

Name: \_\_\_\_\_ Section: \_\_\_\_\_ Date: \_\_\_\_\_

### Plate Tectonics Simulation

Go to <https://phet.colorado.edu/en/simulation/plate-tectonics>

Run the Plate Tectonics simulation. Click **keep** after the file is downloaded. Open the file. If you are prompted to update Java, click the “**Later**” option and run the application.

#### Part I:

1. Begin with the “Crust” tab. Under “View,” check “Both” and “Show Labels.” Use the tools in the lower left corner to compare the thickness, density, and temperature of the oceanic and continental crust samples. Complete the table below.

Crust Type	Thickness	Density	Temperature
Oceanic			
Continental			

2. Which property do you think causes continental crust to have a higher elevation (on average) than oceanic crust? Explain.

**Make your own Crust!** Experiment with making your own crust using the sliders in the center of the screen. Note that the middle crust sample will turn blue or green depending on whether it is considered oceanic or continental crust.

3. What happens to the crust as you increase thickness?
4. Using this observation complete the following statement by writing in Continental or Oceanic:  
\_\_\_\_\_ crust is thicker than \_\_\_\_\_ crust.
5. See what happens when you change the composition of the crust.
  - a. Does oceanic crust have more iron or more silica?
  - b. Does continental crust have more iron or more silica?
6. Set the thickness and composition of your crust somewhere in the middle. Write down what type of crust you have \_\_\_\_\_.
7. See what happens when you change the temperature of the crust.
  - a. What happens to very cool crust?
  - b. What happens to very warm crust?

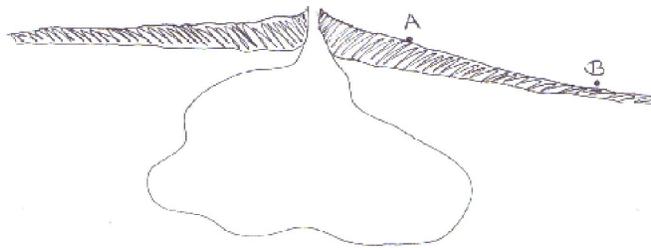
Continue to use the “My Crust” window to manipulate the thickness, composition, and temperature of the crust to fill in the following table

**Summary Table:** What happens to the crust as you increase the thickness? As you add more iron or more silica? As you change the temperature? You can use your answers from questions # 3-7 in addition to these questions to complete the table below. Write your observations in the result columns.

Crustal Property	Result	
Thickness	thick:	thin:
Composition	more iron:	more silica:
Temperature	warm:	cool:

Go to: [http://earthguide.ucsd.edu/eoc/teachers/t\\_tectonics/p\\_seafloorspreading.html](http://earthguide.ucsd.edu/eoc/teachers/t_tectonics/p_seafloorspreading.html)  
 Watch the animation of seafloor spreading and read the key features before proceeding to the next question.

8. Based on what you know about sea-floor spreading, answer the following questions.



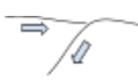
Answer the questions below by using the diagram above:

- Which point is closer to the Midocean Ridge? \_\_\_\_\_
- Which point is older? \_\_\_\_\_
- Which point is at a higher elevation? \_\_\_\_\_
- What type of rock would we expect to find at points A and B? \_\_\_\_\_
- Where could we find a real-world example of the diagram above?  
 \_\_\_\_\_

**Part II:**

Use the “Plate Motion” tab in the PhET simulation. Under View, check “Both” and “Show Labels,”. Experiment with different types of crust at the plate boundary. Click “Show Sea Water” after you have placed the crust.

**Important vocabulary terms:**

<b>Convergent Plate Boundary</b>	A boundary at which two plates move toward each other ⇨⇩
<b>Divergent Plate Boundary</b>	A boundary at which two plates move away from each other ⇩⇨
<b>Transform Plate Boundary</b>	A boundary at which two plates move parallel to each other in opposite directions ⇨⇩
<b>Subduction</b>	 One plate moves under another. (Right plate is <i>subducting</i> under the left plate)

9. Reset the simulation and set it up with a continental and an oceanic (young or old) crust.
  - a. Drag the plate in the direction of the **green arrow**. What type of boundary is this?
  - b. Sketch a time series of this process with at least three diagrams. Label the two types of crust and show the direction of motion.

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- c. Which plate subducts beneath the other? Why do you think this is (hint: think of the properties you explored in part I)?
- d. What feature is created on the continental crust parallel to the plate boundary?

10. Reset the simulation and set it up with two old oceanic crusts.
  - a. What type of boundary does the red arrow display?
  - b. What type of boundary does the blue arrow display?
  - c. Drag the plate in the direction of the red arrow. Sketch a time series of this process with at least three diagrams. Label the two types of crust and show the direction of motion.

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- d. What feature is created at the plate boundary?

11. Reset the simulation and set it up with two continental crusts.
- What type of boundary does the red arrow display?
  - What type of boundary does the green arrow display?
  - What type of boundary does the blue arrow display?
  - Drag the plate in the direction of the **red arrow**. Sketch a time series of this process with at least three diagrams. Label the two types of crust and show the direction of motion.

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- What feature is created at the plate boundary?
- Why does neither plate subduct?

12. Experiment and find two additional scenarios not yet described in this activity. Complete the table below. You can draw pictures or use words to fill in the boxes below.

Types of Crust	Type of Boundary	What Happens/New Features

13. New crust is created at a divergent boundary.
- Where does this new crust come from?
  - What happens to the old crust?