Plate Tectonics PhET

Learning Objectives:

- I can describe the differences between continental and oceanic crust.
- I can identify and describe the three types of plate boundaries .
- I can describe the geologic features created by each type of plate boundary.

Go to www.phet.colorado.edu. Click on the orange "Play With Sims" button. On the right side of the screen, choose the "Earth Science" category. Run the "Plate Tectonics simulation.

Part I:

1. Begin with the "Crust" tab. Under "View," check "Both" and "Show Labels." Use the tools in the lower left corner to qualitatively 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.

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. See what happens when you adjust the thickness of the crust. What kind of crust is very thick crust? What kind of crust is very thin crust?

4. See what happens when you change the composition of the crust? Does oceanic crust have more iron or more silica? Does continental crust have more iron or more silica?

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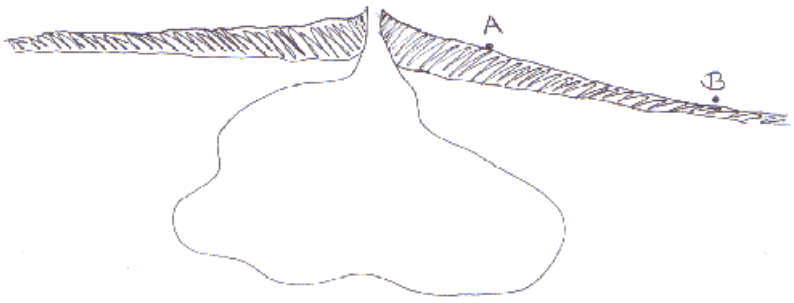
5. Set the thickness and composition of your crust somewhere in the middle. Write down what type of crust you have: _____. See what happens when you change the temperature of the crust. What happens to very cool crust? What happens to very warm crust?

6. Based on your answers to # 3 – 5, complete the table below.

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

7. Based on what you know about sea-floor spreading, mark where you think the crustal properties of points A and B would fall on the continua below.



Property	
Thickness	thin.....thick
Composition	iron.....silica
Temperature	cool.....warm
Age	young.....old

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Part II:
Now go to the "Plate Motion" tab. Under "View, check "Both," "Show Labels," and "Show Sea Water." Experiment with different types of crust at the plate boundary.

Note the following vocabulary terms:

Convergent Plate Boundary	A boundary at which two plates move toward each other ⇨⇦
Divergent Plate Boundary	A boundary at which two plates move away from each other ⇦⇨
Transform Plate Boundary	A boundary at which two plates move parallel to each other in opposite directions ⇧⇩
Subduction	One plate moves under another ⇘⇦

8. 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.

   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?

9. Reset the simulation and set it up with two old oceanic crusts.
   a. Drag the plate in the direction of the red 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.

   c. What feature is created at the plate boundary?

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10. Reset the simulation and set it up with two continental crusts.
    a. Drag the plate in the direction of the blue 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.

11. Reset the simulation and set it up with two continental crusts.
    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.

    c. 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.

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?

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