Moving Plates, Changing Rocks

Model how plate motion shapes landforms and rock locations

E.8.9A.5 "Use models that demonstrate convergent and divergent plate movements that are responsible for most landforms and the distribution of most rocks and minerals within Earth's crust."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each plate motion, circle the landforms it produces, and box words that tell where rocks or minerals form so you can trace each cause and effect.

What Moving Plates Leave Behind

1. Picture a model made of two strips of paper on a desk. The strips stand for plates, the moving pieces of Earth's outer shell. Pull them apart, and the gap stands for a divergent boundary. On the ocean floor, hot rock rises into that gap and cools into basalt. This process builds a long underwater mountain chain called a mid-ocean ridge. New basalt lies closest to the ridge, while older basalt lies farther away on both sides. The model shows where rock forms, not how fast the real plates move.

2. Now push one strip toward another. At a convergent boundary off the western coast of South America, the oceanic Nazca Plate sinks beneath the continental South American Plate. A deep trench forms offshore. As the sinking plate descends, water released from it helps rock above it melt. Magma rises and feeds volcanoes in the Andes. Some magma cools underground to form granite and related rocks. Hot fluids from magma can concentrate copper minerals in cracks nearby. The paper strips show the direction of motion, but they cannot show melting.

3. Not every collision sends a plate deep into the mantle. When two continental plates meet, both resist sinking because their crust is relatively buoyant. In a model, push two thick foam blocks together. Their edges crumple and rise, much as rock layers rise to build the Himalayas. Pressure and heat deep in the collision zone can change existing rocks into metamorphic rocks, including schist that may contain garnet crystals. The model helps predict where mountain belts and changed rocks occur, but real rock layers bend and change over millions of years.

2 ANSWER WITH EVIDENCE

Use the passage

1. If you slide the paper strips apart, where would you place the youngest basalt relative to a mid-ocean ridge? Explain using the model.

2. Use the strip model to predict where a trench and copper minerals would be found at the boundary between the Nazca and South American plates.

3. When thick foam blocks move together, why might schist containing garnet form beneath the rising mountains?

4. Both convergent models involve plates moving together. How does the type of plates change the predicted landforms and rocks?

3 YOUR TURN

Your own words

Invent a region with an ocean beside a continent. In two panels, model two possible plate motions, spreading on the ocean floor and an ocean plate sinking under the continent; in each panel, draw arrows, label a landform and the location of a likely rock or mineral, then write one sentence linking the motion to that location.

ANSWER KEY

Moving Plates, Changing Rocks

GRADE 8 · E.8.9A.5

PART 1 · READ AND MARK

Underline each plate motion, circle the landforms it produces, and box words that tell where rocks or minerals form so you can trace each cause and effect. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	If you slide the paper strips apart, where would you place the youngest basalt relative to a mid-ocean ridge? Explain using the model.	**At the ridge, because hot rock rises into the gap between the separating plates and cools there.**
2	Use the strip model to predict where a trench and copper minerals would be found at the boundary between the Nazca and South American plates.	**The trench is offshore where the Nazca Plate sinks. Copper minerals can form in cracks near magma beneath the Andes.**
3	When thick foam blocks move together, why might schist containing garnet form beneath the rising mountains?	**The collision puts existing rock under heat and pressure, which can change it into schist containing garnet.**
4	Both convergent models involve plates moving together. How does the type of plates change the predicted landforms and rocks?	**An oceanic plate sinking beneath a continent forms a trench and volcanoes, with granite and possible copper minerals nearby. Colliding continental plates build mountains and can form metamorphic rocks such as schist.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Panel 1: Draw two ocean plates with arrows pointing away from a mid-ocean ridge. Label basalt at the ridge. As the ocean plates separate, rising hot rock cools into basalt at the ridge.
Panel 2: Draw an ocean plate with an arrow pointing beneath a continent, with a trench offshore and volcanic mountains on land. Label copper minerals in cracks near magma beneath the mountains. As the ocean plate sinks, magma forms and hot fluids can concentrate copper minerals nearby.

Accept models with correctly directed arrows and rock or mineral locations tied to the predicted landforms. Students may label granite beneath volcanic mountains instead of copper minerals near magma.