

Lesson Title: Are we “Normal” in Eugene?

Lessons Summary: In this lesson, we will find cities in the United States of America that are similar in size to Eugene, Oregon and make comparisons in traits such as crime rate, burglary and area by using Box and Whisker Plots.

Lesson Objective: The students will be able to use the information tool and the query tool to obtain information about cities, and copy and paste the information into an Excel Document. The students will make comparisons regarding the populations by creating Box and Whisker Plots.

Before you begin using this module, you will need to know about using a Web-based GIS viewer. You can do this by watching the tutorial video or working through the tutorial. The tutorial video, student activity, and Web-based GIS Tutorial Viewer can be found at <http://gis.lanecc.edu> → “Modules” tab → “Tutorial” link. The activity works best with a high speed Internet connection.

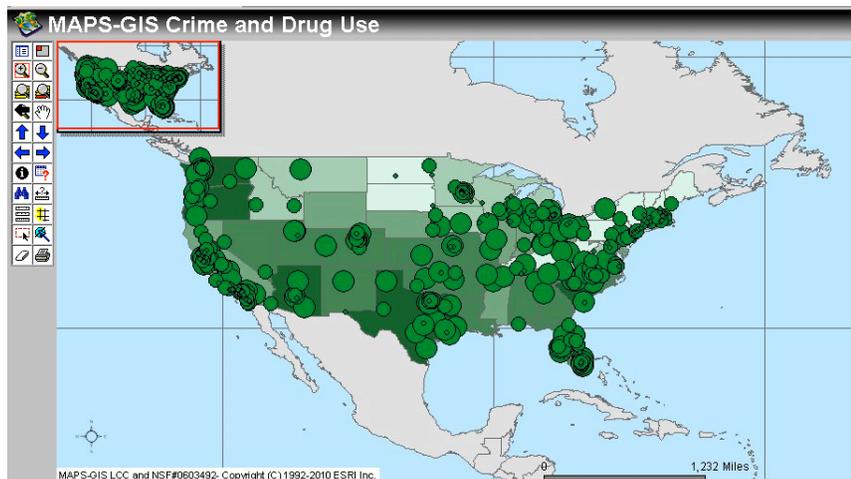
Prior Skills: You will need to know how to turn layers on and off, use the ID tool and, zoom in and out of the map, toggle from layers to the legend, and perform a search (Boolean) query.

Remember: Computer steps are indicated by a ► symbol and questions you need to answer are numbered.

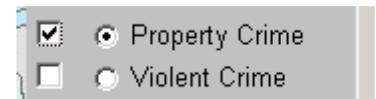
- Open the following page on your web-browser.

<http://arcgis.lanecc.edu/website/crime/viewer.htm>

Your screen should look like this.

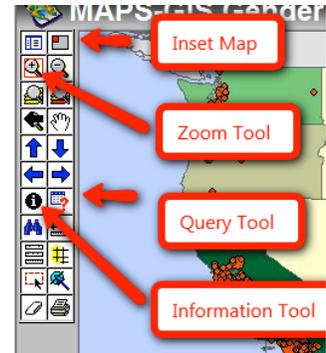


- ▶ Examine the data layers on the right of the map. The first two layers Property Crime and Violent Crime show the total number of crimes for the selected cities. The cities are represented by circles. The circle size is related to the crime value.

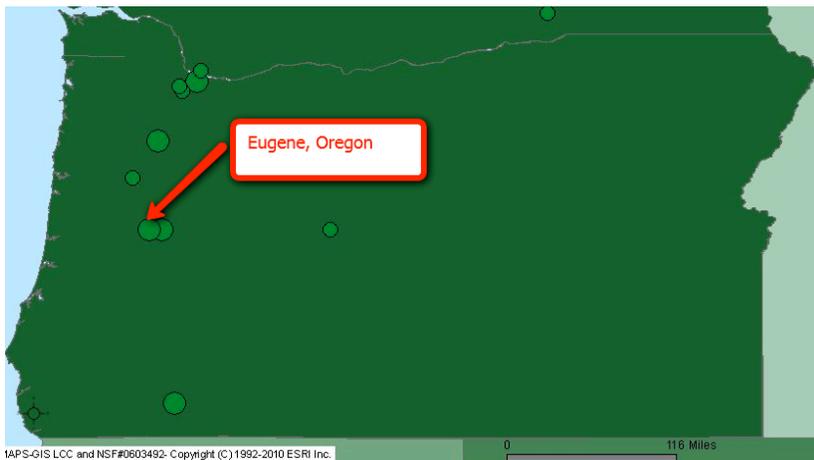


The other data shows state-level crime as a percent of the population for each state. These data are said to be normalized.

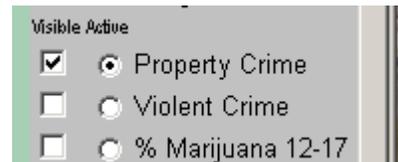
- ▶ Close the inset map by clicking on the map inset tool.
- ▶ Click on the Zoom tool and zoom into Oregon.



Tool Glossary



- ▶ We want to find some information about Eugene, Oregon.
- ▶ Make sure Property Crime is Visible and Active, Refresh the map.



- ▶ Click the Information Tool.  **Identify Tool**
- ▶ Put your cursor over Eugene and press enter. You should see information about Eugene and Springfield, Oregon in the data table at the bottom of the map.

Cities over 40k																		
Rec	FID	ObjectID	NAME	ST	STFIPS	PLACEFIP	HOUSEUNITS	POP2000	AREALAND	PLACEFIP_1	POP200F4	VIOL_CRM	MURDER_MAN	FORC_RAPE	ROBBERY	AG_ASSULT	TOT_PO_CRM	BURGLERY
1	97	3443	Springfield	OR	41	69600	21500	52864	14.401	69600	55760	195	0	10	36	149	4859	814
2	390	0	Eugene	OR	41	23850	61444	137893	40.518	23850	144526	328	5	54	119	150	9902	1603

Q1. What was the population of Eugene, OR in 2000? (POP2000) _____

Q2. What was the population of Springfield, OR in 2000? (POP2000) _____

Q3. Which city has a higher total crime rate (Tot_Crime)? Why do you think that is? Hint: you may need to arrow to the right to see the column for Total Crime.

One reason Eugene has a higher number of crimes than Springfield may be because Eugene has a larger population. Let's compare Eugene to other cities in the USA with comparable populations. There are no cities with the exact population as Eugene, so you will look for cities in a similar range.

- ▶ Round the population of Eugene up to the nearest 10,000 and down to the nearest 10,000 and that will be the range of population similar to Eugene.

Q4. Population range _____ to _____

Hint: If the population was 174,542 it would round up to 180,000 and down to 170,000 so the range would be 170,000 to 180,000.

- ▶ Now we will use the Query tool to find cities in the United States of America that are within the range we found in #5.

- ▶ Click on the Query Tool 



We want to find cities that have a population greater than 130,000 but less than 140,000. The query should look like this when you are done.

POP2000 < 140000 AND POP2000 > 130000

- ▶ Select from the Field pull-down menu "POP2000"
- ▶ Select from the Operator pull-down menu "<"
- ▶ Type in 140000 into the Value Field
- ▶ Press "Add to Query String"
- ▶ Press "And" button
- ▶ Select from the Field pull-down menu "POP2000"
- ▶ Select from the Operator pull-down menu ">"
- ▶ Type in 130000 into the Value field.
- ▶ Press "Add to Query String"

- ▶ Press “Execute”

Now you should see cities highlighted that meet our criteria. You may need to use the Zoom tool to zoom out to see the entire country (Use the “Zoom to active Layer” button).

Q5. How many cities are similar in size to Eugene based on our criteria? _____

Q6. Which city is closest to Eugene? _____ What is the distance in miles? Hint: You may remember how to use the “measure” tool.

Q7. Which city is farthest away from Eugene? _____ What is the distance in miles?

Now we want to be able to look at the data we found from our query.

Rec	FID	ObjectID	NAME	ST	STFIPS	PLACEFIP	HOUSEUNITS	POP2000	AREALAND	PLACEFIP_1	POP200F4	VIOL_CRM	MURDER_MAN	FORC_RAPE	ROBBERY	AG_ASSULT	TOT_PO_CRM	BL
1	53	2870	Sunnyvale	CA	06	77000	53753	131760	21.936	77000	128862	232	3	27	73	129	2861	49
2	83	3233	Pasadena	CA	06	56000	54132	133936	23.097	56000	145025	803	6	23	285	489	4389	78
3	96	3439	Salem	OR	41	64900	53817	136924	45.732	64900	148009	706	3	53	134	516	9004	11

- ▶ Click, hold and highlight the data. Make sure you drag your mouse down to get all data.
- ▶ Select “copy” from the “edit” pulldown menu.
- ▶ Open your Excel Application. Put your cursor over the first cell.
- ▶ Select “paste” from the “Edit” pulldown menu.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Rec	FID	ObjectID	NAME	ST	STFIPS	PLACEFIP	HOUSEUNITS	POP2000	AREALAND	PLACEFIP_1	POP200F4	VIOL_CRM	MURDER_MAN	FORC_RAP E	
2		1	53	2870	Sunnyvale	CA	6	77000	53753	131760	21.936	77000	128862	232	3	27
3		2	83	3233	Pasadena	CA	6	56000	54132	133936	23.097	56000	145025	803	6	23
4		3	96	3439	Salem	OR	41	64900	53817	136924	45.732	64900	148009	706	3	53
5		4	249	14270	Hollywood	FL	12	32000	68426	139357	27.34	32000	147798	773	6	60
6		5	251	14284	Pembroke Pines	FL	12	55775	55296	137427	33.054	55775	153492	353	6	25
7		6	353	24034	Bridgeport	CT	9	8000	54367	139529	15.999	8000	140177	4	0	0
8		7	390	0	Eugene	OR	41	23850	61444	137893	40.518	23850	144526	328	5	54
9		Zoom to these records.														
10																

We will ignore most of the columns. What we are interested in looking at is:

- AREALAND: This is the area (in square miles) of the city of interest.
- Tot_Crime: This is the total number of crimes reported in the city.
- Burglery: Is unlawful entry into a structure. (Typically, burglary is taking something from an unoccupied building/home as opposed to robbery which taking something in the presence of the victim.)

Note: If you find another trait more interesting, you may use the data from that trait. There are lots to choose from...violent crime, murder, rape, arson, etc.

For each trait, we are going to create a Box and Whisker plot.

Q8. Area: List the areas of each city in ascending order (smallest to largest). Circle Eugene.

Find the 5 number summary:

Min _____

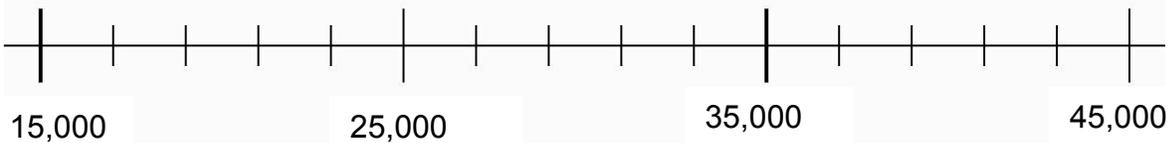
Q1 _____

Med _____

Q3 _____

Max _____

Create the box and whisker plot.



Put a ☆ where Eugene ranks in area. Do you think Eugene is the “normal” or an “outlier”?

Q9. Total Crime: List the total crime of each city in ascending order. Circle Eugene.

Find the 5 number summary:

Min _____

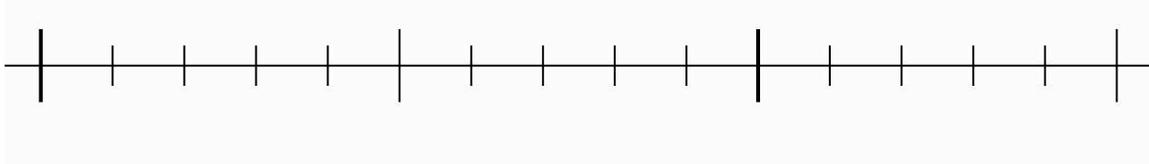
Q1 _____

Med _____

Q3 _____

Max _____

Create the box and whisker plot.



Put a ☆ where Eugene ranks in Total Crime. Do you think Eugene is the “normal” or an “outlier”?

Q10. Burglary: List the burglary of each city in ascending order. Circle Eugene.

Find the 5 number summary:

Min _____

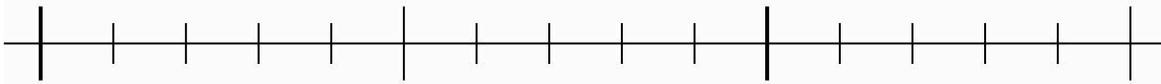
Q1 _____

Med _____

Q3 _____

Max _____

Create the box and whisker plot.



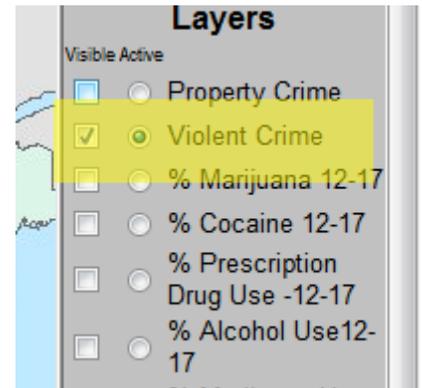
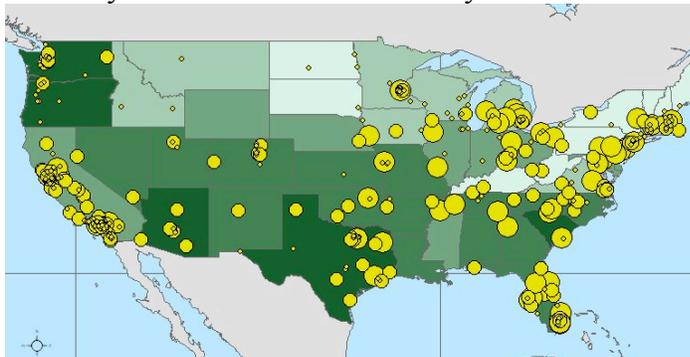
Put a ☆ where Eugene ranks in burglary. Do you think Eugene is the “normal” or an “outlier”?

Q11. In general, do you think that Eugene is similar or different from cities of comparable size in the United States? Why?

Now, let’s look at the United States in general. Go back to the “Maps-GIS Crime and Drug Use” website. If you have lost it, it is <http://arcgis.lanec.edu/website/crime/>

- ▶ Make “Violent Crime” visible and active.
- ▶ Refresh Map.

You may need to “zoom to active layer” to see the entire country.



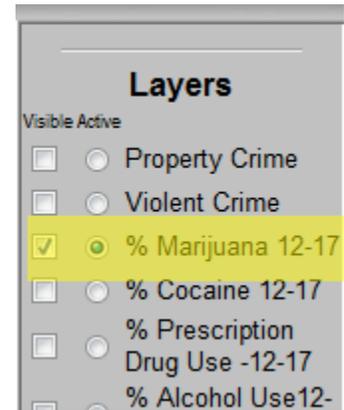
Q12: What regions of the United States have the highest violent crime rate? Which regions of the United States have the lowest violent crime rate? Describe the spatial pattern. Is it even, irregular, clustered, or linear? If it is clustered or linear where in the country is that occurring? Speculate on the reasons why you are seeing this pattern.

- ▶ Toggle back to “Layers” menu.
- ▶ Make %Marijuana 12-17 Visible and Active.

- ▶ Refresh Map

Q13: What regions of the United States have the highest usage of Marijuana ages 12-17? What regions of the United States have the lowest usage of Marijuana? Describe the spatial pattern. Is it even, irregular, clustered, or linear? If it is clustered or linear where in the country is that occurring? Speculate on the reasons why you are seeing this pattern.

Q14: If you have time, you may want to toggle other drugs or age groups. Do you find any other interesting statistics?



Career Extension:

- ▶ Go to the website <http://esri.com/industries.html>
- ▶ Find a career from the list that is of interest to you. For example: In the Natural Resources list, there is a link to forestry. In the forestry link, there are several job descriptions.
- ▶ List four ways GIS is used in the career you choose.
- ▶ Conduct an internet search to find information about salary ranges and possible job locations.



Name _____
Period _____

Follow-up Activity:

The following data was from the 21 most highly populated cities in the United States. Find the 5-number summary for Violent crime and create a box and whisker plot from it. Remember you will need to order the crime rate smallest to largest before you find the 5-number summary.

State	City	Population	Violent crime
New York	New York	8,345,075	580.3
California	Los Angeles	3,850,920	689.5
Illinois	Chicago	2,829,304	-
Texas	Houston	2,238,895	1,106.8
Arizona	Phoenix	1,585,838	659.9
Pennsylvania	Philadelphia	1,441,117	1,441.3
Nevada	Las Vegas	1,353,175	984.6
Texas	San Antonio	1,351,244	717.8
Texas	Dallas	1,276,214	894.8
California	San Diego	1,271,655	475.5
California	San Jose	945,197	385.4
Hawaii	Honolulu	906,349	284.1
Michigan	Detroit	905,783	1,924.1
Indiana	Indianapolis	808,329	1,204.3
Florida	Jacksonville	806,080	996.4
California	San Francisco [4]	798,144	995.3
North Carolina	Charlotte-Mecklenburg	758,769	931.8
Texas	Austin	753,535	522.2
Ohio	Columbus	751,887	774.2
Texas	Fort Worth	701,345	656.0
Tennessee	Memphis	672,046	1,925.0