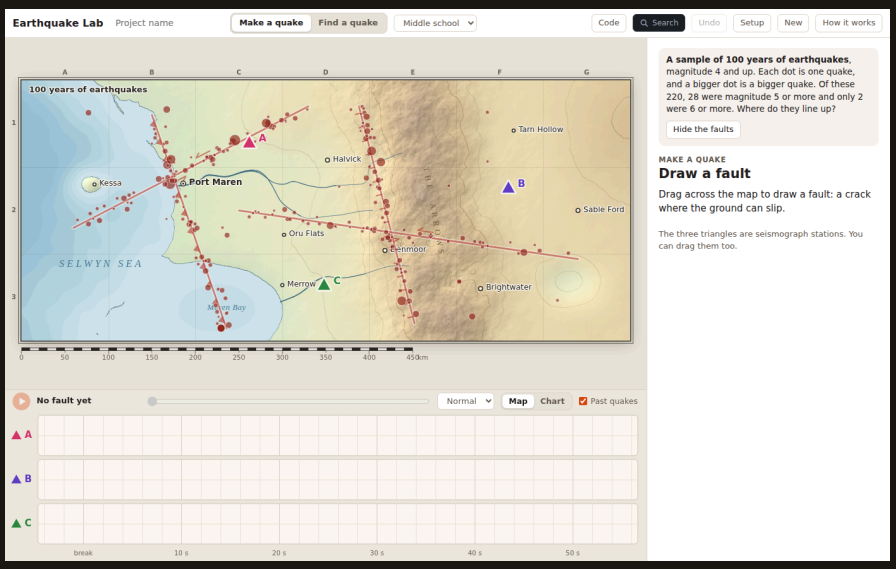
mytekDev

Earthquake Lab: Where Do Earthquakes Happen?

Grades 6-8 · 45 minutes

Earth science



Slides, rubric and answer key **Print and go** **No student accounts**

Chromebook friendly

What's included

- A one-page overview: objectives, essential question, vocabulary, standards and assessment
- A 45-minute lesson sequence: warm-up, direct instruction, guided practice, independent practice, closure
- Slides for the board: a PowerPoint file that also opens in Google Slides
- A student worksheet with a QR code and a counting table
- A 3-question exit ticket, two to a page, with an answer key
- A rubric: 3 criteria, 4 levels, scored out of 12
- Differentiation for English learners, students with IEPs or 504 plans, and students who need more support or more challenge
- Cross-curricular extensions, and notes for teaching it in grade 4 and in high school earth science
- Standards: NGSS

Earthquake Lab: Where Do Earthquakes Happen?

Grades 6-8 · 45 minutes · Earth science

Students play a hundred years of earthquakes onto a map, one dot each, and look for the pattern. The dots are not spread evenly: they line up along a few faults, and small quakes far outnumber big ones. Students count them, draw a fault along one line and break it, and explain what a map of past quakes lets scientists forecast, and what it cannot.

At a glance

ESSENTIAL QUESTION

Earthquakes cannot be predicted. What can a map of past earthquakes tell us?

OBJECTIVES

Students will be able to:

- describe the pattern of earthquakes on a map: along faults, not evenly
- compare how often small and large earthquakes happen
- explain the difference between a forecast of where and how strong, and a prediction of when
- use the pattern to say where people should build to withstand shaking

VOCABULARY

Pattern, Fault, Frequency, Forecast, Prediction

STANDARDS

MS-ESS3-2, MS-ESS2-3

TIME AND MATERIALS

45 minutes, grades 6-8.

- One computer or Chromebook per student
- A projector
- The worksheet and exit ticket, one copy each per student
- The rubric, one copy per student if you grade the work

PREP

Make copies of the worksheet and exit ticket. Before class, open mytekdev.com/try/earthquakelab?lesson=where-do-earthquakes-happen&ref=tpt-earthquakelab-4 once on a student computer to check that your school's filter allows the app. Run it yourself, about ten minutes: tick Past quakes under the map and let a hundred years play, read the card, press Show the faults, then draw a fault along one of the lines and break it.

ASSESSMENT

- Formative: the questions under What to look for, asked while students work, and the exit ticket (answer key included).
- Summative: the worksheet, scored with the rubric.

TECHNOLOGY AND PRIVACY

Runs in any browser, Chromebooks included, with nothing to install. Students need no account and no email: the link works signed out, and nothing they do is stored on our server unless they choose to save.

Lesson sequence

MINUTES	STAGE	WHAT YOU DO	WHAT STUDENTS DO
0 to 5	**Warm-up** Hook	Show the title, essential question and Today I can slides (about 1 minute). Then the warm-up: sketch where a hundred years of earthquakes would fall.	Answer the warm-up on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app. Tick Past quakes and let the century play. Read the card aloud, then press Show the faults. Show Small ones far outnumber big ones. > **It's working when:** Ask what the dots would look like if quakes could happen anywhere. Then compare with the map.	Watch, and fill in the vocabulary on the worksheet.
12 to 22	**Guided practice (We do)** Play the century together	Students open the link or scan the QR code. A short guide walks them through Past quakes. Everyone reads the card and presses Show the faults. > **Watch for:** Students who read a big dot as many quakes. Each dot is one quake; its size is its magnitude.	Fill in the counting table: how many quakes of 4 and up, 5 and up, 6 and up.
22 to 38	**Independent practice (You do)** Read the map	Students count the faults, name the squares each crosses, choose the safest and riskiest town for a school with a reason, then draw a fault along one line and break it to see which towns shake. Walk the room with the What to look for questions. > **If they ask:** "A fault has had no big quake in this hundred years. Is it safe?" Quiet line	Fill in the map questions and the school choice with a reason.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Take answers: nobody can say when, but scientists can say where quakes are likely and how strong they could be. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/earthquakelab?lesson=where-do-earthquakes-happen&ref=tpt-earthquakelab-4. A short guide opens over the app: the made-up map with its nine towns and three stations, no fault yet.

1. **Past quakes.** Tick `Past quakes` under the map. A hundred years play onto it in about ten seconds, one dot per quake, a bigger dot for a bigger quake.
2. **The card.** A sample of 100 years of earthquakes, magnitude 4 and up: of 220, 28 were 5 or more and only 2 were 6 or more.
3. **The faults.** Press `Show the faults`: the lines the dots sit on.

4. **A break.** Drag along one of the lines to draw a fault and press `Break the fault`; The towns shows which towns shake hardest.

> The moment that lands is the faults appearing under the dots: students have usually traced most of the lines already.

Background for the teacher

Earthquakes happen where rock breaks along faults, and the same faults slip again and again. Plotted over time, quakes line up along them; on the real Earth, along plate boundaries most of all. Small quakes far outnumber large ones: worldwide there are about ten times as many of each magnitude as of the next one up.

Nobody can predict when an earthquake will happen. A map of past quakes lets scientists forecast where they are likely and how strong they could be, which tells people where to build stronger and where to prepare. The past quakes here are a made-up sample of magnitude 4 and up, spread evenly in time with no aftershocks. The map is made up, and so is every quake on it. The waves travel at 6 and 3.5 kilometers a second in straight lines; in the real Earth they speed up with depth and bend, so the 8 km rule works best within about 200 kilometers.

Common mistakes: thinking quakes can happen anywhere equally; thinking a fault that has been quiet is safe; and thinking scientists can say when the next big one will come.

What to look for

Ask these while students work. A student who has understood the lesson can answer them without help:

- Where do most of the dots fall?
- Are there more big quakes or small ones? By about how much?
- Which town would you not build a school in, and why?
- Can the map tell you when the next big quake will come?
- A fault has had no big quake for a hundred years. Is it safe?

> The fourth question is the real test: a student who says it tells where and how strong but not when has the forecast-prediction difference.

Cross-curricular extensions

- Geography: on the USGS latest earthquakes map, find where the last month's quakes line up, and name the plate boundaries.
- Math: the card counts 220, 28 and 2. Graph them. What happens to the count each step up?
- Civics: find whether your state has a building code for earthquakes.
- English: write a short news item about earthquake risk in the made-up region that does not claim a prediction.

Vocabulary

Pattern	Something that repeats in data, like dots lining up.
Fault	A crack in the crust where the rock on each side can slip, again and again.
Frequency	How often something happens.
Forecast	Saying where something is likely to happen and how likely, without a date.
Prediction	Saying exactly when something will happen. Nobody can do this for earthquakes.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the screen as you say each word: the rings, the flags and the circles carry the meaning.
- Pair each learner with a partner; the map and the dots carry the pattern without words.
- Accept the school choice as a town name and a square, with one word for the reason.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students for the independent part, one reading the map and one writing.
- Zoom the browser to 125%; the dots stay visible.
- Allow the counting table and the school choice only, where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "Most earthquakes happen along ___."
- A check-in after the guide: every student has the faults showing before anyone moves on.
- Ask only where most of the dots are.

STUDENTS READY FOR MORE

- Work out the ratio from the card: how many quakes of 4 and up for each one of 5 and up?
- Compare with a real map: open the USGS latest earthquakes map and find where the last month's quakes line up.
- Write what a building code near the busiest fault should require, and why.

Adapting for other grades

Younger students: In grade 4, pick 4th grade in the header. This lesson fits 4-ESS2-2 well: patterns of earthquakes on a map. Do the counting and the school choice; skip the third rubric row; total 8, and 6 meets the objectives.

Older students: In high school, plot the counts on a log scale: magnitude against the number of quakes at that size or more. The straight line is the Gutenberg-Richter relation; find its slope.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/earthquakelab?lesson=where-do-earthquakes-happen

Essential question: Earthquakes cannot be predicted. What can a map of past earthquakes tell us?

Warm-up: Would a hundred years of earthquakes be spread evenly on a map? Sketch what you think.

_____

1. **Vocabulary.** Pattern, fault, frequency, forecast, prediction: write each in your own words.

2. **The counting table.** Magnitude 4 and up _____; 5 and up _____; 6 and up _____. How many faults? _____ The squares they cross _____.

1. Which town would you build a school in, and which not? Use the map.

2. What can scientists say ahead of time about earthquakes, and what can nobody say?

Exit ticket

Name: _____

1. On the map, most earthquakes (A) are spread evenly (B) line up along faults (C) happen in the sea

2. Compared with magnitude 4 quakes, magnitude 6 quakes are (A) more common (B) about as common (C) much rarer

3. Explain the difference between forecasting earthquakes and predicting them.

Earthquake Lab: Where Do Earthquakes Happen?

Exit ticket

Name: _____

1. On the map, most earthquakes (A) are spread evenly (B) line up along faults (C) happen in the sea

2. Compared with magnitude 4 quakes, magnitude 6 quakes are (A) more common (B) about as common (C) much rarer

3. Explain the difference between forecasting earthquakes and predicting them.

Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	The same faults break again and again.
2	C	About ten times rarer for each step up: 220 at 4 and up, 2 at 6 and up.
3	A forecast says where and how strong; a prediction says when	Past quakes show where they are likely and how strong; nobody can say when. Defining only one of the two is half.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
Reading the pattern	Describes quakes lining up along the faults, names the squares, and counts the sizes from the card.	Describes quakes lining up along the faults.	Says quakes are in some places, with no pattern named.	No description, or says they are spread evenly.
The school choice	Picks a town far from the faults and one near the busiest, and supports both with the map.	Picks a town and gives a reason from the map.	Picks a town with no reason.	No choice.
Forecast or prediction	Explains that scientists can say where and how strong, not when, and why the map supports that.	Says quakes cannot be predicted but places at risk can be found.	Says quakes can be predicted, or cannot be forecast at all.	No answer.

Total: ____ / 12. A score of 9 or more meets the objectives.

Standards

The lesson is built for MS-ESS3-2, the locations, magnitudes and frequencies of a hazard as data for forecasting, and leads toward MS-ESS2-3.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
NGSS	**MS-ESS3-2**	6-8	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	Students analyze where past quakes happened, how big they were and how often, the data the clarification names, to forecast future risk.
NGSS	**MS-ESS2-3**	6-8	Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	Quakes lining up along faults is the classic step toward plate boundaries; earthquakes themselves are not in this standard's text.

Checked November 2026 against: NGSS MS-ESS3-2, Earth and Human Activity, NGSS MS-ESS2-3, Earth's Systems.

Optional: save student work in a free class

The whole lesson runs at the link on the worksheet, with no accounts and no sign-up.

To keep students' work, and see it all in one place, make a free class. It takes about ten minutes, once, and covers every lesson in this series: mytekdev.com/tools/class-setup

Students in a class open mytekdev.com/tools/earthquake-lab/lessons/where-do-earthquakes-happen/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

Terms of use

Thank you for downloading this lesson. The plan, the handouts and the art were made by mytekDev.

You may:

- print and copy it for your students
- change it for your own classes
- post it on your class website or learning management system
- share this file with other teachers, whole and unchanged, with this page included

You may not:

- sell it, or put it in a product you sell
- share a changed copy
- claim it as your own

The app this lesson uses is free and runs in the browser. Students need no account. It is at mytekdev.com.

Questions, or found a mistake? Ask on the Teachers Pay Teachers Q&A for this resource, or write to us at mytekdev.com/contact.

© 2026 mytekDev. All rights reserved.