

My Tectonic Plate Boundary Tour

Build and explain a connected boundary tour

AHS Worldwide | Earth Science | Unit 1 Project | Middle School

WHAT YOU WILL TURN IN: After Step 4, turn in your finished research pages from the My Tectonic Plate worksheet. After Step 8, turn in your three-to-four-minute presentation and the last page of your worksheet.

Your Challenge

You will become the expert on one tectonic plate. In Steps 1—4, you will use the Tectonic Plates World Map to select, trace and research your plate. You will discover its neighboring plates and pick the boundaries you want to study. For each one, you will name the boundary type and find real evidence for your answer. Write your sources and measurements in the My Tectonic Plate worksheet. You will turn in those worksheet pages after Step 4.

In Steps 5—8, you will build one connected boundary tour. Make one model for each boundary type you found. Keep the models together on a desk, counter, or large tray. You may use a cookie tin, shallow box, or sheet of cardboard if it helps you carry your work. Each model needs two cloth pieces, one for each real plate. Any cloth works, and different colors are a nice touch but are not required. You will move the plates by hand and use researched measurements to know how far they should move. Then you will figure out how much real time that movement stands for. Finally, you will present and record your work in a three to four minute video, which you will upload after step 8.

Choose Your Plate — 10 Approved Choices

- Juan de Fuca Plate
- Cocos Plate
- Caribbean Plate
- Nazca Plate
- Pacific Plate
- North American Plate
- Arabian Plate
- Philippine Sea Plate
- Scotia Plate
- Indian Plate

Do Your Research: Research your chosen tectonic plate, trace it, study it's neighboring plates, plate relationship and movement, and how fast it's moving. Record your findings in the My Tectonic Plate worksheet.

Build Your Boundary Tour

Build two or three boundary models and keep them together as one project. Each model shows one place where your plate meets a neighboring plate. Look at the pieces from above or from a slight angle. Move them with your hands so your viewer can see the plates pull apart, push together, or slide past each other.

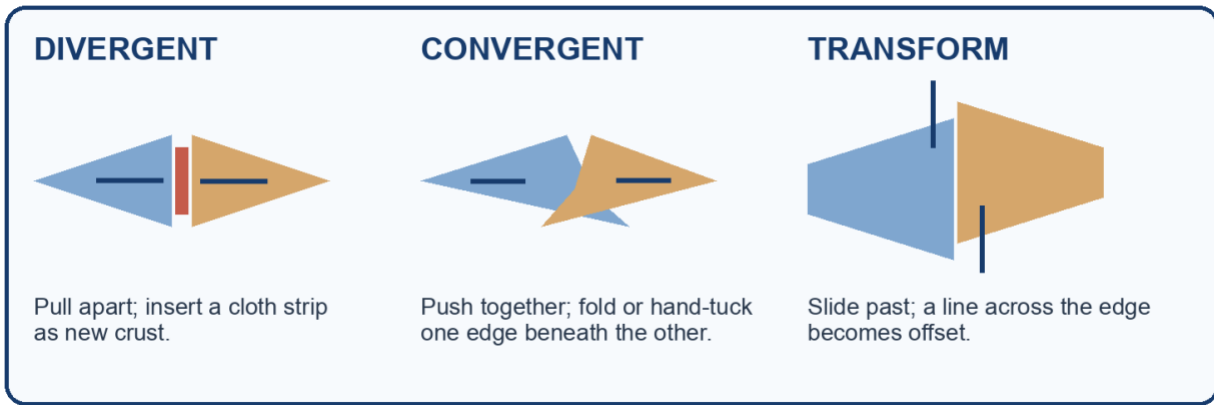


Figure 1 — Use your hands to make each motion. The arrows show which way to move the cloth.

Your Model Must

- Keep all models together as one boundary tour. You can work right on a desk or counter. Use a cookie tin or shallow box only if it helps you carry the models.
- Build one model for each boundary type you found. If two trusted sources give different answers, write down both and tell which one you used.
- Show two real, named plates in each of your models.
- Use cloth for every plate. Any color or thickness works, as long as it is easy to cut and move. A different color for each plate is a nice touch, but it is not required.
- Move the pieces of cloth with your hands to demonstrate accurate plate movement.
- Measure how far each model moves in centimeters. Use this scale: 1 centimeter in your model equals 1 kilometer on Earth.
- Explain at least one thing your model cannot show correctly.

What You Need

Cost: about \$0—8 if you use things you already have at home. Buying everything new may cost about \$20.

Gather Before You Begin

- A printed My Tectonic Plate worksheet
- Cloth scraps: felt, fleece, flannel, an old T-shirt, denim, towel material, or any cloth that is easy to cut and move. Different colors for different plates help, but they are not required.
- Paper for labels and a measuring strip
- Permanent marker or sticky labels
- Scissors, ruler, pencil, colored pencils or markers
- Phone or camera for photographs and the final video

Helpful but Not Required

- A cookie tin, shallow box, or cardboard sheet if you want an easy way to organize or carry the models
- Tape or binder clips for labels and measuring strips

SAFETY: Ask an adult for help if the cloth is hard to cut. You do not need a craft knife, hot glue, a motor, heat, water, or electricity.

Step 1 — Choose and Trace Your Plate

Estimated Time to Complete: 20 minutes

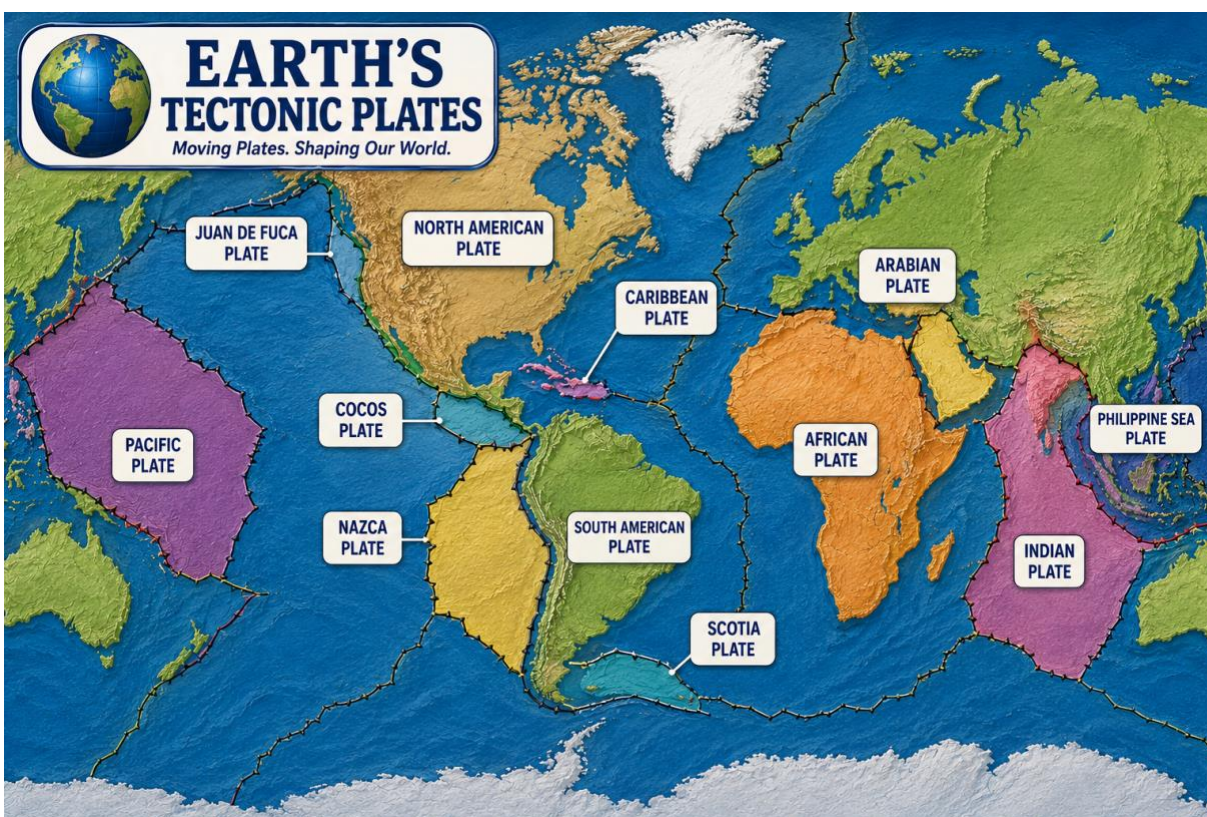
What You're Working On

Choose one plate from the list. Use the Tectonic Plates World Map below to help you decide. Trace your plate in the My Tectonic Plate worksheet. Follow the plate boundary, not the coastline. You will use this outline in the next steps.

Materials & Resources

- My Tectonic Plate worksheet
- Pencil and one colored pencil

Tectonic Plates World Map



Use this map to trace your plate and mark the boundaries you will research in Steps 2–3.

Instructions

1. Choose one plate from the approved list and write one sentence explaining your choice.
2. Research images or illustrations of your plate online, and draw the plate boundary—not the coastline—on your My Tectonic Plate worksheet.
3. Find out whether your plate sits mostly under ocean, mostly under land, or both. Write down what you find and where you found it.
4. Circle any part of the outline you are unsure about. Check that part during your research in Step 2.

WORKSHEET REMINDER: Keep working in the My Tectonic Plate worksheet. You will turn in your Steps 1–4 pages together after Step 4.

Think Deeper: Why is the edge of a continent sometimes in a different place than the edge of its plate?

How This Builds Your Project: Your outline helps you find the real neighboring plates and pick the boundaries for your models.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	You trace the plate boundary instead of the coastline.	Your outline is mostly right, but one part still needs checking.	You trace the coastline, or your outline is unclear.
Reasoning	You name the plate type and back it up with a source.	You name the plate type but give little support.	Your answer is missing or has no source.

Step 2 — Name the Neighboring Plates and Pick Boundaries

Estimated Time to Complete: 20 minutes

What You're Working On

Now find the plates that touch yours. Look up how they move where they meet. Then pick the boundaries you want to build.

Materials & Resources

- My Tectonic Plate worksheet with traced outline from Step 1
- A device with internet access or reference sources from your teacher

Instructions

1. Look at the outline you traced. Every plate that touches yours is a neighboring plate. Write each neighboring plate name on your map, right where it touches your plate.

2. Pick a different colored marker or crayon for each neighboring plate. Trace the boundary where that plate touches yours. Then draw a line in the same color to that plate's name.
3. For each boundary, look up how the two plates move: toward each other (convergent), apart (divergent), or past each other (transform). Write the answer next to that boundary.
4. Write down where you found each answer. The name of the website or book is enough. USGS, NOAA, a university science page, or an atlas are all good places to look.
5. Now pick the boundaries you will build. Choose one boundary for each kind of motion you found, and draw a star next to it.

WORKSHEET REMINDER: Keep your labels and starred boundaries in the My Tectonic Plate worksheet. You will turn in everything from Steps 1–4 after Step 4.

Think Deeper: Why does a boundary belong to two plates instead of just one?

How This Builds Your Project: Your starred boundaries decide how many models you build and which real plates each model shows.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	You name the main neighboring plates and write down your sources.	One boundary is unclear or incomplete.	Several neighboring plates are missing or unnamed.
Choices	You pick one boundary you can build for each kind of motion you found.	One boundary you picked needs more support or a clearer location.	The boundaries you picked do not match your map and research.

Step 3 — Name and Check Each Boundary Type

Estimated Time to Complete: 20 minutes

What You're Working On

Check every starred boundary against real evidence. Look for something real at that boundary that fits the motion you wrote down. It could be a mid-ocean ridge, a mountain range, a volcano, a fault, or a pattern of earthquakes.

Materials & Resources

- My Tectonic Plate worksheet and the sources collected in Step 2
- A second trusted source for checking each boundary
- A trusted atlas, USGS or NOAA page, or university source

Instructions

1. Name each starred boundary as convergent, divergent, or transform. Check your answer with a second trusted source.
2. If a boundary is convergent, find out what the collision makes. The plates may push up a mountain range. Or the denser plate may sink beneath the other one, which is called subduction. Write down which one happens at your boundary.
3. Name one real piece of evidence for each answer: a mid-ocean ridge, a mountain range, a volcano, a fault, or a pattern of earthquakes.
4. Draw a short line across each starred boundary. This marks the exact place your model will show.
5. Write down where each answer came from: the name of the source and its web link. If two sources disagree, write one sentence telling which answer you used and why.

CHECK YOUR RESEARCH: For each boundary, write down a trusted source and explain how the plates move. Then name a real feature or earthquake pattern that backs up your answer. Check a second source, too.

WORKSHEET REMINDER: Keep working in the My Tectonic Plate worksheet. There is nothing extra to turn in for this step.

How This Builds Your Project: Each model shows one real boundary that your research backs up.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Your sources back up the motion at every boundary and what it builds.	Your answers are mostly right, but one needs more checking.	Several boundary types have no source.
Evidence	You give specific, named evidence for every model.	One model has evidence that is too general.	Evidence is missing, or it just repeats your answer.
Reasoning	You explain what you did when two sources disagreed.	You mention a disagreement but do not explain it.	Sources are missing, or you ignore a disagreement.

Step 4 — Measure Motion and Set the Model Scale

Estimated Time to Complete: 20 minutes

What You're Working On

At each boundary you starred, find out which way the two plates move and how fast. Write down the direction, the speed, and where you found them.

Materials & Resources

- My Tectonic Plate worksheet
- Ruler and calculator
- A trusted plate-motion source, or one your teacher gives you

Instructions

1. Look up how fast your plate moves in centimeters per year, and which way it moves. Write down both answers and where you found them.
2. For each boundary you starred, write whether the two plates move toward each other, apart, or past each other. Then find a source that gives a speed for that pair of plates and write it down.
3. Use this scale: 1 centimeter in your model equals 1 kilometer on Earth. Write the scale on your My Tectonic Plate worksheet and beside each model.
4. Plan to move each model 3—6 centimeters. Change that movement into kilometers using the project scale.
5. Figure out how many years that movement stands for. Multiply the real distance in kilometers by 100,000. Then divide by the plate speed in centimeters per year. Example: 6 centimeters in your model equals 6 kilometers. At 4 centimeters per year, that movement stands for 150,000 years.
6. Draw one direction arrow for each plate at every selected boundary.

STEP 4 UPLOAD: Turn in clear photos or a PDF of your finished Steps 1–4 pages from the My Tectonic Plate worksheet. You do not need to send anything else yet.

How This Builds Your Project: Your arrows and math tell you exactly how to move and explain each model.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Your speeds, sources, units, and math are correct.	You have one small unit or math error.	Your scale or math is hard to follow.
Depth	You clearly explain how the two plates move compared with each other.	Your explanation of how the two plates move is partly clear.	Your plate speeds have no source for that pair of plates.
Clarity	Every model has clear arrows and a stated scale.	One model is missing an arrow or scale.	Directions or scale are missing.

Step 5 — Design Your Connected Boundary Tour

Estimated Time to Complete: 20 minutes

What You're Working On

Plan how all your boundary models will sit together on a desk, counter, or large tray. You may use a cookie tin, shallow box, or cardboard sheet if it helps you carry the models.

Materials & Resources

- Your completed My Tectonic Plate worksheet
- Paper, ruler, and pencil
- Any cloth that is easy to cut and move. Different colors are a nice touch, but they are not required.

Instructions

1. Arrange uncut cloth next to each boundary model you will be designing.
2. For each model, plan two cloth pieces that meet along one shared boundary line. Different colors are a nice touch, but they are not required.
3. Make a name label for both plates, or write the names with a colored marker. Make sure they are easy to read.
4. Make a measuring strip labeled "1 model cm = 1 real km."
5. Plan which way your plates will move and what your viewer will see. Divergent plates open up and show a narrow strip of new crust. Convergent plates fold, or one plate slides beneath the other. Transform plates slide past each other and shift the line you drew across the boundary.

Collect for Step 8: Keep your completed design page. Do not upload it yet.

How This Builds Your Project: Your plan tells you exactly what to build and test.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Every model matches your researched plates and motion.	One model does not fully match your research.	Your design conflicts with your research.
Building	You can make every motion clearly, again and again, with your hands.	One model needs a change before you build it.	Your design depends on a motion that may not work every time.
Clarity	Your shared edges, labels, arrows, and scale are easy to see.	One required part is missing.	Your plan does not clearly show what to build.

Step 6 — Build and Label the Whole Model

Estimated Time to Complete: 20 minutes

What You're Working On

Build all your boundary models and place them together. Focus on cutting, arranging, testing, and labeling the cloth pieces. You do not need to build hills or land shapes.

Materials & Resources

- Step 5 design
- Cloth of your choice
- Scissors, marker or paper labels, tape
- Paper measuring strips
- A cookie tin, shallow box, or cardboard sheet if you want one

Instructions

1. Cut the boundary line of your first model down the middle of one piece of cloth. The two edges you cut will fit together. If you use two colors, use the first cut edge as your guide for cutting the neighboring plate.
2. Use your labels from Step 5 to label both plates right away. Names are required.
3. Test every model with your hands before you attach the labels. Divergent pieces should pull apart. Convergent pieces should fold, or let you slide one beneath the other. Transform pieces should slide far enough to shift the line.
4. Place the measuring strip you made in Step 5 beside each model. Then draw arrows showing which way each plate moves.
5. Take a photo of the complete model from above and from a low angle.

Collect for Step 8: Keep the complete model, both photos, and any cloth pieces you fixed. Do not upload them yet.

Think Deeper: What does your model show well, and what still depends on your hand?

How This Builds Your Project: Your boundary tour is now ready to measure, test, and improve.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Every model has two named plates and the correct motion.	One label or motion needs to be fixed.	A neighboring plate is missing or the motion is incorrect.
Building	You can move every model by hand, again and again.	One model does not work the same way every time.	The motion depends on luck or extra parts.
Clarity	A viewer can understand your labels, arrows, and scale without help.	Your model is mostly clear but has one gap.	A viewer cannot understand the model without help.

Step 7 — Measure, Test, and Improve

Estimated Time to Complete: 20 minutes

What You're Working On

Move every model three times and measure each movement. Then improve the weakest result. Try to make the motion clear and easy to repeat.

Materials & Resources

- Complete model
- My Tectonic Plate worksheet math
- Ruler, labels, camera

Instructions

1. Use the speed you found in Step 4 and your scale to figure out how far each plate moves in 150,000 years.
Remember: 1 model cm = 1 real km.
2. Practice moving each pair of plates that far, a few times. Use the same starting and ending marks every time.
3. Check that the motion matches Step 4: toward, apart, or past.
4. Which result is hardest to see or easiest to misunderstand? Why?
5. Improve the cloth, the cut, the arrows, or the measuring strip. Then test it once more.
6. Record a short video of all your models moving after you improve them.

Collect for Step 8: Keep your test notes, your before-and-after note, and your motion video.

How This Builds Your Project: Your tests give you measurements and evidence for your presentation.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Your distance and time math are correct.	You have one small math error.	Speeds, distances, and time are mixed up.
Depth	You name a specific weak spot and improve it.	You name a weak spot but change very little.	You do not make a real improvement.
Repeating	The same hand movement gives a clear result every time.	The result changes each time you try.	The result cannot be repeated.

Step 8 — Show and Explain Your Plate

Estimated Time to Complete: 20 minutes, plus a three-to-four-minute presentation

What You're Working On

Use your boundary tour to explain what your plate does and why. Tie together your evidence, the plate motion, your measurements, and one thing your model cannot show.

Materials & Resources

- Finished model
- My Tectonic Plate worksheet and test log
- One note card
- Phone or camera
- A family member, class, co-op group, or a recording

Instructions

1. Plan your explanation in this order: energy inside Earth, then plate motion, then boundary types, then the change at Earth's surface.
2. Record yourself doing all of the following:
 - Name your plate, the neighboring plates you picked, and where each model is located.
 - Explain how energy inside Earth leads to plate motion, boundary types, and changes at Earth's surface.
 - Move every model with your hands while you explain how the two plates move. Name both real plates.
 - Give one distance you measured and the number of years it stands for.
 - Explain one thing your model cannot show correctly, and why. Say it yourself instead of waiting for someone to ask.
3. Record a three-to-four-minute presentation.
4. After that, write two sentences on your My Tectonic Plate worksheet: the clearest part of your boundary tour, and what you would change next time.

STEP 8 UPLOAD: Turn in your three-to-four-minute presentation and the last page of your My Tectonic Plate worksheet.

How This Builds Your Project: Your presentation brings your research and your model together into one clear explanation.

Step Rubric

Dimension	Meets Expectations	Approaching	Beginning
Accuracy	Your science claims, plate names, motion, and math are correct.	One claim is wrong or has no support.	Several important claims are wrong.
Connections	You tie together your evidence, the motion, your result, and what your model cannot show.	Most parts of your explanation connect.	You describe the parts but do not connect them.
Communication	Your presentation lasts three to four minutes and is clear, easy to see, and not rushed.	People can follow your presentation, but parts are unclear.	Your presentation is hard to see, hear, or follow.

A Strong Presentation Includes

A strong presentation uses your models to back up what you say. Name both plates in every model. Explain how the two plates move. Give the distance you measured and the number of years it stands for. Point to the evidence you found. Then say one thing your model cannot show.