details of the alignment to PE dimensions listed can be accessed online in the **Analyzing Maps Teacher Rubrics.**

88

TE p. 88-91

Earthquake Solutions

This assessment has a Depth of Knowledge level of 2

DoK 2

OVERVIEW

Students are asked to identify the best solution for protecting a famous historic library building in California, based on constraints. Students are provided with two potential solutions and will consider the effects an earthquake will have on the building using each. They will identify the best solution for protecting the building and will explain their decision.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital
- Earthquake Solutions Benchmark Assessment
- Earthquake Solutions Teacher Rubrics
- Earthquake Solutions Student Rubrics

Earthquake Solutions Benchmark Assessment

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4-ESS3-2	SEP-6 Constructing Explanations and Designing Solutions	ESS3.B Natural Hazards	NA	1
2	4-ESS3-2	NA	ESS3.B Natural Hazards	CCC-2 Cause and Effect	2

*Details of the alignment to PE dimensions listed can be accessed online in the **Earthquake Solutions Teacher Rubrics.**

174

TE p. 174

SP4: Equitable Access

The materials are High Quality in regards to SP4.
Most assessments in the materials are free from bias and are accessible.

Evidence

The digital TB and digital assessment items (Benchmark, Multiple Choice, Rubrics) have a text to speech function allowing students of all reading levels to access the assessments.

Assessments of the three dimensions are multimodal and include multiple choice, writing, drawing, physical models, posters and oral presentations, allowing all students to access a range of assessment types to suit their learning style and/or reading level.

The rubrics for the Performance Tasks (DQ4L3 Spark TE p. 142, DQ6L5 Spark TE p. 204) and Benchmark Assessments (TE p. 88-91, p. 174 and online DQ2 and DQ5) have four levels—emerging, developing, proficient, advanced—allowing all students to demonstrate their current level of attainment.

Review the Rubric

Have students review the Criteria for Success and Constraints on page 69 of their Twig Books.

Display the **Earthquake-Resistant Design Rubric visual.** Read it as a class so that all students are clear on what the aim of the activity is.

Explain that students will use the rubric to self-assess after they test their structures.

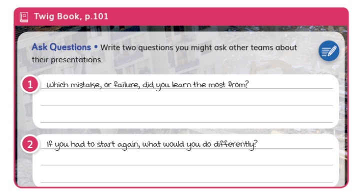
DQ4L3 Spark TE p. 142

Prepare for the Presentation

Display the **Earthquake-Resistant Design Rubric visual**. Point out the "Poster" category to remind students of its content, and explain that they are going to be using this part of the rubric to self-assess their posters and presentations.

Provide students with guidelines for how to respectfully observe presentations and ask questions.

Have students turn to page 101 of their Twig Books and write two questions that they might ask other teams.



To help students relax, have the class do a confidence pose. Have students choose a pose that they associate with feeling confident and successful. Ask them to hold that pose for 30 seconds.

DQ6L5 Spark TE p. 204

Analyzing Maps

This assessment has a Depth of Knowledge level of 3

DoK 3

OVERVIEW

Students are asked to select a suitable location for a new theme park in California, choosing from three possible sites. Maps of California are provided, showing data sets for: where current faults lie; the magnitudes of earthquakes within the last 200 years; and the level of shaking each region experiences during an earthquake. Students interpret these maps and use them to pick a location for the theme park, providing evidence from the map to support their choice.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital

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- **Analyzing Maps Teacher Rubrics**
- **Analyzing Maps Student Rubrics**

STANDARDS

Rubric	PE*	SEP	DCI	CCC	DoK
1	4–ESS2-2	**SEP-4** Analyzing and Interpreting Data	**ESS2.B** Plate Tectonics and Large-Scale System Interactions	NA	3
2	4–ESS2-2	NA	**ESS2.B** Plate Tectonics and Large-Scale System Interactions	**CCC-1** Patterns	3

*Details of the alignment to PE dimensions listed can be accessed online in the **Analyzing Maps Teacher Rubrics.**

TE p. 88-91

Earthquake Solutions

This assessment has a Depth of Knowledge level of 2

DoK 2

OVERVIEW

Students are asked to identify the best solution for protecting a famous historic library building in California, based on constraints. Students are provided with two potential solutions and will consider the effects an earthquake will have on the building using each. They will identify the best solution for protecting the building and will explain their decision.

This assessment is to be completed individually, but you should spend time with the class reviewing the format and the student rubrics. Provide 20–30 minutes for students to complete the assessment.

RESOURCES

Digital

- **Earthquake Solutions Benchmark Assessment**
- **Earthquake Solutions Teacher Rubrics**
- **Earthquake Solutions Student Rubrics**

STANDARDS

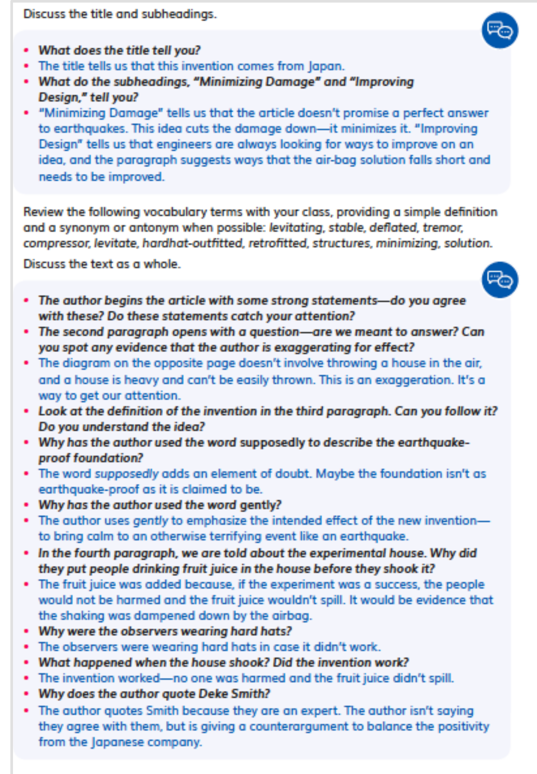
Rubric	PE*	SEP	DCI	CCC	DoK
1	4-ESS3-2	**SEP-6** Constructing Explanations and Designing Solutions	**ESS3.B** Natural Hazards	NA	1
2	4-ESS3-2	NA	**ESS3.B** Natural Hazards	**CCC-2** Cause and Effect	2

*Details of the alignment to PE dimensions listed can be accessed online in the **Earthquake Solutions Teacher Rubrics.**

TE p. 174

The Multiple Choice Assessment (DQ6) contains questions targeting different DoK levels, with an extended section available to further challenge GATE students.

Writing, Reading, Listening and Speaking domain tasks dedicated to assessing science relevant English language development are integrated into the core instructional resources (DQ5L3 Report TE p. 166) and the On-Level reader lessons (Chapter 3, Second Read TE p. 225).



Discuss the title and subheadings.

- ***What does the title tell you?***
- The title tells us that this invention comes from Japan.
- ***What do the subheadings, "Minimizing Damage" and "Improving Design," tell you?***
- "Minimizing Damage" tells us that the article doesn't promise a perfect answer to earthquakes. This idea cuts the damage down—it minimizes it. "Improving Design" tells us that engineers are always looking for ways to improve on an idea, and the paragraph suggests ways that the air-bag solution falls short and needs to be improved.

Review the following vocabulary terms with your class, providing a simple definition and a synonym or antonym when possible: *levitating, stable, deflated, tremor, compressor, levitate, hardhat-outfitted, retrofitted, structures, minimizing, solution.*

Discuss the text as a whole.

- ***The author begins the article with some strong statements—do you agree with these? Do these statements catch your attention?***
- ***The second paragraph opens with a question—are we meant to answer? Can you spot any evidence that the author is exaggerating for effect?***
- The diagram on the opposite page doesn't involve throwing a house in the air, and a house is heavy and can't be easily thrown. This is an exaggeration. It's a way to get our attention.
- ***Look at the definition of the invention in the third paragraph. Can you follow it? Do you understand the idea?***
- ***Why has the author used the word supposedly to describe the earthquake-proof foundation?***
- The word *supposedly* adds an element of doubt. Maybe the foundation isn't as earthquake-proof as it is claimed to be.
- ***Why has the author used the word gently?***
- The author uses *gently* to emphasize the intended effect of the new invention—to bring calm to an otherwise terrifying event like an earthquake.
- ***In the fourth paragraph, we are told about the experimental house. Why did they put people drinking fruit juice in the house before they shook it?***
- The fruit juice was added because, if the experiment was a success, the people would not be harmed and the fruit juice wouldn't spill. It would be evidence that the shaking was dampened down by the airbag.
- ***Why were the observers wearing hard hats?***
- The observers were wearing hard hats in case it didn't work.
- ***What happened when the house shook? Did the invention work?***
- The invention worked—no one was harmed and the fruit juice didn't spill.
- ***Why does the author quote Deke Smith?***
- The author quotes Smith because they are an expert. The author isn't saying they agree with them, but is giving a counterargument to balance the positivity from the Japanese company.

DQ5L3 Report TE p. 166

	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. Chapter 3, Second Read TE p. 225