

## ***Investigation 6: What Happens When Plates Collide?* Investigation Sheet**

Answer the questions below in complete sentences.

### **Part 1: Subduction Zones**

1. How deep is the trench in the Aleutian subduction zone?
  
  
  
  
  
  
  
  
  
  
2. a. What is the height of the volcano **along the elevation profile**?
  
  
  
  
  
  
  
  
  
  
- b. On which plate is this volcano located?
  
  
  
  
  
  
  
  
  
  
3. What is the name of the plate immediately north of the Aleutian Trench?
  
  
  
  
  
  
  
  
  
  
4. What is the name of the plate immediately south of the Aleutian Trench?
  
  
  
  
  
  
  
  
  
  
5. What type of plate boundary is located along the eastern section of the Aleutian Trench where most volcanoes are located?
  
  
  
  
  
  
  
  
  
  
6. What type of plate boundary is located along the western section of the Aleutian Trench where volcanoes are absent?
  
  
  
  
  
  
  
  
  
  
7. Formulate a hypothesis. Which plate is the overriding plate and which is the subducting plate? Support your hypothesis with your knowledge about what occurs in a subduction zone.

8. On your **O\O (Atka Island)** and **O\C (Kodiak Island)** profiles, what is the horizontal distance between the volcanoes and the trench? How deep is the deepest earthquake focus on the profile?

	O\O (Atka Island)	O\C (Kodiak Island)
Distance from volcano to boundary		
Depth of the deepest earthquake focus		

9. a. Imagine you are standing on Kodiak Island and feel a deep earthquake which occurs beneath you. On which plate is the epicenter?

b. On which plate is the focus - the place where the deep earthquake originates?

10. On which profile is the subducting slab steeper?

11. Look at your hypothesis in question #7. Was your hypothesis correct? Think about how the volcanoes are formed. Restate your hypothesis about which plate is subducting? Support your hypothesis with evidence about processes that occur at a subduction zone.

12. On the **Subducting Slab Depth** layer, which colored line is the deepest and which colored line is the shallowest, the red line or green line?

13. Which direction is the subducting slab sloping (dipping)?

14. a. Imagine the subduction zone profile extended past the Aleutian Trench to the south. What is the age of the ocean floor at the edge of the O\O (Atka Island) **Subduction Zone Profile**?

- b. Imagine the subduction zone profile extended past the Aleutian Trench. What is the age of the ocean floor at the edge of the O\C (Kodiak Island) **Subduction Zone Profile**?
  
- c. What is the relationship between the age of the ocean and the slope (steepness) of the subducting slab?

## **Part 2: Colliding Creates Landforms**

- 15. What type of crust are these plates composed of at this location (oceanic or continental)?
  
- 16. What type of landform is formed north of the plate boundary at this location?
  
- 17. What are the names and elevations of the three volcanoes in the **Investigation 6 Images** layer?
  
- 18. Which plate is overriding and which plate is subducting in the U.S. Pacific Northwest at the convergent plate boundary? Support your answer with evidence from the GIS map. (Hint: Where are the volcanoes located?)
  
- 19. What type of crust are the plates composed of at the convergent plate boundary in the Cascadia region of the U.S. Pacific Northwest (oceanic or continental)?
  
- 20. What type of landform do volcanoes create at the plate boundary in the U.S. Pacific Northwest?
  
- 21. What are the names and elevations of the three volcanoes in the **Investigation 6 Images** layer?

22. Compare the three volcano images. Which volcano do you think erupted most recently? Support your answer with evidence from the images. (Hint: Pay close attention to the shape of the top of each volcano.)
23. How are the subduction zone areas in the Aleutian Trench and Cascadia **similar**?
24. How are the subduction zone areas in the Aleutian Trench near Atka Island and Cascadia **different**?
25. What is the primary geologic hazard in the U.S Pacific **Northwest**?
26. What is the primary hazard in the U.S. Pacific **Southwest**?
27. Why do the hazards on the western coast of the United States exist where they are? Support your answer with evidence from the GIS map. (Hint: Look at your GIS layers and legend.)
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28. What landform was created when Africa collided with North America 300 million years ago?
29. The Appalachian Mountains are currently about 2,000 meters tall and 300 million years old. Assuming these mountains have been eroding at a rate of 20 meters per million years, how tall were the Appalachian Mountains when they formed?
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30. Africa is no longer next to North America. What caused Africa to move to its current location?