6.5 Natural Hazards

Content Area: **Science**
Course(s):
Time Period: **Marking Period 3**
Length: **6 weeks**
Status: **Published**

Course Pacing Guide

Unit	MP/Trimester	Weeks
Intro to MS Science and Light	1	5
Thermal Energy	1	8
Weather and Climate	2	9
Plate Tectonics	2, 3	6
Natural Hazards	3, 4	6
Cells and Systems	4	8

Unit Overview

In this unit, students first experience a devastating natural event that caused major flooding in coastal towns of Japan. Through this anchoring phenomenon, students think aboutways to detect tsunamis, warn people and reduce damage from the wave. As students design solutions to solve this problem, they begin to wonder about the natural hazard itself: what causes it, where it happens and how it causes damage. The first part of the unit forcuses on identifying the causal mechanism for how tsunamis form, how they move across the ocean and what happens as they approach shore. Students investigate these ideas using maps, physical models and simulations. They use these science ideas to think about which communities are most at risk for a tsunami. The second part of the unit transitions students to consider design solutions for reducing the damage from a tsunami wave. Students evaluate different design solutions by identifying the criteria and constraints and using a systematic process to rate the solutions and identify trade-offs. Realizing that design solutions can sometimes fail, as they did during the 2011 earthquake, students recognize the need to prepare for these events. As such, students consider systems that detect tsunamis and send warning signals to community stakeholders so they can respond appropriately when the tsunami approaches. Finally, students apply these science ideas to consider how to communicate about a local natural hazard to stakeholders in their own community.

Enduring Understandings

- Scientists use data about where hazards have occured in the past to determine where hazards may happen in the future and which communities are at risk.
- Understanding the impacts of natural hazards requires an understanding of how quickly a hazard develops and moves, and how large and intense it can become.
- Engineers design systems for responding to hazards that include technologies to detect hazards, warn people and reduce damage.
- Design solutions can b e evaluated using a systematic process that accounts for an understanding of the science of the hazard and the needs of the people at risk.
- Communication strategies include educating the community before a natural hazard happens and alerting people when the hazard is happening.
- Knowledge about hazards (the causes of the hazard, locations at risk, how to design solutions, and how to respond when it happens) can empower us and others to design safer communities and save lives.

Essential Questions

- What happens to a community when a tsunami occurs?
- Where do tsunamis happen?
- What causes a tsunami to form and move?
- How can we forecast where and when tsunamis will happen and how much damage they will cause?
- How can we reduce damage from a tsunami wave?
- How are tsunamis detected and warning signals sent?
- What are ways we can communicate with people before and during a tsunami?
- How can we model the systems put into place to protect communities?
- How can we effectively prepare our communities for a natural hazard?

New Jersey Student Learning Standards (No CCS)

6-8.MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
6-8.MS-PS4-1	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave.

Interdisciplinary Connections

MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
LA.RI.6.1	Cite textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.

LA.RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

Technology Standards

TECH.8.1.8.C	Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
TECH.8.1.8.F	Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

21st Century Themes/Careers

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.

Instructional Strategies & Learning Activities

Students will research recent news stories of seismic events.

Students will analyze data from maps and recording from scientific sources.

Students will apply their understanding to analyzing probabilities of events affecting the Philadelphia area

Students will research best practices and design models of best practices for engineering.

Students will interview local engineers or community members.

Students will research best practices for emergency preparations and responses to natural disasters.

Students will apply their learning to develop a plan of action for preparation in the areas of engineering and emergency planning for predicted natural disasters in the Philadelphia area.

Students will communicate their plans in a public service announcement.

Differentiated Instruction

- Inquiry/Problem-Based Learning
- Learning preferences integration (visual, auditory, kinesthetic)
- Sentence & Discussion Stems
- Tiered Learning Targets
- Meaningful Student Voice & Choice

- Relationship-Building & Team-Building
- Self-Directed Learning
- LMS use
- Student Data Inventories
- Mastery Learning (feedback toward goal)
- Grouping
- Rubrics
- Jigsaws
- Assessment Design & Backwards Planning
- Student Interest & Inventory Data

Formative Assessments

Including, but not limited to:

- Scientist Circle discussions
- Google Form reflections
- Exit tickets
- Article written responses
- Science notebook entries

Summative Assessment

- Final Performance Task: develop a community design plan and create a public service announcement to communicate plan

Benchmark Assessments

- Fall/Winter LinkIt Assessments

Resources & Technology

BOE Approved Texts

N/A

Closure

Individual classes and lessons will end with a closure activity that reinforces what students figured out during class, and helps navigate toward next steps.
Closure activities may include:

- Scientists' Circle
- Post-it reflection
- Google form exit ticket
- Group performance reflection
- Science notebook jot

ELL

- Alternate Responses
- Extended Time
- Teacher Modeling
- Simplified Written and Verbal Instructions
- Frequent Breaks
- Google Translate

Special Education

Accomodations will be made in accordance with students' IEPs. The following list provides examples:

- Shorten assignments to focus on mastery of key concepts.
- Substitute alternatives for written assignments (clay models, posters, panoramas, collections, etc.)
- Keep workspaces clear of unrelated materials.
- Provide a computer for written work.
- Seat the student close to the teacher or a positive role model.
- Provide an unobstructed view of the chalkboard, teacher, movie screen, etc.
- Keep extra supplies of classroom materials (pencils, books) on hand.
- Maintain adequate space between desks.
- Give directions in small steps and in as few words as possible.

- Number and sequence the steps in a task.
- Have student repeat the directions for a task.
- Provide visual aids.
- Go over directions orally.
- Allow the student to complete an independent project as an alternative test.
- Show a model of the end product of directions (e.g., a completed math problem or finished quiz).
- Stand near the student when giving directions or presenting a lesson.
- Mark the correct answers rather than the incorrect ones.
- Use a pass-fail or an alternative grading system when the student is assessed on his or her own growth.

504

Examples of accommodations in 504 plans include but are not limited to:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits

At Risk

Examples may include:

- Have student restate information
- Provision of notes or outlines
- Concrete examples
- Assistance in maintaining uncluttered space
- Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
- Peer or scribe note-taking
- Use of manipulatives
- No penalty for spelling errors or sloppy handwriting
- Follow a routine/schedule
- Teach time management skills
- Verbal and visual cues regarding directions and staying on task
- Adjusted assignment timelines
- Visual daily schedule
- Immediate feedback
- Work-in-progress check

- Pace long-term projects
- Preview test procedures
- Film or video supplements in place of reading text
- Pass/no pass option
- Cue/model expected behavior
- Use de-escalating strategies
- Use peer supports and mentoring
- Have parent sign homework/behavior chart

Gifted and Talented

Examples may include:

- Offer choice
- Speak to Student Interests
- Allow G/T students to work together
- Tiered learning
- Focus on effort and practice
- Encourage risk taking