

Plate Tectonics ▪ *Laboratory Investigation*

Mapping a Future World

Pre-Lab Discussion

You can't feel the land underneath you moving every day, but it is! The surface of Earth is divided into continents and oceans. These landmasses and water bodies are slowly but surely changing their positions and shapes. Scientists have measured these movements of a few centimeters a year.

What will Earth look like in the future? No one can be sure where the continents will end up. In this investigation, you will predict what Earth will look like as you map the movement of the continents.

1. What are plates in the Earth's crust?


2. What does *plate tectonics* mean?

Problem

Where will the continents be in the distant future, and how will their position affect mountains and oceans around the world?

Materials *(per group)*

- 2 outline maps of the world showing latitude and longitude lines
- scissors
- colored pencils or markers
- envelope
- pencil or pen
- clear tape
- world map or globe

Safety  *Review the safety guidelines in Appendix A.*

Use caution in handling sharp scissors.

Plate Tectonics ▪ *Laboratory Investigation***Mapping a Future World** *(continued)***Procedure**

1. You will ignore the movement of Antarctica in this activity. Label the other continents and the oceans on the two outline maps.
2. You will need reference points when you start moving continents. Use a world map or globe to locate and label one city on each continent on both of the maps. In Data Table 2 in Observations, record the current latitude and longitude of each reference-point city.
3. From one map, carefully cut out the continents. Keep these pieces in an envelope when you are not using them.
4. Assemble a complete world map—the base map—by cutting out the map on one page and overlapping it with the map on the other page. The 20°W longitude lines (also called meridians) should overlay each other. Carefully tape the map together along the 20°W longitude line.
5. Lay the cutout continents on the base map in their current positions. You should be able to slide your cutouts easily over your base map.
6. Predict where the continents will be in 100 million years. Slowly move the continents to where you predict they will be. Trace their outlines lightly in pencil. Assume that the Indo-Australian Plate splits in a few million years, and India and Australia continue to move at the same rate.
7. Now, check your predictions. Use the plate speeds in Data Table 1 and the map in your textbook to find the direction and rate of movement for each plate that carries a continent. Calculate how far each continent will drift in 100 million years. Record these figures in Data Table 2 in Observations.
8. Use the scale on the base map to help you decide where the continents will be in 100 million years. Slowly move the cutout continents to their new locations. Trace their outlines on your base map, using a different color for each continent. Some continents may overlap in their new positions. Trace the outlines overlapping.
9. Mark and record the new location of each reference point.
10. Compare your completed map to your predictions. Then compare it to those of your classmates and discuss any differences.

DATA TABLE 1

Plate	Speed (cm/yr)
African	0.66
Eurasian	0.95
Indo-Australian	8.50
North American	2.31
South American	3.55

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Observations

DATA TABLE 2

Continent	Reference Point	Location Now (Latitude and Longitude)	Distance Traveled in 100 Million Years	Location in 100 Million Years (Latitude and Longitude)
Africa				
Asia				
Australia				
Europe				
North America				
South America				



Analyze and Conclude

- How did your predicted locations of continents compare with the locations in Step 8?

- What will happen to the location of North and South America as sea-floor spreading widens the Atlantic Ocean?

- What will happen to the size of the Pacific Ocean as North America moves west?

- How did the latitude and longitude of your reference point in South America change?

- What might happen to the Himalayas over the next several million years? Give a reason for your answer.

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Mapping a Future World *(continued)*

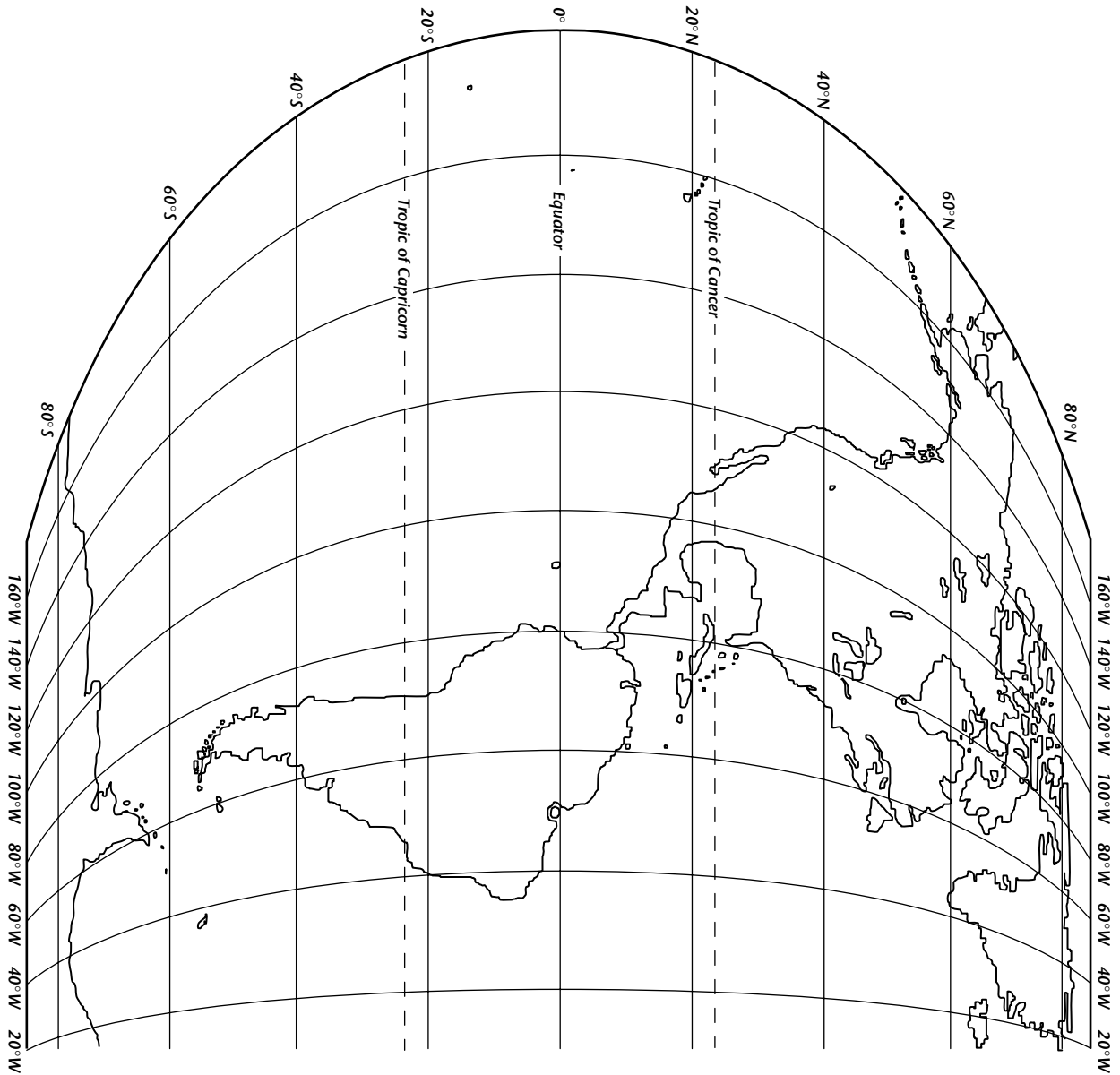


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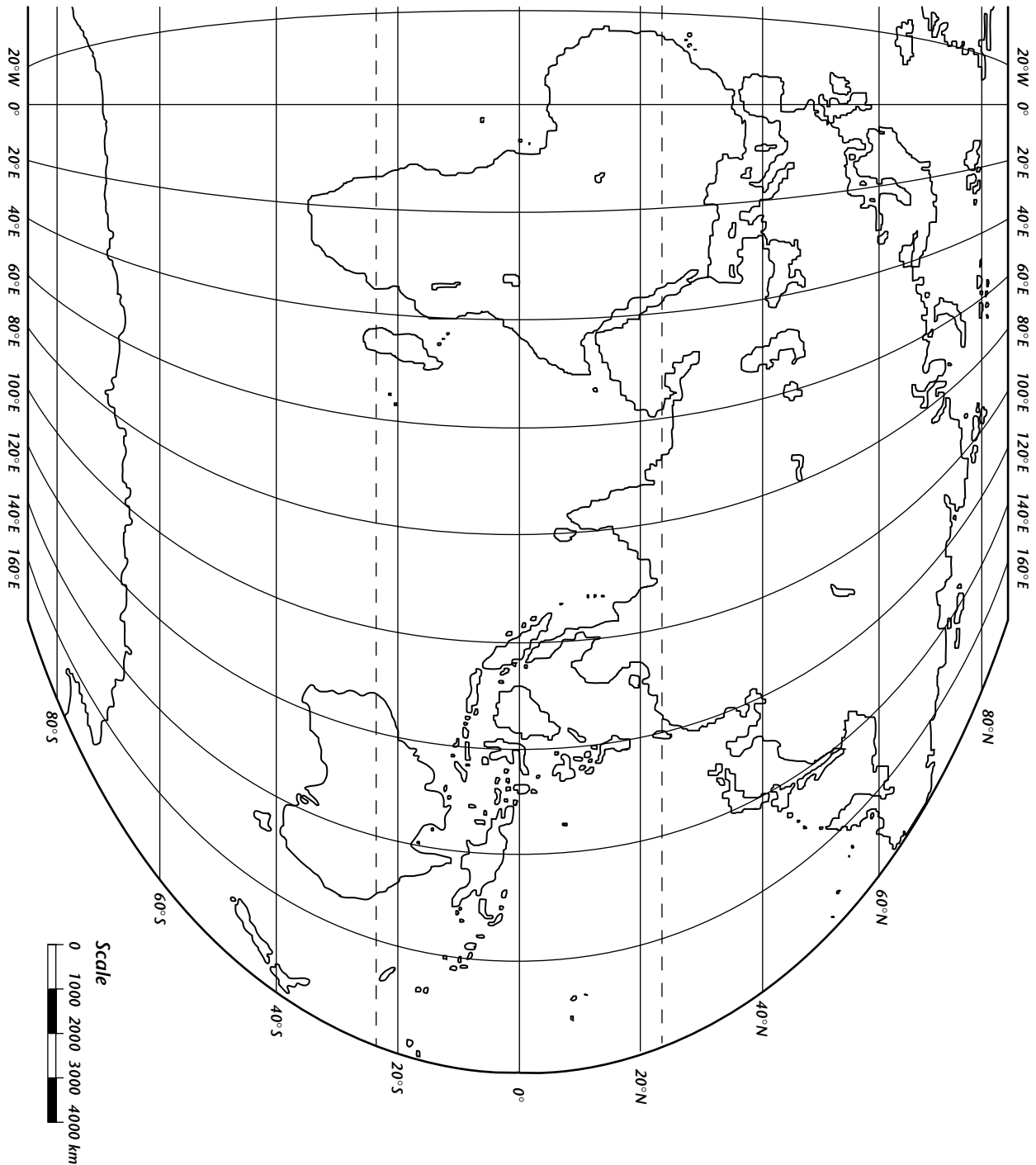


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Mapping a Future World *(continued)*

Critical Thinking and Applications

1. Why did many scientists not accept the early theories of continental drift?

2. Based on your movements of the continents, where do you predict new mountain ranges will be forming in 100 million years? Explain your reasoning.

3. Why do continents move at different rates?

4. Which is more important in determining the future location of a city—what continent it is on or what plate it is on? Give a reason for your answer.

More to Explore

New Problem Near what city's location will Los Angeles, California, be in about 17 million years? (*Hint:* The rate of plate movement along the San Andreas Fault is about 3.4 cm/yr.)

Possible Materials Use the same map and continent shapes as before. You may also need scissors again.

Safety Use caution in handling sharp scissors.

Procedure Predict where Los Angeles will be. Then develop a procedure to test your prediction. Get the teacher's approval before carrying out your investigation.

Observations Record your prediction. Also record any appropriate observations on your base map.

Analyze and Conclude Where do you think Los Angeles will be located in about 17 million years?