

Grade 6 Science

Unit 5: Natural Hazards

Driving question: Where do natural hazards happen, and how do we prepare for them?

15 lessons (investigations and weekly readings) and a words quiz. Use this pack with the unit's **Teacher Guide**, **Student Procedure Guide**, **Student Work Pages** and **Science Literacy Student Reader** (download them once from the course) to teach the whole unit without the internet.

What is in this pack

- A plan for each lesson: the lesson question, how many class days it takes, the Teacher Guide pages to follow, and the student pages to print.
- For each weekly reading: the Student Reader pages, words to know and the exercise page.
- The words quiz, ready to print, with its key at the back.

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Lesson schedule

Each investigation lesson takes the number of class days shown (about 45 minutes a day). Do each reading over a week alongside the lessons. Tick each one off as you go.

	Lesson	Days	Student pages
☐	Reading: Science Literacy Preface: Put Yourself in This Scene	1 week	—
☐	Lesson 1: What happens to a community when a tsunami occurs?	3	6 to print
☐	Lesson 2: Where do tsunamis happen and what causes them?	2	6 to print
☐	Reading: Science Literacy Collection 1: Types and Frequencies of Hazards	1 week	1 to print
☐	Lesson 3: What causes a tsunami to form and move?	3	2 to print
☐	Lesson 4: How can we forecast where and when tsunamis will happen and which communities are at risk?	1	2 to print
☐	Reading: Science Literacy Collection 2: Forecasting the Unpreventable	1 week	1 to print
☐	Lesson 5: How can we reduce damage from a tsunami wave?	3	9 to print
☐	Lesson 6: How are tsunamis detected and warning signals sent?	1	2 to print
☐	Lesson 7: What are ways we can communicate with people before and during a tsunami?	2	6 to print
☐	Reading: Science Literacy Collection 3: Minimizing Damage	1 week	1 to print
☐	Lesson 8: Which emergency communication systems are the most reliable in a hazard?	1	3 to print
☐	Lesson 9: How can we model the systems put into place to protect communities?	1	2 to print
☐	Lesson 10: How can we effectively prepare our communities for a natural hazard?	2	10 to print
☐	Reading: Science Literacy Collection 4: Communities and Cooperation	1 week	1 to print

	Lesson	Days	Student pages
☐	Words quiz	—	—

Page numbers are PDF page numbers of each file, so they match what your PDF reader shows.

Reading: Science Literacy Preface: Put Yourself in This Scene

Words to know

- **natural hazard** — events in Earth’s physical environment that are harmful to people but are not directly caused and cannot be controlled by them
- **science literacy** — the ability to read, hear, and comprehend information about scientific topics and demonstrate understanding in discussion and through writing
- **sea level rise** — increase of the ocean water level caused by melting of ice
- **tsunami** — a series of higher-than-usual waves produced by displacement of a large volume of water, generally as a result of seismic activity

Teacher’s lesson plan

Follow the Teacher Guide, PDF pages 25–28: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Preface: “Put Yourself in This Scene”: PDF pages 6–7. Look at the pictures and maps together.

Check for understanding

- Use one of today’s words in a sentence of your own.

Lesson 1: What happens to a community when a tsunami occurs?

LESSON QUESTION

What happens to a community when a tsunami occurs?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 29–51: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 6–9
- Tsunami: Japan 2011 — Student Work Pages, PDF pages 7–12
- Reference: Tsunami Images — Student Procedure Guide, PDF page 32
- Reference: Historical Data of Tsunamis and Related Events — Student Procedure Guide, PDF pages 34–41
- Reference: Natural Hazards Around the World — Student Procedure Guide, PDF pages 67–90
- Reference: Developing a Family Hazard Plan — Student Procedure Guide, PDF pages 92–94

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What happens to a community when a tsunami occurs?

Lesson 2: Where do tsunamis happen and what causes them?

LESSON QUESTION

Where do tsunamis happen and what causes them?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 52-70: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 10-12
- Tsunami Predictions — Student Work Pages, PDF pages 13-14
- Where do tsunamis happen? — Student Work Pages, PDF pages 15-16
- Comparing All Earthquakes to Earthquakes that Cause Tsunamis — Student Work Pages, PDF pages 17-18
- Connecting Earthquakes and Tsunamis — Student Work Pages, PDF pages 19-22
- Reference: Tuva Graphing Instructions — Student Procedure Guide, PDF page 33

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 245-254

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where do tsunamis happen and what causes them?

Reading: Science Literacy Collection 1: Types and Frequencies of Hazards

Words to know

- **gradient** — an increase or decrease of the magnitude of a measurement
- **index** — an indicator, sign, or measure of something
- **pandemic** — an outbreak of a disease that occurs over multiple continents and affects a large portion of the population
- **storm surge** — an abnormal rise of the water level at a coastline, produced by storm winds
- **tsunami** — a series of higher-than-usual waves produced by displacement of a large volume of water, generally as a result of seismic activity
- **waterspout** — a whirling column of air and water mist
- **wildfire** — a large, destructive, unplanned, uncontrolled fire that spreads quickly across land

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 71-77: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 1: "Types and Frequencies of Hazards": PDF pages 8-17. Look at the pictures and maps together.

Student pages to print

- Exercise Page 1 — Student Work Pages, PDF pages 77-78

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 3: What causes a tsunami to form and move?

LESSON QUESTION

What causes a tsunami to form and move?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 78–101: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 13–14
- Wave Investigations — Student Work Pages, PDF pages 23–24

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What causes a tsunami to form and move?

Lesson 4: How can we forecast where and when tsunamis will happen and which communities are at risk?

LESSON QUESTION

How can we forecast where and when tsunamis will happen and which communities are at risk?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 102–110: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 15–16
- Forecasting Risk to Communities — Student Work Pages, PDF pages 25–26

For the teacher

- Answer Key — Teacher Guide, PDF pages 255–260

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How can we forecast where and when tsunamis will happen and which communities are at risk?

Reading: Science Literacy Collection 2: Forecasting the Unpreventable

Words to know

- **accurate** — correct, as in a prediction that matches the actual, observed result
- **anthropology** — the study of humans and human groups radiation, n. emitted energy in the form of waves or over time particles
- **epidemiologist** — a scientist who studies communicable diseases, how they spread in populations, and how to control them
- **infectious** — likely to be transmitted and spread infection
- **pandemic** — an outbreak of a disease that occurs over multiple continents and affects a large portion of the population
- **precise** — strictly conforming
- **probability** — the mathematical likelihood that something will occur
- **sea level rise** — increase of the ocean water level caused by melting of ice
- **subduction zone** — a place where two tectonic plates meet and one overlaps the other
- **tsunami** — a series of higher-than-usual waves produced by displacement of a large volume of water, generally as a result of seismic activity

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 111–117: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 2: “Forecasting the Unpreventable”: PDF pages 18–27. Look at the pictures and maps together.

Student pages to print

- Exercise Page 2 — Student Work Pages, PDF pages 79–80

Check for understanding

- Use one of today's words in a sentence of your own.

Lesson 5: How can we reduce damage from a tsunami wave?

LESSON QUESTION

How can we reduce damage from a tsunami wave?

Plan about **3 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 118–146: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 17–21
- What happened in Ryoishi Bay? — Student Work Pages, PDF pages 27–28
- Evaluating Solutions to Protect Communities from Tsunamis — Student Work Pages, PDF pages 29–32
- Existing Solutions for Coastal Communities — Student Work Pages, PDF pages 33–42
- Tsunami Ranking Cards — Student Work Pages, PDF pages 43–44
- Decision Matrix — Student Work Pages, PDF pages 45–46
- Reference: Existing Solutions for Coastal Communities — Student Procedure Guide, PDF pages 42–49
- Reading: What happened in Ryoishi Bay? — Student Procedure Guide, PDF pages 100–101
- Reading: Comparing Ryoishi to Nearby Communities — Student Procedure Guide, PDF page 102

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 261–264

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How can we reduce damage from a tsunami wave?

Lesson 6: How are tsunamis detected and warning signals sent?

LESSON QUESTION

How are tsunamis detected and warning signals sent?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 147–158: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF page 22
- Reading: How are tsunamis detected and warning signals sent? — Student Procedure Guide, PDF pages 103–104

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How are tsunamis detected and warning signals sent?

Lesson 7: What are ways we can communicate with people before and during a tsunami?

LESSON QUESTION

What are ways we can communicate with people before and during a tsunami?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 159–177: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 23–25
- Community Stakeholders — Student Work Pages, PDF pages 47–48
- Evaluation Matrix — Student Work Pages, PDF pages 49–50
- Reference: Tsunami Communication Examples — Student Procedure Guide, PDF pages 50–57
- Reading: Voices from Japan Tsunami Survivors — Student Procedure Guide, PDF pages 105–107
- Reading: Case Study: Kamaishi East Junior High School — Student Procedure Guide, PDF pages 108–112

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What are ways we can communicate with people before and during a tsunami?

Reading: Science Literacy Collection 3: Minimizing Damage

Words to know

- **accurate** — correct, as in a prediction that matches the actual, observed result
- **amplitude** — height of a wave above or below the midpoint
- **buoy** — an anchored float
- **contagious** — spread from one organism to another through contact
- **density-dependent** — describing an ecological factor that affects organisms in relation to the number of individuals in a given area
- **infectious** — likely to be transmitted and spread infection
- **magnitude** — size or extent
- **natural hazard** — events in Earth’s physical environment that are harmful to people but are not directly caused and cannot be controlled by them
- **pandemic** — an outbreak of a disease that occurs over multiple continents and affects a large portion of the population
- **reactor** — the structure that initiates and controls a nuclear reaction for the purpose of harnessing energy
- **satellite** — an object or device that orbits a planet or other celestial body
- **tsunameter** — a system of devices for detection of tsunamis

Teacher’s lesson plan

Follow the Teacher Guide, PDF pages 178–184: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 3: “Minimizing Damage”: PDF pages 28–37. Look at the pictures and maps together.

Student pages to print

- Exercise Page 3 — Student Work Pages, PDF pages 81–82

Check for understanding

- Use one of today’s words in a sentence of your own.

Lesson 8: Which emergency communication systems are the most reliable in a hazard?

LESSON QUESTION

Which emergency communication systems are the most reliable in a hazard?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 185–194: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF page 26
- Obtaining Information Notetaking Guide — Student Work Pages, PDF pages 51–52
- Sending Warning Signals — Student Work Pages, PDF pages 53–58

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Which emergency communication systems are the most reliable in a hazard?

Lesson 9: How can we model the systems put into place to protect communities?

LESSON QUESTION

How can we model the systems put into place to protect communities?

Plan about **1 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 195–209: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 27–28
- Engineering Self-Assessment Rubric — Student Work Pages, PDF pages 59–60

For the teacher

- Rubric — Teacher Guide, PDF pages 265–266

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How can we model the systems put into place to protect communities?

Lesson 10: How can we effectively prepare our communities for a natural hazard?

LESSON QUESTION

How can we effectively prepare our communities for a natural hazard?

Plan about **2 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 210–227: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 29–31
- Determining Stakeholder Needs — Student Work Pages, PDF pages 61–62
- Project Options — Student Work Pages, PDF pages 63–64
- Hazard Communication Planning — Student Work Pages, PDF pages 65–68
- Stakeholder Criteria and Constraints Peer Feedback Form — Student Work Pages, PDF pages 69–70
- Self-Assessment: Giving and Receiving Feedback — Student Work Pages, PDF pages 71–72
- Family Hazard Plan — Student Work Pages, PDF pages 73–76
- Reference: Hazard Risk Maps — Student Procedure Guide, PDF pages 58–66
- Reference: Peer Feedback Guidelines — Student Procedure Guide, PDF page 91
- Reference: Family Hazard Plan: Hazard-specific Information — Student Procedure Guide, PDF pages 95–99

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 267–274
- Teacher Reference 2 — Teacher Guide, PDF pages 275–276
- Teacher Reference 3 — Teacher Guide, PDF pages 277–279
- Rubric — Teacher Guide, PDF pages 280–282
- Answer Key 1 — Teacher Guide, PDF pages 283–289

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: How can we effectively prepare our communities for a natural hazard?

Reading: Science Literacy Collection 4: Communities and Cooperation

Words to know

- **buoy** — an anchored float
- **satellite** — an object or device that orbits a planet or other celestial body
- **social media** — websites and applications that allow users to participate in sharing content on the internet
- **storm surge** — an abnormal rise of the water level at a coastline, produced by storm winds
- **subduction zone** — a place where two tectonic plates meet and one overlaps the other
- **topography** — the collective elevations and contours of a land area
- **tsunami** — a series of higher-than-usual waves produced by displacement of a large volume of water, generally as a result of seismic activity

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 228–234: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 4: “Communities and Cooperation”: PDF pages 38–47. Look at the pictures and maps together.

Student pages to print

- Exercise Page 4 — Student Work Pages, PDF pages 83–88

Check for understanding

- Use one of today's words in a sentence of your own.

WORDS QUIZ

Natural Hazards

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “a series of higher-than-usual waves produced by displacement of a large volume of water, generally as a result of seismic activity”?
 - a) landslide
 - b) sea level rise
 - c) tsunami
 - d) epicenter
2. Which word means “a self-contained system within a larger system”?
 - a) storm surge
 - b) subsystem
 - c) epidemiologist
 - d) index
3. Which word means “a whirling column of air and water mist”?
 - a) gradient
 - b) waterspout
 - c) subduction zone
 - d) tsunameter
4. Which word means “the structure that initiates and controls a nuclear reaction for the purpose of harnessing energy”?
 - a) buoy
 - b) reactor
 - c) stakeholder
 - d) transmitter
5. Which word means “a very strong wind”?
 - a) gale
 - b) trade-off
 - c) contagious
 - d) tsunameter
6. Which word means “strictly conforming”?
 - a) precise
 - b) causation
 - c) storm surge
 - d) tsunameter

- 7.** Which word means “an object or device that orbits a planet or other celestial body”?
- a) subsystem
 - b) social media
 - c) satellite
 - d) epidemiologist
- 8.** Which word means “a place where two tectonic plates meet and one overlaps the other”?
- a) subduction zone
 - b) constraint
 - c) pandemic
 - d) criteria
- 9.** Which word means “relating to intermittent off/on (or 0/1) signals (as opposed to an analog signal)”?
- a) digital
 - b) landslide
 - c) epicenter
 - d) social media
- 10.** Which word means “a system of devices for detection of tsunamis”?
- a) social media
 - b) science literacy
 - c) epidemiologist
 - d) tsunameter
- 11.** Which word means “an anchored float”?
- a) pandemic
 - b) precise
 - c) amplitude
 - d) buoy
- 12.** Which word means “a method or device for locating objects using reflected sound waves”?
- a) sonar
 - b) wildfire
 - c) correlation
 - d) satellite

FOR THE TEACHER

Answers

Unit quiz key

1. c 2. b 3. b 4. b 5. a 6. a 7. c 8. a 9. a 10. d 11. d 12. a