

STEAM Subject: Earth Science
Lab: Puzzle Piece Continents

Grades: 4th-8th

Learning objective:

Students will be able to analyze and interpret data from maps to describe patterns of Earth's features, such as continents and oceans. They will also examine some evidence that show that continents have moved.



ENGAGE:

Start by watching the following video:

<https://www.youtube.com/watch?v=T1-cES1Ekto>

Ask students:

- What was Alfred Wegner's theory? Can you describe what it was? *Continental Drift, he thought that the continents were moving around the surface of the Earth*
- What was the main reason people dismissed the theory? *There was no explanation for how they were moving*

EXPLORE:

Puzzle Piece Continents Activity:

We are going to be looking at some of the evidence Alfred Wegner saw that caused him to think that continents and large land masses were moving.

Students will use landmass cut outs as puzzle pieces and try to link them together into a supercontinent.

Materials needed per student:

- 1 landmass worksheet (page 26) and 1 fossil descriptions worksheet (page 27) printed from here: https://volcanoes.usgs.gov/vsc/file_mgr/file-139/This_Dynamic_Planet-Teaching_Companion_Packet.pdf
See examples in the last pages. Answer key is on page 25.
- 5 pens, markers, colored pencils, or crayons (yellow, green, blue, orange, brown)
- Scissors
- 1 sheet of blue paper
- Glue stick

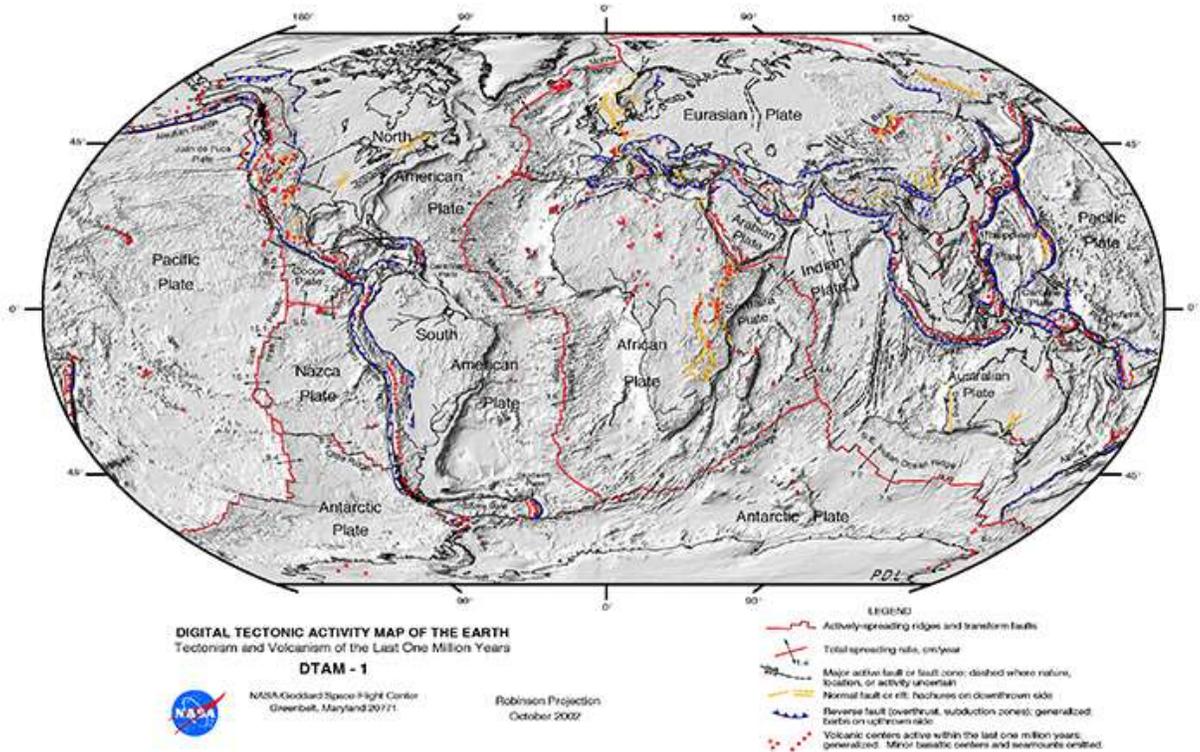
Directions:

- 1) Start by color coding the fossil evidence on your land masses. Read about each fossil on the description sheet before trying to find and color code where their fossils were found on land. Be careful! Some of the icons look very similar!

- 2) Before moving forward take a second to think about what this means. Most of the animals whose fossils were found couldn't swim very well and would never be able to cross an entire ocean. How are their fossils found so far away from each other? If the landmasses used to be next to each other, then the areas where the fossils of each one was found could have been connected.
- 3) Cut out the landmasses! You may notice that the different continents sometimes have a dotted area around them. This is the **continental shelf**. It is the part of the continent that extends out into the ocean before it stops. We want to include it in our cut outs because it is part of the land!
- 4) Once the pieces have been cut out, try to puzzle them together! Use the sheet of blue paper as the background (ocean) and keep our fossil evidence in mind! (If students need a hint, the two pieces that have the most fossil evidence is usually a good place to start.)
- 5) Once you think you've solved the puzzle, glue it on to the ocean to save your supercontinent!

EXPLAIN:

- We can see from our supercontinents that there is evidence that land masses today may have been together in the past. The continents fit together like puzzle pieces, which is fossil evidence.
- There is a third piece of evidence that is not shown on our activity sheets. Similar to how fossils can be connected together, so can geologic evidence. For example: we might see a mountain range stop suddenly at the edge of a continent only to have a very similar one start again at the edge of a continent across the ocean (same rock type, same age, etc.).
- Today we don't use the theory of Continental Drift, instead we have the theory of Plate Tectonics. It uses a lot of the same evidence Alfred Wegner used, however with better technology and more information. Plate tectonics also uses additional evidence to paint a better picture of how different continents move. We now know that they don't just "drift" which is why we have a new theory.
- **Plate tectonics** is the theory that explains the past and current movements of the rocks at Earth's surface and help us understand its geological history. Plate movements are responsible for most continental and ocean floor features and for the distribution of most rocks and minerals within Earth's crust. Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart.
- Review the NASA digital Tectonic Plate map available at <https://visibleearth.nasa.gov/images/88415/digital-tectonic-activity-map/88416w>



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EVALUATE:

- Do you think Earth will always look how it does now? (No, continents are still moving!)
- Take a look at this video to see how the Earth has looked in the past and how it might look in the future.
<https://www.youtube.com/watch?v=uLahVJNnoZ4&t=306s>
- Also check out “The Magic School Bus Rides Again” on Netflix, Season 2 Episode 1 “The Land Before Tim” for an episode all about fossils and tectonic plate movement!

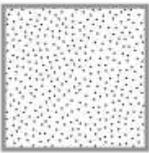


Wegener's Puzzling Evidence

DIRECTIONS:

1. Label the land masses on each sheet. Color the fossil areas to match the legend below.
2. Cut out each of the continents along the edge of the continental shelf (the outermost dark line). Alfred Wegener's evidence for continental drift is shown on the cut-outs. Wegener used this evidence to reconstruct the positions of the continents relative to each other in the distant past.
3. Try to logically piece the continents together so that they form a giant supercontinent.
4. When you are satisfied with the 'fit' of the continents, discuss the evidence with your partners and decide if the evidence is compelling or not. Explain your decision and reasoning on the evidence.

Key to Wegener's Puzzling Evidence - Fossils



The continents is surrounded by the continental shelf (stippled pattern), which extends beyond the continent until there is a large change in slope.



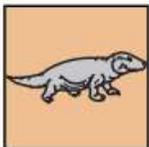
By about 300 million years ago, a unique community of plants had evolved known as the European flora. Fossils of these plants are found in Europe and other areas. Color the areas with these fossils yellow.



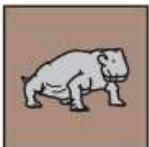
Fossils of the fern *Glossopteris* have been found in these locations . Color the areas with these fossils green.



Fossil remains of the half meter-long fresh or brackish water (reptile) *Mesosaurus*. *Mesosaurus* flourished in the early Mesozoic Era, about 240 million years ago. *Mesosaurus* had limbs for swimming, but could also walk on land. Other fossil evidence found in rocks along with *Mesosaurus* indicate that they lived in lakes and coastal bays or estuaries. Color the areas with these fossils blue.



Fossil remains of *Cynognathus*, a land reptile approximately 3 meters long that lived during the Early Mesozoic Era, about 230 million years ago. It was a weak swimmer. Color the areas with these fossils orange.

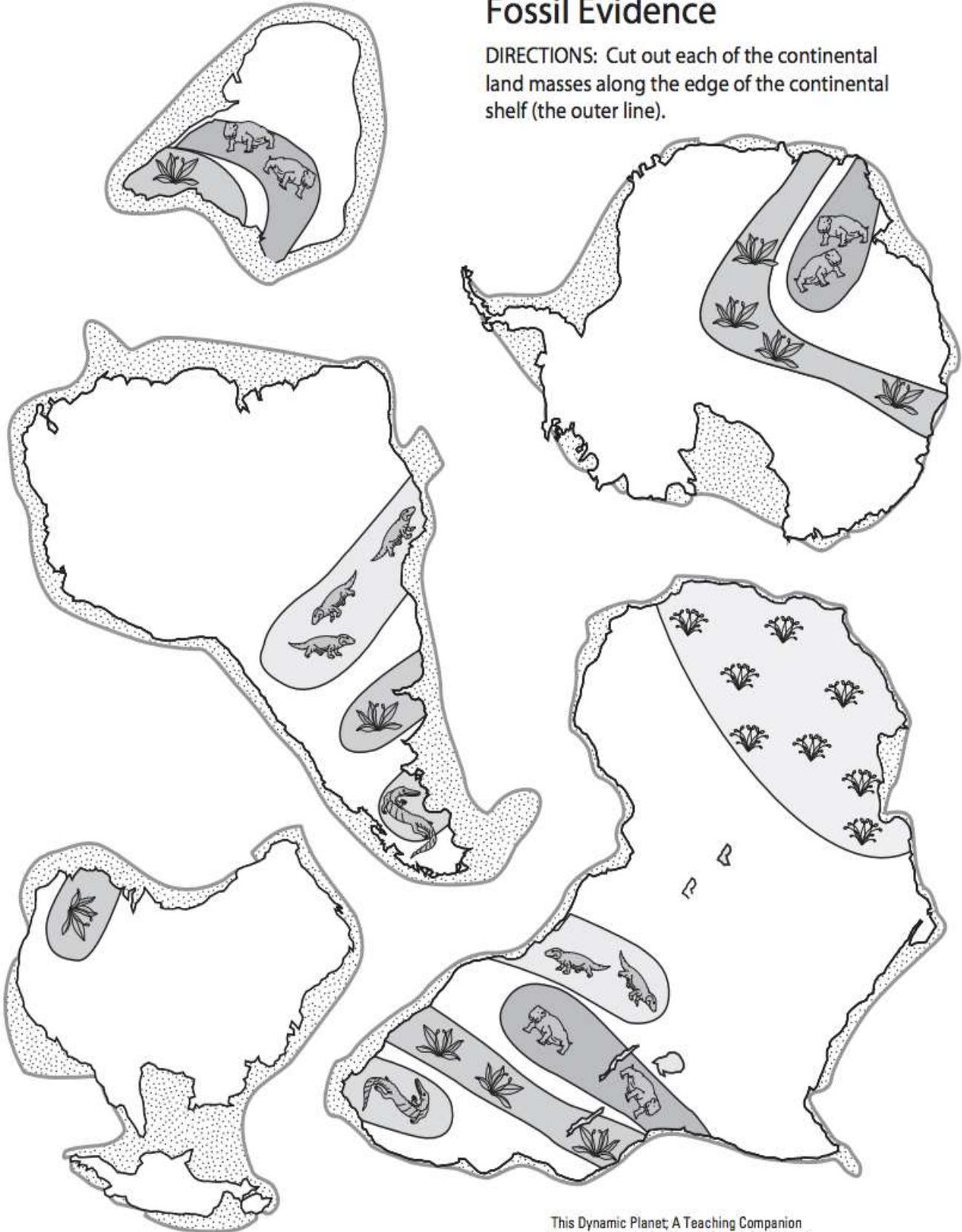


Fossil evidence of the Early Mesozoic, land-dwelling reptile *Lystrosaurus*. They reproduced by laying eggs on land. In addition, their anatomy suggests that these animals were probably very poor swimmers. Color the areas with these fossils brown.



Fossil Evidence

DIRECTIONS: Cut out each of the continental land masses along the edge of the continental shelf (the outer line).



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