

Name: \_\_\_\_\_ Laboratory Section: \_\_\_\_\_  
Date: \_\_\_\_\_ Score/Grade: \_\_\_\_\_

**Video**  
Exercise 30  
Pre-Lab Video



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## LAB EXERCISE

# An Introduction to Geographic Information Systems

## Lab Exercise and Activities

### SECTION 1

#### Basic GIS Concepts

1. Give some examples of a GIS that you have used, perhaps without realizing it.

*Personal answer*

2. If you were a land planner, what questions could you answer by using the composite overlay of data layers in Figure 30.1?

*You could identify flood zones, available open space, the location of wetlands to protect, optimal areas to develop*

3. Give examples of features in your life that would be symbolized by points, arcs, and polygons.

*Personal answers, but might include*

*Points: fire hydrants, location of a favorite restaurant, my school.*

*Arcs: streets, rivers, utility lines, airline routes.*

*Polygons: my backyard, a favorite park, my campus.*

### SECTION 2

#### The Internet and GIS

1. Using the Internet, find three websites that use online GIS. Examples might include real estate, online maps or directions, remote-sensing imagery, and wildfire tracking. Record their URLs and descriptions below.

*Personal answer*

2. Visit three websites that offer free data for downloading that could be used in a GIS. Record their URLs and descriptions below.

*Personal answer*

## SECTION 3

## Mt. Rainier Hazards

1. Download the files 100-year\_Lahar.zip, 1000-Year\_Lahar.zip, Pyroclastic\_flow.zip, and Schools.zip to your computer.
2. Sign in to ArcGIS Online and try different base map layers. After you've picked a base map, use the Add tool and Search for Layers at ArcGIS Online. You won't add these layers to the map; this step is just to acquaint you with some of the data sources available. You can limit your search by using key words and specifying the region to search. What are the three most interesting layers that you found?
3. Use the Add tool and Search for Layers at ArcGIS Online and search for topographic maps. You will need a layer that has elevation contour lines, such as the USA Topo Maps layer or the USA Topographic Maps (Mature Support) layer. You can add it to your map or use it as a base map. After you have added an appropriate topographic map, use the Add tool and Add Layer from File for each of the four files you downloaded.
4. Turn off the 100-year lahar and 1000-year lahar layers. Turn each layer on and off so that you can see the extent of each. Modify the symbology of each file so that you can distinguish the pyroclastic flow layer from the 100-year and 1000-year lahar layers.
5. Which layer covers the largest area?

*1000-year lahar.*

6. You can rearrange the order that the layers draw by dragging and dropping them in the Contents window. In order to best see both lahar layers, which layer should be on the bottom?

*1000-year lahar.*

7. You can also adjust the transparency of each layer so you can see your data and the base map underneath. What levels of transparency did you use for the pyroclastic flow, 1000-year lahar, and 100-year lahar layers?

*Personal answer*

8. Use the topographic map and the pyroclastic flow layers to find the relief from summit to the farthest extent of the 100-year lahar flow. How far does the pyroclastic flow extend from the summit? What is the lowest elevation that is covered by potential pyroclastic flow?

*The 100-year lahar extends to the Port of Tacoma, therefore the relief is 14410'. The pyroclastic flow extends 18 km to the southwest and down to the 2160' contour along the Nisqually River.*

9. How far does the 100-year lahar extend from the summit?

*68.5 km to the Port of Tacoma*

10. How far does the 1000-year lahar extend from the summit?

*78.5 km to Nisqually Flats*

11. What is the name of the school that is closest to the summit and in a lahar area? What is the distance from the summit to the closest school? What is the vertical relief from the summit to the closest school?

*Shaw Road Elementary School is 52.7 km from the summit. It is 81', so the relief is 14,329' below the summit.*

12. If lahars can travel at 100 kmph (60 mph), how much time would it take for a flow to reach the school closest to the summit?

*32 minutes.*

13. Identify three schools at risk from a 1000-year lahar but not from a 100-year lahar.

*Personal answers.*

14. Identify three schools at risk from both 1000-year and 100-year lahars.

*Personal answers.*

15. Use the Add tool to search for a Washington counties layer and add that layer to your map. How many schools are at risk from a 1000-year lahar in each county? Which county has the most schools at risk?

*Thurston County: 1; Pierce County: 6; King County: 4. Pierce County.*

16. This exercise involved only elementary schools. What other types of structures would you analyze for hazard potential?

*Personal answer*

17. Increase the transparency of the lahar layers so you can see the terrain underneath. What terrain features appear to control the flow of the lahars?

*River channels*

18. When you have finished editing your map, use the Share tool to send a link to your instructor.