Natural Hazards

STEM Road Map for Elementary School

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

NSTA press
National Science Teaching Association

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NATURAL HAZARDS MODULE OVERVIEW

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

THEME: Cause and Effect

LEAD DISCIPLINE: Science

MODULE SUMMARY

In this module, students learn about the effects of natural hazards on people, communities, and the environment and consider how threats to human safety from natural hazards can be minimized. They also explore the economic effects of natural hazards from the perspectives of human and natural resources. Student teams are challenged to create a plan for how people can prepare for a natural hazard to minimize its impacts on the environment and on humans (adapted from Koehler, Bloom, and Milner 2015).

ESTABLISHED GOALS AND OBJECTIVES

The goal of this module is for students to understand and demonstrate their knowledge about the influence of natural hazards on people and on other animals. At the conclusion of this module, students will be able to do the following:

- Identify various natural hazards
- Identify the basic causes of natural hazards
- Use technology to gather research information and communicate
- Identify ways that natural hazards can impact people and communities
- Identify features of structures designed to withstand earthquakes and construct models of structures that incorporate these types of features
- Identify ways that natural hazards can impact animals' homes
- Model natural hazards

- Identify the steps of the engineering design process (EDP)
- Use the EDP to complete team projects
- Identify effective collaboration practices and reflect on their teams' efforts to collaborate
- Identify models for measuring, calculating, comparing, and evaluating numbers related to the probabilities of weather occurrences
- Identify bar graphs and infographics as ways that numbers can be displayed graphically
- Create bar graphs and infographics for data sets
- Identify ways that people and communities can prepare for natural hazards to mitigate their impacts on people and property
- Communicate information about natural hazards and natural hazard preparedness to a target audience
- Identify tall tales as a type of fictional literature and create their own tall tales
- Identify the basic parts of a story

CHALLENGE OR PROBLEM FOR STUDENTS TO SOLVE: NATURAL HAZARD PREPAREDNESS CHALLENGE

Students are challenged to work in teams to develop and communicate a plan for people to prepare for one type of natural hazard, such as a flood, tornado, earthquake, volcano, wildfire, thunderstorm, or hurricane. The plan should focus on keeping people safe if a natural hazard should strike their community. As part of this plan, students produce a public service announcement about how the community can prepare for the natural hazard.

CONTENT STANDARDS ADDRESSED IN THIS STEM ROAD MAP MODULE

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

STEM RESEARCH NOTEBOOK

Each student should maintain a STEM Research Notebook, which will serve as a place for students to organize their work throughout this module (see p. 12 for more general

discussion on setup and use of the notebook). All written work in the module should be included in the notebook, including records of students' thoughts and ideas, fictional accounts based on the concepts in the module, and records of student progress through the EDP. The notebooks may be maintained across subject areas, giving students the opportunity to see that although their classes may be separated during the school day, the knowledge they gain is connected. The lesson plans for this module contain STEM Research Notebook Entry sections (numbered 1–31), and templates for each notebook entry are included in Appendix A (p. 119).

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

MODULE LAUNCH

Following agreed-upon rules for discussions, hold a whole-class discussion about natural hazards, asking students questions such as the following:

- What are natural hazards?
- Are there different types of natural hazards?
- What kinds of natural hazards are there?
- What causes natural hazards?
- Can people make or cause natural hazards?
- Where and when have you seen natural hazards?

This discussion gives students an opportunity to express their conceptions of natural hazards and the influence of natural hazards. Show a video about natural hazards such as "Natural Disasters" at *www.youtube.com/watch?v=_smJ13x90oM*. Then, hold a class discussion about the various natural hazards featured in this video.

PREREQUISITE SKILLS FOR THE MODULE

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

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

Prerequisite Key Knowledge	Application of Knowledge by Students	Differentiation for Students Needing Additional Support
Science • Understand cause and effect.	*Science* • Determine how natural hazards affect humans, communities, and animals' homes.	*Science* • Provide demonstrations of cause and effect (e.g., dropping egg [cause] and observing breakage [effect]), emphasizing that cause is why something happens, effect is what happens. • Read aloud picture books to class and have students identify cause-and-effect sequences. • Create a class T-chart to record causes and related effects students observe in the classroom, in nature, and in literature.
Mathematics • Demonstrate number sense.	*Mathematics* • Measure, calculate, compare, and evaluate numbers when exploring natural hazards.	*Mathematics* • Model measurement techniques using standard and nonstandard units of measurement. • Read aloud nonfiction texts about temperature, rainfall, wind, and measurement. • Provide opportunities for students to practice measurement in a variety of settings (e.g., in the classroom and outdoors).
Language and Inquiry Skills • Visualize. • Make predictions. • Record ideas and information using words and pictures. • Ask and respond to questions.	*Language and Inquiry Skills* • Make and confirm or reject predictions. • Share thought processes through keeping a notebook, asking and responding to questions, and using the engineering design process.	*Language and Inquiry Skills* • As a class, make predictions when reading fictional texts. • Model the process of using information and prior knowledge to use predictions. • Provide samples of notebook entries.
Speaking and Listening • Participate in group discussions.	*Speaking and Listening* • Engage in collaborative group discussions in the development of natural hazard plans and about how to communicate those plans.	*Speaking and Listening* • Model speaking and listening skills. • Create a class list of good listening and good speaking skills. • Read picture books that feature collaboration and teamwork.

POTENTIAL STEM MISCONCEPTIONS

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

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

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

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

SRL PROCESS COMPONENTS

Table 3.2 (p. 28) illustrates some of the activities in the Natural Hazards module and how they align with the self-regulated learning (SRL) process before, during, and after learning.

Table 3.2. SRL Process Components

Learning Process Components	Examples From Natural Hazards Module	Lesson Number and Learning Component
BEFORE LEARNING		
Motivates students	Students brainstorm about natural hazards before watching a video on the subject.	Lesson 1, Introductory Activity/Engagement
Evokes prior learning	While watching a video, students document their own experiences with natural hazards.	Lesson 1, Introductory Activity/Engagement
DURING LEARNING		
Focuses on important features	Students participate in the Earthquake Shake activity, in which they simulate earthquake conditions and observe the effects of the earthquake on various structures. Students use the most earthquake-resistant designs to identify important design features.	Lesson 2, Activity/ Exploration
Helps students monitor their progress	Students create simulated earthquakes and earthquake-resistant structures using the Define, Learn, Plan, Try, Test, and Decide steps of the engineering design process, and then share their products. During the Test step, students decide whether to improve their designs based on the structures' earthquake resistance.	Lesson 2, Activity/ Exploration
AFTER LEARNING		
Evaluates learning	Students present public service announcements about how to prepare for a natural disaster and receive peer feedback to improve their products before video recording them for viewing by other students and parents.	Lesson 3, Explanation
Takes account of what worked and what did not work	The whole class discusses and analyzes strengths and weaknesses of each group's natural hazard preparedness plan. Groups can meet to improve and adapt their plans based on discussion.	Lesson 3, Elaboration/ Application of Knowledge

STRATEGIES FOR DIFFERENTIATING INSTRUCTION WITHIN THIS MODULE

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

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

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

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

Assessments. Students are assessed in a variety of ways throughout the module, including individual and collaborative formative and summative assessments. Students have the opportunity to produce work via written text, oral and media presentations, and modeling. You may choose to provide students with additional choices of media for their products (for example, PowerPoint presentations, posters, or student-created websites or blogs).

Compacting. Based on student prior knowledge, you may wish to adjust instructional activities for students who exhibit prior mastery of a learning objective. Since student work in science is largely collaborative throughout the module, this strategy may be most appropriate for mathematics, social studies, or ELA activities. You may wish to compile a classroom database of research resources and supplementary readings for different reading levels and on a variety of subjects related to the module's topic to provide opportunities for students to undertake independent reading.

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

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

STRATEGIES FOR ENGLISH LANGUAGE LEARNERS

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

When differentiating instruction for ELL students, you should carefully consider the needs of these students as you introduce and use academic language in various language domains (listening, speaking, reading, and writing) throughout this module. To adequately differentiate instruction for ELL students, you should have an understanding

of the proficiency level of each student. The following five overarching preK–5 WIDA learning standards are relevant to this module:

- Standard 1: Social and Instructional Language. Focus on following directions, personal information, collaboration with peers.
- Standard 2: The Language of Language Arts. Focus on nonfiction, fiction, sequence of story, elements of story.
- Standard 3: The Language of Mathematics. Focus on basic operations, number sense, interpretation of data, patterns.
- Standard 4: The Language of Science. Focus on forces in nature, scientific process, Earth and sky, living and nonliving things, organisms and environment, weather.
- Standard 5: The Language of Social Studies. Focus on community workers, homes and habitats, jobs and careers, representations of Earth (maps and globes).

SAFETY CONSIDERATIONS FOR THE ACTIVITIES IN THIS MODULE

The safety precautions associated with each investigation are based in part on the use of the recommended materials and instructions, legal safety standards, and better professional safety practices. Selection of alternative materials or procedures for these investigations may jeopardize the level of safety and therefore is at the user's own risk. Remember that an investigation includes three parts: (1) setup, in which you prepare the materials for students to use; (2) the actual hands-on investigation, in which students use the materials and equipment; and (3) cleanup, in which you or the students clean the materials and put them away for later use. The safety procedures for each investigation apply to all three parts. For more general safety guidelines, see the Safety in STEM section in Chapter 2 (p. 18).

We also recommend that you go over the safety rules that are included as part of the safety acknowledgment form with your students before beginning the first investigation. Once you have gone over these rules with your students, have them sign the safety acknowledgment form. You should also send the form home with students for parents or guardians to read and sign to acknowledge that they understand the safety procedures that must be followed by their children. A sample elementary safety acknowledgment form can be found on the National Science Teaching Association's Safety Portal at *http://static.nsta.org/pdfs/SafetyAcknowledgmentForm-ElementarySchool.pdf*.

DESIRED OUTCOMES AND MONITORING SUCCESS

The desired outcome for this module is outlined in Table 3.3, along with suggested ways to gather evidence to monitor student success. For more specific details on desired outcomes, see the Established Goals and Objectives sections for the module (p. 23) and individual lessons.

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

Desired Outcome	Evidence of Success	
	Performance Tasks	Other Measures
Students will understand and can demonstrate their knowledge about the influence of natural hazards on people and on animals' homes.	• Students complete a variety of investigations related to natural hazards. • Student teams develop and communicate natural hazard preparedness plans. • Students each maintain a STEM Research Notebook that includes what they have learned, responses to questions, and observations.	Students are assessed using the Observation, STEM Research Notebook, and Participation Rubric.

ASSESSMENT PLAN OVERVIEW AND MAP

Table 3.4 provides an overview of the major group and individual *products* and *deliverables*, or things that students will produce in this module, that constitute the assessment for this module. See Table 3.5 (p. 34) for a full assessment map of formative and summative assessments in this module.

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

Lesson	Major Group Products and Deliverables	Major Individual Products and Deliverables
1	• Vortex Bottles	• STEM Research Notebook entries #1–11 • Weather Tall Tale • Lesson assessment
2	• Earthquake Shake structures • Group presentations of Earthquake Shake structures • Hazard Sleuths research and poster	• STEM Research Notebook entries #12–22 • "Animals in a Natural Hazard" story (creative writing) • Lesson assessment
3	• Community infographics • Our Natural Hazard Preparedness Plans public service announcements	• STEM Research Notebook entries #23–31 • Lesson assessment

Table 3.5. Assessment Map for Natural Hazards Module

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
1	STEM Research Notebook *entries*	Individual/ Group	Formative	• Identify various natural hazards. • Identify the causes of various natural hazards. • Identify ways that mathematics can be used to describe natural phenomena. • Use a model to explain the behavior of debris in a tornado. • Identify several impacts natural hazards can have on people and communities.
1	Vortex Bottle Investigation *performance task*	Group	Formative	• Identify examples of physical models. • Create a model of tornado winds. • Use a model to explain the behavior of debris in a tornado.
1	Weather Tall Tale *creative writing rubric*	Individual/ Group	Formative	• Identify the characteristics of a tall tale. • Identify the basic parts of a story. • Create a tall tale related to weather events.
1	Lesson assessment	Individual	Formative	• Identify various natural hazards. • Identify the causes of various natural hazards. • Identify examples of physical models. • Understand that mathematical models are used to predict weather. • Identify several impacts natural hazards can have on people and communities.

Continued

Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
2	STEM Research Notebook *entries*	Individual/ Group	Formative	• Explain that the movement of tectonic plates can cause natural hazards. • Identify natural hazards associated with movements of tectonic plates. • Identify several impacts that natural hazards associated with the movement of tectonic plates can have on people and communities. • Identify the influence natural hazards can have on animals, with an emphasis on animals' homes. • Use bar graphs to model earthquake data and identify geographic patterns.
2	Earthquake Shake *structures and group presentations*	Group	Formative	• Identify the steps of the engineering design process (EDP). • Use the EDP to complete a group task. • Understand that design features of structures can help protect people during natural hazard events and apply that understanding to create structures designed to withstand a simulated earthquake.
2	Hazard Sleuths *research and poster*	Group	Formative	• Use technology to gather research information and communicate about natural hazards. • Identify several impacts that natural hazards associated with the movement of tectonic plates can have on people and communities. • Identify several ways that people can remain safe during a natural hazard occurrence. • Communicate information about natural hazards in a visual format.
2	"Animals in a Natural Hazard" story *creative writing rubric*	Individual	Formative	• Identify the influence natural hazards can have on animals, with an emphasis on animals' homes. • Identify several ways that people can remain safe during a natural hazard occurrence.

Continued

Table 3.5. (*continued*)

Lesson	Assessment	Group/ Individual	Formative/ Summative	Lesson Objective Assessed
2	Lesson assessment	Individual	Formative	• Identify several impacts that natural hazards associated with the movement of tectonic plates can have on people and communities.
3	STEM Research Notebook *prompts*	Individual/ Group	Formative	• Identify impacts of natural hazards on people and the environment. • Create a preparedness plan that can mitigate the impacts of a natural hazard on people and the environment. • Use technology tools to gather data about natural hazards.
3	Community infographics *performance task*	Group	Formative	• Understand that community characteristics can be expressed numerically and in text. • Organize numerical and textual information about students' communities in an infographic.
3	Our Natural Hazard Preparedness Plans public service announcements *performance task*	Group	Summative	• Identify impacts of natural hazards on people and the environment. • Create a preparedness plan that can mitigate the impacts of a natural hazard on people and the environment. • Communicate understanding of natural hazard preparedness through a PSA. • Understand that community characteristics can be expressed numerically and in text. • Use technology to communicate about natural hazards.
3	Lesson assessment	Individual	Summative	• Identify impacts of natural hazards on people and the environment.

MODULE TIMELINE

Tables 3.6–3.10 (pp. 37–40) provide lesson timelines for each week of the module. These timelines are provided for general guidance only and are based on class times of approximately 30 minutes.

Table 3.6. STEM Road Map Module Schedule for Week One

Day 1	Day 2	Day 3	Day 4	Day 5
Lesson 1 *Let's Explore Natural Hazards* • Launch the module by holding a group discussion about natural hazards and showing a video. • Introduce the module challenge. • Introduce a current natural hazard.	*Lesson 1* *Let's Explore Natural Hazards* • The class classifies natural hazards according to their causes. • Conduct an interactive read-aloud of *Violent Weather: Thunderstorms, Tornadoes, and Hurricanes*, by Andrew Collins. • Begin vocabulary chart.	*Lesson 1* *Let's Explore Natural Hazards* • Show a video about tornadoes. • Discuss wind patterns in tornadoes. • Introduce the Predict, Observe, Explain (POE) process. • Introduce modeling. • Introduce the use of numbers to describe natural hazards, and conduct an interactive read-aloud of pages 4–21 of *Hurricanes (Real World Math: Natural Disasters series)*, by Barbara A. Somervill.	*Lesson 1* *Let's Explore Natural Hazards* • Conduct Vortex Bottle Investigation (Predict and Observe). • Discuss weather forecasting and probabilities. • Conduct an interactive read-aloud of *That's a Possibility!: A Book About What Might Happen*, by Bruce Goldstone.	*Lesson 1* *Let's Explore Natural Hazards* • Conclude Vortex Bottle Investigation (Explain). • Introduce tall tales. Conduct interactive read-aloud of *Cloudy With a Chance of Meatballs*, by Judi Barrett. • Students begin planning and writing their Weather Tall Tales

Table 3.7. STEM Road Map Module Schedule for Week Two

Day 6	Day 7	Day 8	Day 9	Day 10
Lesson 1 *Let's Explore Natural Hazards* • Discuss floods and conduct an interactive read-aloud of *Flood Warning (Let's-Read-and-Find-Out Science 2)*, by Katharine Kenah. • Continue writing Weather Tall Tales.	*Lesson 1* *Let's Explore Natural Hazards* • Conduct lesson assessment. • Complete Weather Tall Tales.	*Lesson 2* *Natural Hazard Quest!* • Discuss movement of tectonic plates as a cause of earthquakes and associated natural hazards. • Conduct an interactive read-aloud of the book *Earthquakes*, by Ellen Prager. • Discuss animal habitats and the impacts of natural hazards on animals' homes. • Conduct an interactive read-aloud or show the video of *A House Is a House for Me*, by Mary Ann Hoberman	*Lesson 2* *Natural Hazard Quest!* • Discuss impacts of natural hazards on people and communities, and show and discuss before-and-after images of natural disasters. • Investigate and document financial costs associated with a natural hazard that occurred recently.	*Lesson 2* *Natural Hazard Quest!* • Introduce the engineering design process. • Create class collaboration rules and contracts. • Begin Earthquake Shake activity (Define and Learn).

Table 3.8. STEM Road Map Module Schedule for Week Three

Day 11	Day 12	Day 13	Day 14	Day 15
Lesson 2 *Natural Hazard Quest!* • Continue Earthquake Shake activity (Plan, Try, and Test). • Introduce bar graphs. • Conduct interactive read-aloud of *Lemonade for Sale,* by Stuart J. Murphy.	*Lesson 2* *Natural Hazard Quest!* • Continue Earthquake Shake activity (Plan, Try, and Test). • Students create bar graphs for current earthquake magnitudes by continent.	*Lesson 2* *Natural Hazard Quest!* • Share Earthquake Shake activity designs, and test best class designs. • Students share bar graphs of earthquake magnitudes by continent. • Begin planning and writing stories about animal homes in natural hazards.	*Lesson 2* *Natural Hazard Quest!* • Conduct research for Hazard Sleuths activity. • Introduce U.S. regions and earthquake statistics for these regions. • Continue planning and writing stories about animal homes in natural hazards.	*Lesson 2* *Natural Hazard Quest!* • Continue research for Hazard Sleuths activity. • Students create bar graphs for earthquake magnitude by U.S. region. • Continue writing stories about animal homes in natural hazards.

Table 3.9. STEM Road Map Module Schedule for Week Four

Day 16	Day 17	Day 18	Day 19	Day 20
Lesson 2 *Natural Hazard Quest!* • Create posters for Hazard Sleuths activity. • Continue writing stories about animal homes in natural hazards.	*Lesson 2* *Natural Hazard Quest!* • Create posters for Hazard Sleuths activity. • Complete stories about animal homes in natural hazards. • Conduct lesson assessment.	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Introduce natural hazard preparedness through class discussion. • Introduce PSAs through class discussion and video. • Introduce numerical information about the community and infographics.	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Discuss thunderstorm preparedness through an interactive read-aloud of *Flash, Crash, Rumble, and Roll* by Franklyn M. Branley. • Students create community infographics.	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Introduce use of the engineering design process and storyboards for PSAs. • Class decides on types of information that should be included in PSAs (Define).

Table 3.10. STEM Road Map Module Schedule for Week Five

Day 21	Day 22	Day 23	Day 24	Day 25
Lesson 3 *Our Natural Hazard Preparedness Plans* • Conduct research for PSAs (Learn).	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Create storyboards for PSAs (Plan).	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Teams practice PSAs (Try). • Teams give feedback to and receive feedback from one other team (Test). • Teams decide how to improve their PSAs (Decide).	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Teams present their PSAs.	*Lesson 3* *Our Natural Hazard Preparedness Plans* • Teams discuss possible improvements to PSAs based on class discussion. • Conduct lesson assessment.

RESOURCES

The media specialist can help teachers locate resources for students to view and read about natural hazards, habitats, animal homes, and related content. Special educators and reading specialists can help find supplemental sources for students needing extra support in reading and writing. Additional resources may be found online. Community resources for this module may include meteorologists, climate scientists, emergency services personnel, and public safety officials.

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Page numbers printed in **boldface type** indicate tables, figures, or handouts.

Grade 2

STEM Road Map for Elementary School

Natural Hazards

What if you could challenge your second graders to help communities prepare for disasters ranging from floods and wildfires to earthquakes and hurricanes? With this volume in the *STEM Road Map Curriculum Series,* you can!

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

This interdisciplinary module uses project- and problem-based learning to help young children explore cause and effect. Working in teams, your second graders will draw on science, English language arts, mathematics, social studies, and the engineering design process to do the following:

- Identify various natural hazards, their basic causes, and how they affect people, animals, and communities.
- Model natural hazards.
- Identify features of structures designed to withstand earthquakes and then construct models of those structures.
- Learn about predicting weather, including measuring, calculating, and evaluating numbers involved in probabilities.
- Create their own "Weather Tall Tales."
- Identify ways that people and communities can prepare for natural hazards and then communicate about the hazards to a target audience.

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

Grade 2

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