

Grade 6 Science

Unit 4: Plate Tectonics and Rock Cycling

Driving question: What causes Earth’s surface to change?

19 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 is causing Mt. Everest and other mountains to move, grow, or shrink?	4	9 to print
☐	Lesson 2: How are earthquakes related to where mountains are located?	2	4 to print
☐	Reading: Science Literacy Collection 1: The Gorgeous Globe	1 week	1 to print
☐	Lesson 3: How does what we find on and below Earth’s surface compare in different places?	2	5 to print
☐	Lesson 4: What is happening to Earth’s surface and the material below it during an earthquake?	2	4 to print
☐	Lesson 5: How does plate movement affect the land around mountains such as Mt. Everest?	1	2 to print
☐	Reading: Science Literacy Collection 2: A Historical Perspective	1 week	1 to print
☐	Lesson 6: How could plate movement help us explain how Mt. Everest and other locations are changing in elevation?	3	4 to print
☐	Lesson 7: What happens at mountains where we see volcanic activity?	1	4 to print
☐	Lesson 8: What is occurring at locations where two plates are moving away from each other?	2	5 to print
☐	Reading: Science Literacy Collection 3: The Rocking Rock Cycle	1 week	1 to print
☐	Lesson 9: What causes mountains to change?	1	2 to print
☐	Lesson 10: Where were Africa and South America in the past?	1	6 to print

	Lesson	Days	Student pages
☐	Lesson 11: Where were the other plates located in the distant past?	2	1 to print
☐	Reading: Science Literacy Collection 4: The Mysteries of Earth	1 week	1 to print
☐	Lesson 12: Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from?	1	2 to print
☐	Lesson 13: What causes mountains to shrink in elevation?	1	3 to print
☐	Lesson 14: How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer?	2	2 to print
☐	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

- **fracking** — the shortened name for hydraulic fracturing, a process that uses pressurized liquid to break rock during the extraction of underground natural resource materials
- **social media** — websites and applications that allow users to participate in sharing content on the internet

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 26–29: 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 is causing Mt. Everest and other mountains to move, grow, or shrink?

LESSON QUESTION

What is causing Mt. Everest and other mountains to move, grow, or shrink?

Plan about **4 class days** for this lesson.

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 30–60: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 6–9
- Explain How Mt. Everest Moves and Grows — Student Work Pages, PDF pages 7–8
- Alternate: Initial Model — Student Work Pages, PDF pages 9–10
- Patterns of Change for Mountains — Student Work Pages, PDF pages 11–12
- Explaining Other Mountains That Shrink — Student Work Pages, PDF pages 13–14
- Reference: Mountain Case Cards — Student Procedure Guide, PDF pages 48–54
- Reference: Data Cards on Other Mountains and Mt. Everest — Student Procedure Guide, PDF pages 55–66
- Reading: What is happening on Mount Everest? — Student Procedure Guide, PDF page 86
- Reading: Why do earthquakes happen in specific patterns around the world? — Student Procedure Guide, PDF pages 87–96

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What is causing Mt. Everest and other mountains to move, grow, or shrink?

Lesson 2: How are earthquakes related to where mountains are located?

LESSON QUESTION

How are earthquakes related to where mountains are located?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 61–88: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 10–12
- Earthquake Investigations — Student Work Pages, PDF pages 15–16
- How Are Earthquakes Related to Where Mountains Are Located? — Student Work Pages, PDF pages 17–18
- What do we see on Earth's surface where we live? — Student Work Pages, PDF pages 19–20

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 356–357

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How are earthquakes related to where mountains are located?

Reading: Science Literacy Collection 1: The Gorgeous Globe

Words to know

- **crust** — earth's rocky outer layer
- **fault** — a fracture between two blocks of rock where the blocks shift relative to one another
- **seismic waves** — energy waves that travel through Earth's layers
- **seismometer** — an instrument used to detect waves from an earthquake

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 89-95: the steps, materials and timing for this lesson.

Read

Read Science Literacy Student Reader, Collection 1: "The Gorgeous Globe": PDF pages 8-17. Look at the pictures and maps together.

Student pages to print

- Exercise Page 1 — Student Work Pages, PDF pages 85-86

Check for understanding

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

Lesson 3: How does what we find on and below Earth's surface compare in different places?

LESSON QUESTION

How does what we find on and below Earth's surface compare in different places?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 96–116: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 13–16
- Materials Found at and Below the Surface — Student Work Pages, PDF pages 21–22
- Reading: What do people dig or drill deep underground for and what do they find? — Student Work Pages, PDF pages 23–26
- Rock Investigations Data Chart — Student Work Pages, PDF pages 27–32
- Rock Investigations Cards — Student Work Pages, PDF pages 33–38

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: How does what we find on and below Earth's surface compare in different places?

Lesson 4: What is happening to Earth's surface and the material below it during an earthquake?

LESSON QUESTION

What is happening to Earth's surface and the material below it during an earthquake?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 117–141: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 17–19
- Constructing Profile Model West and East of Ridgecrest — Student Work Pages, PDF pages 39–40
- 10-Year and 30-Year Earthquake Data — Student Work Pages, PDF pages 41–42
- Reference: 10-Year and 30-Year Earthquake Data — Student Procedure Guide, PDF page 67

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What is happening to Earth's surface and the material below it during an earthquake?

Lesson 5: How does plate movement affect the land around mountains such as Mt. Everest?

LESSON QUESTION

How does plate movement affect the land around mountains such as Mt. Everest?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 142–155: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 20–21
- North American Plate Manipulative — Student Work Pages, PDF pages 43–44

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
How does plate movement affect the land around mountains such as Mt. Everest?

Reading: Science Literacy Collection 2: A Historical Perspective

Words to know

- **continental drift** — the concept of gradual movement of Earth’s continents over geologic time
- **crust** — earth’s rocky outer layer
- **ferromagnetic** — attracted to magnets
- **magnetometer** — a device that measures a magnetic field
- **seafloor spreading** — the process where new oceanic crust forms at and then pushes away from a ridge
- **seismometer** — an instrument used to detect waves from an earthquake
- **theory** — an idea that proposes an unproven or not fully provable explanation for a phenomenon
- **theory of plate tectonics** — the generally accepted characterization of Earth’s crust as large regions of rock slowly moving relative to each other

Teacher’s lesson plan

Follow the Teacher Guide, PDF pages 156–162: the steps, materials and timing for this lesson.

Read

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

Student pages to print

- Exercise Page 2 — Student Work Pages, PDF pages 87–88

Check for understanding

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

Lesson 6: How could plate movement help us explain how Mt. Everest and other locations are changing in elevation?

LESSON QUESTION

How could plate movement help us explain how Mt. Everest and other locations are changing in elevation?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 163–189: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 22–25
- Plate Movement Maps — Student Work Pages, PDF pages 45–46
- Blank World Map — Student Work Pages, PDF pages 47–48
- Record Your Observations — Student Work Pages, PDF pages 49–52

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 358–360

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: How could plate movement help us explain how Mt. Everest and other locations are changing in elevation?

Lesson 7: What happens at mountains where we see volcanic activity?

LESSON QUESTION

What happens at mountains where we see volcanic activity?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 190–206: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 26–29
- Volcano and Earthquake Data Chart — Student Work Pages, PDF pages 53–54
- Reading: How are volcanoes formed and what kinds of changes do they cause? — Student Work Pages, PDF pages 55–58
- Reference: Gathering Data from Maps — Student Procedure Guide, PDF pages 68–69

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What happens at mountains where we see volcanic activity?

Lesson 8: What is occurring at locations where two plates are moving away from each other?

LESSON QUESTION

What is occurring at locations where two plates are moving away from each other?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 207–229: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 30–31
- Seismic Explorer Plate Movement Map — Student Work Pages, PDF pages 59–60
- Evidence Tracker — Student Work Pages, PDF pages 61–62
- Reference: Mid-Atlantic Ridge Storymap Images — Student Procedure Guide, PDF pages 70–78
- Reference: Seismic Explorer Plate Movement Map — Student Procedure Guide, PDF page 79

For the teacher

- Teacher Reference 1 — Teacher Guide, PDF pages 361–362
- Teacher Reference 2 — Teacher Guide, PDF pages 363–364
- Answer Key — Teacher Guide, PDF pages 365–366

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What is occurring at locations where two plates are moving away from each other?

Reading: Science Literacy Collection 3: The Rocking Rock Cycle

Words to know

- **crust** — earth's rocky outer layer
- **hot spot** — an area in Earth's crust prone to volcanic activity
- **igneous rock** — rock formed through the cooling of lava or magma
- **relative dating** — characterization of the age of material based on its occurrence related to other materials
- **rock cycle** — the ongoing transition of rock from one type (sedimentary, metamorphic, igneous) to another

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 230–236: the steps, materials and timing for this lesson.

Read

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

Student pages to print

- Exercise Page 3 — Student Work Pages, PDF pages 89–90

Check for understanding

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

Lesson 9: What causes mountains to change?

LESSON QUESTION

What causes mountains to change?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 237–249: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 32–33
- Making Predictions — Student Work Pages, PDF pages 63–66

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: What causes mountains to change?

Lesson 10: Where were Africa and South America in the past?

LESSON QUESTION

Where were Africa and South America in the past?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 250–267: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 34–36
- Calculating Plate Movement — Student Work Pages, PDF pages 67–68
- South America and Africa Evidence Maps — Student Work Pages, PDF pages 69–72
- Talking sticks protocol for our continental datasets — Student Work Pages, PDF pages 73–74
- Exit Ticket — Student Work Pages, PDF pages 75–76
- Reference: South America and Africa Evidence Maps — Student Procedure Guide, PDF pages 80–83

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where were Africa and South America in the past?

Lesson 11: Where were the other plates located in the distant past?

LESSON QUESTION

Where were the other plates located in the distant past?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 268–281: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 37–39

For the teacher

- Teacher Reference — Teacher Guide, PDF pages 367–373
- Answer Key 1 — Teacher Guide, PDF pages 374–377

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
Where were the other plates located in the distant past?

Reading: Science Literacy Collection 4: The Mysteries of Earth

Words to know

- **crust** — earth's rocky outer layer
- **cumulative** — added together over time
- **fault** — a fracture between two blocks of rock where the blocks shift relative to one another
- **paleontologist** — a scientist who uses the fossil record to study Earth's history

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 282–288: the steps, materials and timing for this lesson.

Read

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

Student pages to print

- Exercise Page 4 — Student Work Pages, PDF pages 91–96

Check for understanding

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

Lesson 12: Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from?

LESSON QUESTION

Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 289–309: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 40–43
- Reference: Satellite and Relief Maps — Student Procedure Guide, PDF pages 84–85

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: Where did mountains that aren't at plate boundaries today, like the Appalachians and Urals, come from?

Lesson 13: What causes mountains to shrink in elevation?

LESSON QUESTION

What causes mountains to shrink in elevation?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 310–329: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 44–45
- Erosion Rates — Student Work Pages, PDF pages 77–80
- Erosion Rates vs. Uplift Rates — Student Work Pages, PDF pages 81–82

For the teacher

- Answer Key — Teacher Guide, PDF pages 378–391

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation:
What causes mountains to shrink in elevation?

Lesson 14: How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer?

LESSON QUESTION

How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer?

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

Teacher's lesson plan

Follow the Teacher Guide, PDF pages 330–343: the steps, materials and timing for this lesson.

Student pages to print

- Student procedures for this lesson — Student Procedure Guide, PDF pages 46–47
- Comparing Related Phenomena — Student Work Pages, PDF pages 83–84

Check for understanding

- Explain your answer to the lesson question, using evidence from your investigation: How is there an exposed marine fossil on Mt. Everest? And, what other remaining questions from our Driving Question Board can we now answer?

WORDS QUIZ

Plate Tectonics and Rock Cycling

Name: _____ Date: _____

Circle the letter of the best answer.

1. Which word means “the concept of gradual movement of Earth’s continents over geologic time”?
 - a) correlated
 - b) theory of plate tectonics
 - c) seafloor spreading
 - d) continental drift
2. Which word means “an idea that proposes an unproven or not fully provable explanation for a phenomenon”?
 - a) theory
 - b) seismometer
 - c) continental drift
 - d) correlated
3. Which word means “websites and applications that allow users to participate in sharing content on the internet”?
 - a) crust
 - b) ferromagnetic
 - c) social media
 - d) fault
4. Which word means “a device that measures a magnetic field”?
 - a) magnetometer
 - b) social media
 - c) relative dating
 - d) ferromagnetic
5. Which word means “a scientist who uses the fossil record to study Earth’s history”?
 - a) paleontologist
 - b) cumulative
 - c) seafloor spreading
 - d) seismometer
6. Which word means “an area in Earth’s crust prone to volcanic activity”?
 - a) hot spot
 - b) social media
 - c) continental drift
 - d) seafloor spreading

- 7.** Which word means “the ongoing transition of rock from one type (sedimentary, metamorphic, igneous) to another”?
- a) relative dating
 - b) rock cycle
 - c) seismometer
 - d) crust
- 8.** Which word means “a fracture between two blocks of rock where the blocks shift relative to one another”?
- a) igneous rock
 - b) theory of plate tectonics
 - c) fault
 - d) rock cycle
- 9.** Which word means “characterization of the age of material based on its occurrence related to other materials”?
- a) theory
 - b) cumulative
 - c) seismometer
 - d) relative dating
- 10.** Which word means “attracted to magnets crust forms at and then pushes away from a ridge”?
- a) ferromagnetic
 - b) correlated
 - c) continental drift
 - d) crust
- 11.** Which word means “earth’s rocky outer layer writing”?
- a) crust
 - b) hot spot
 - c) correlated
 - d) absolute dating
- 12.** Which word means “having a connection between factors that science literacy, n. the ability to read, hear, and mutually affects the factors comprehend information about scientific topics and demonstrate understanding in discussion and through”?
- a) paleontologist
 - b) fracking
 - c) correlated
 - d) fault

FOR THE TEACHER

Answers

Unit quiz key

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