

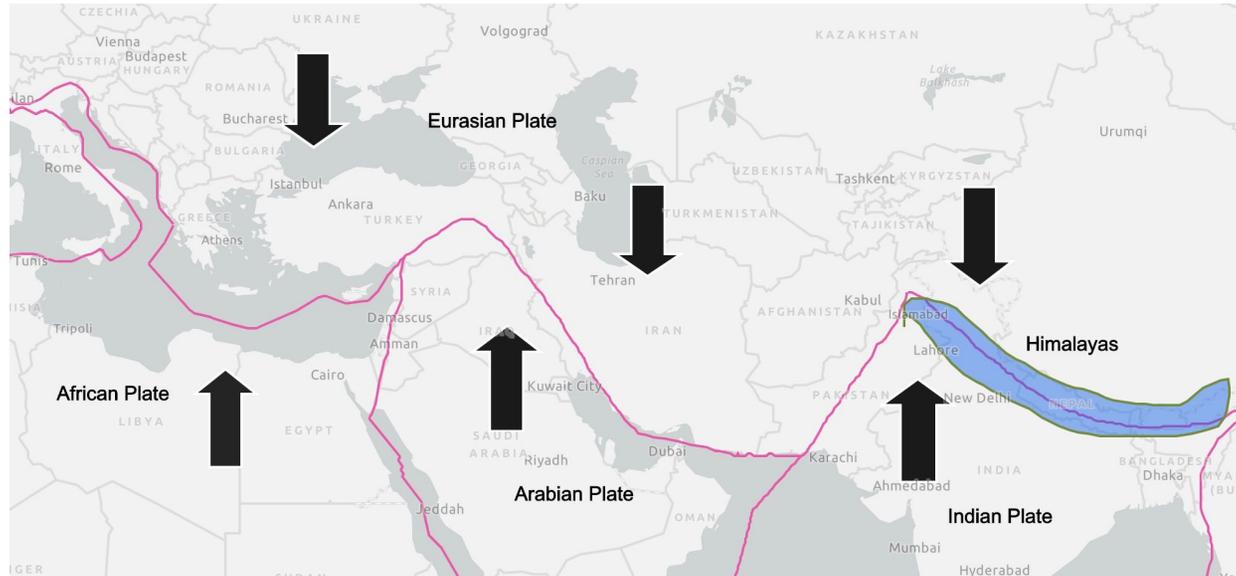
## Lesson 10: Answer Key

# Using Models to Explain Patterns

The Himalayas are not the only mountains in their area of the world. As we have seen, the movement of Earth's plates has created other mountain ranges too. Below is a map of the Eurasian, African, Arabian, and Indian Plates. Here is their relative movement and direction:

- Eurasian Plate: South, 7-14 mm/year
- African Plate: Northeast, 215 mm/year
- Arabian Plate: Northwest, 6-14 mm/year
- Indian Plate: Northeast, 26-36 mm/year

Using what you know about how the plates move on Earth's surface, answer the following questions.



1a. What would you predict the pattern of mountain ranges would be on this map? Add them onto the map using words and pictures.

- Mountain ranges drawn on the border of the Eurasian plate and the other three plates to the south.

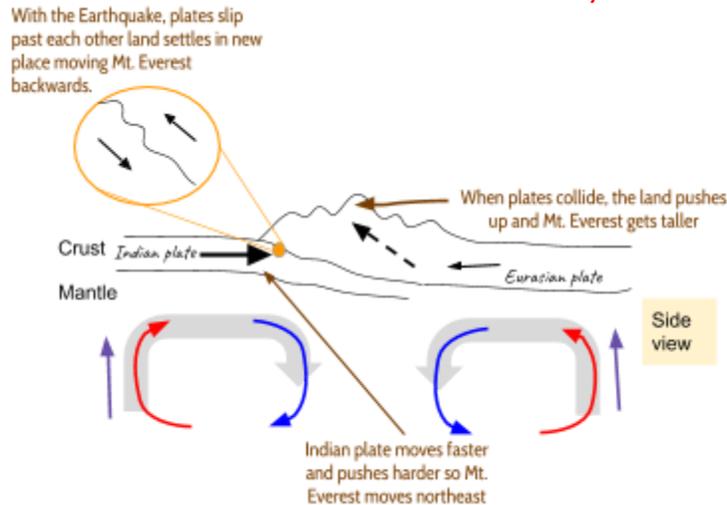
1b. Construct an explanation for why the mountain ranges exist in the pattern that you drew on the map. Also include what is happening in the mantle below the plates.

- The mountains formed in this pattern along the plate boundaries because the plates are moving toward each other and colliding and pushing the land up.
- The mantle below has currents moving toward each other which is pushing the plates together.
- (optional) Because the plates in this area are continental crust, they are about the same heaviness. This would cause the land to uplift and buckle to form these mountains.

1c. Draw and label a cross-section model for what you think is happening at this plate boundary, based on the three types of plate movements that you have studied.

Use this question to elicit further student thinking from 1b, especially if students struggle with writing but can show their ideas as a model/drawing. Score 1b and 1c together.

Example from previous lessons. Model does not need to look exactly like this:



2a. These plates are moving towards one another, but there are very few volcanoes in this area compared to other places in the world. Using this information, which pattern of earthquakes would you expect to see here? Choose one.

- Earthquakes are shallow and spread out over a large area.\*
- Earthquakes are shallow and happen in a straight line.
- Earthquakes are deep and spread out over a large area.
- Earthquakes are deep and happen in a straight line.

2b. Construct an explanation that supports why you would expect to see the pattern of earthquakes that you chose above.

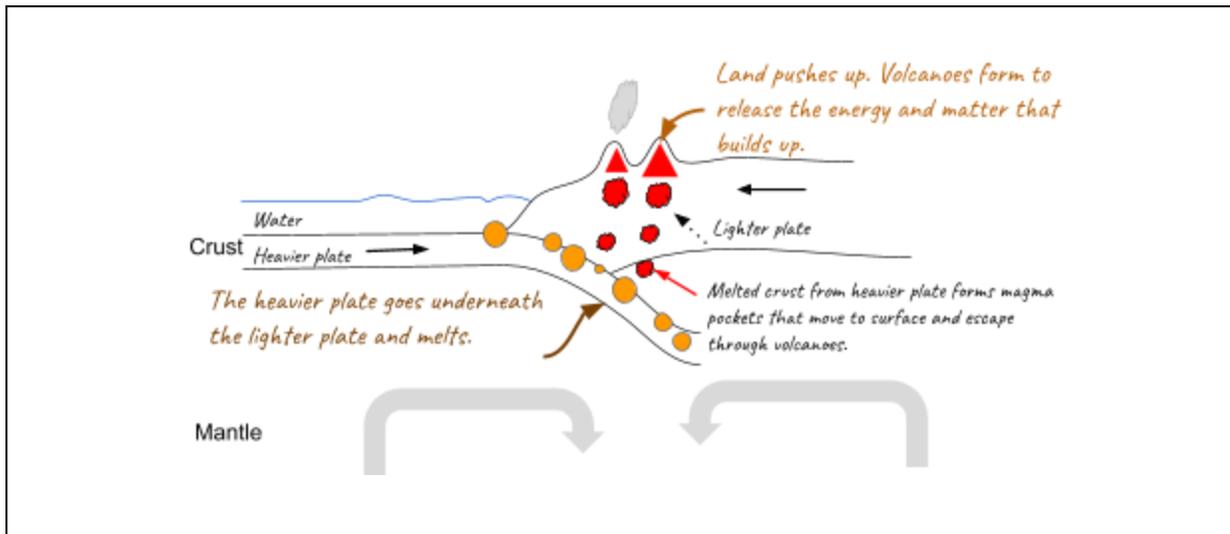
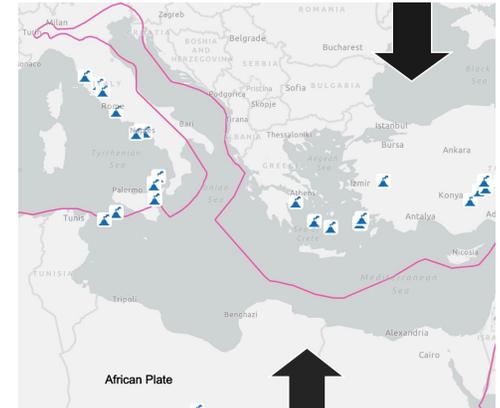
- The earthquakes form this pattern (shallow and spread out) because when the plates collide, they lift upwards and bend or buckle in a lot of different directions.
- Nothing is sinking into the mantle, so the earthquakes stay shallow near the surface as all the rock in the crust gets pushed upward.

3. A small part of the African plate is made of heavier material and sinking below the Eurasian plate near the southern part of Italy, Greece, and Turkey. This means it interacts with the Eurasian plate differently than at other places along the plate boundary. The map shows a zoom in this area where there are a number of volcanoes.

3a. Draw a cross-section model that explains why volcanoes form at this type of plate boundary.

In your model include:

- The heaviness of the plates
- Pattern of earthquakes you would see at this boundary
- Where the volcanoes form
- Where the matter in the volcano comes from



3b. Use your model to explain why volcanoes are present in this area where the African Plate and the Eurasian Plate interact.

The two plates are moving toward each other and colliding. One plate is heavier (African Plate) and sinks below the other plate (Eurasian Plate). As the sinking plate melts into the mantle, magma is pushed to the surface of the lighter plate, forming volcanoes.