THE GREAT NORTHWEST
PATTERNS of CLIMATE

INTRODUCTION: The world is a very diverse planet, and one of the reasons for that diversity is differences in climate, which is similar to weather, only over a long period of time. In the rainforests of Brazil we find a warm and wet climate. It the wilderness of northern Alaska, the climate is cold and dry. What causes these differences?

Discuss this first with a partner. Record your answers here. What are the major causes in the difference of climate? _____

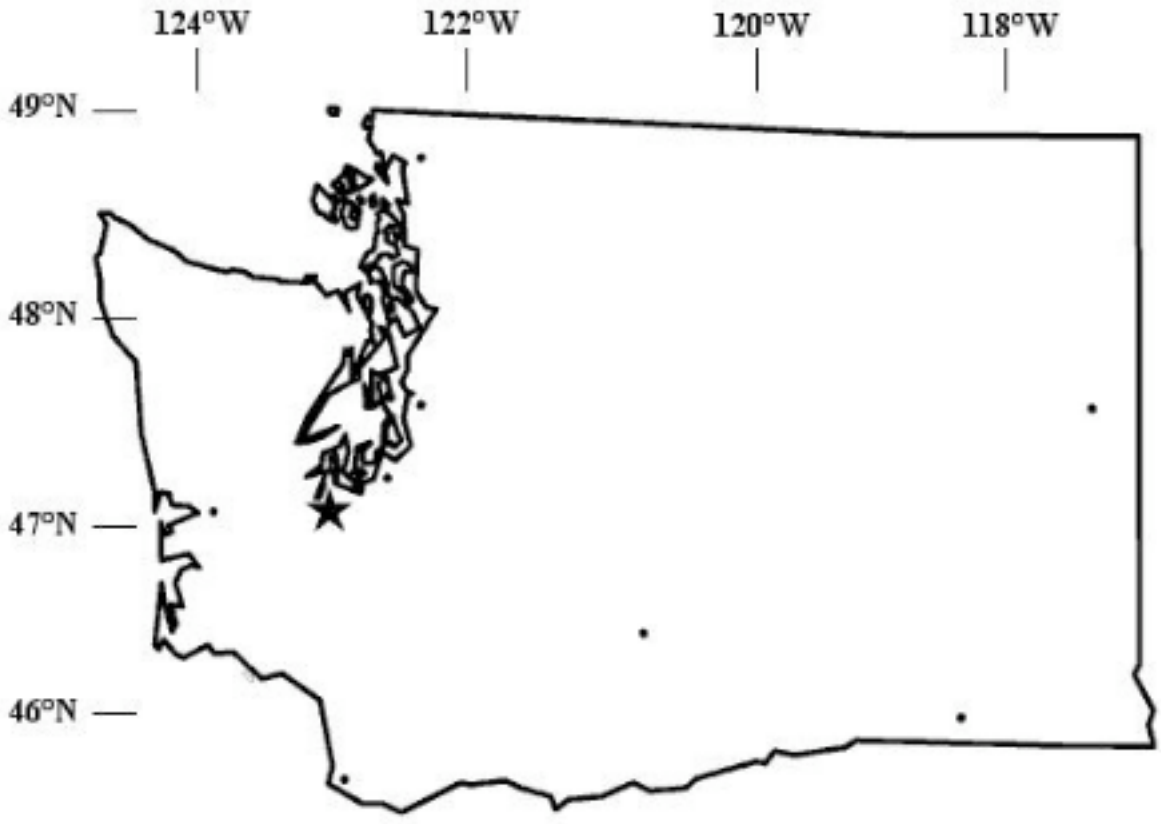
_____

_____

Share this information with the class as a whole.

PART I: *Making Climagraphs*

To interpret climate we need statistics, especially temperature and precipitation. Your teacher has given you data for six cities in the state of Washington. The latitude and longitude for each city are included on the chart. Use this information to plot the location of each city on the map below.



(1) Why do you think cities with nearly the same latitude were chosen? _____
_____
_____

(2) You will now be assigned one of the six cities, and you will construct a *climagraph*. It consists of two parts: a line graph of average monthly temperature (in Celsius degrees), and a bar graph of monthly precipitation (in millimeters of rainfall). There is one catch… the bar graph should start at "0" even though it is not at the bottom of the graph. It may seem strange to you, but there is a good reason for it.
Now plot your climagraph on the paper provided.

PART II: *Interpreting the Results*

To see patterns we need to analyze these statistics. First we need to determine the **means** and the **medians** for both graphs.

PRECIPITATION: What is the total *annual* precipitation for your city? _____ mm

(1) What is the *mean* monthly precipitation? _____

(You must divide the total by _____, and round your answer to the nearest tenth).

(2) What is the *median* monthly precipitation? _____

Show here how you calculated this answer:

Are you answers for (1) and (2) the same? _____ close? _____

TEMPERATURE:

(3) Now determine the *mean* monthly temperature of your city: _____

(4) And finally what is the *median* monthly temperature? _____

RANGE: Another useful statistic is the *range,* which is the difference between _____
_____

What is the range for monthly precipitation? _____ – _____ = _____

What is the range for monthly temperature? _____ – _____ = _____

If you have a small range for temperature, then the line graph is nearly flat. If the range is high, then the line graph is steep.

OTHER STATISTICS: At the bottom of the climagraph, it describes four important statistical measurements for climate: growing season, tree growth season, water surplus, and water deficit. Determine the length in months for these four measurements:

(5) growing season (months with temperatures above 3°C): _____

(6) tree growth (months with temperatures above 10°C): _____

(7) water surplus (months with precipitation greater than temperature): _____

(8) water deficit (months with precipitation less than temperature): _____

At this time, you will be assigned to a group of six students. Each student has graphed a different city. You need to share the results:

(9) What three cities have the highest median precipitation? _____

What three cities have the lowest median precipitation? _____

(10) Look again at your map of Washington. Use an atlas and locate the Olympic Mountains, the Cascade Mountains, the Pacific Ocean, Strait of Juan de Fuca, and Puget Sound.

Where do the "wet" cities tend to be located? _____

_____

_____

And the "dry" ones? _____

_____

_____

What do the mountain ranges appear to be doing to available moisture? _____

_____

Look at your climagraphs. How can you best describe the precipitation for these cities: *always wet, always dry, wet summers and dry winters, wet winters and dry summers*.

Tatoosh _____ Sequim _____

Everett _____ Silverton _____

Chelan _____ Spokane _____

Note that places with wet/dry seasons have a large range in their precipitation results.

(11) Now look at the temperature statisitics. Rank the six cities in terms of *mean* monthly temperature from lowest to greatest: _____

_____

Do you see any pattern here? _____

(12) Now compare results for the range in temperature. Rank the cities in order of smaller temperature range to largest: _____

_____

(13) Look again at the map. Do you see any pattern? Cities near water have a *marine climate,* which means the range in temperatures is _____. Those cities far from water have a *continental climate,* which means the range in temperatures is _____.

Which cities do you consider marine? _____

Which ones are continental? _____

(14) Finally, we need to compare results for growing season, tree growth season, water surplus, and water deficit. Rank the cities again from lowest to highest:
Length of growing season: _____
_____
Length of tree growing season: _____
_____
Months of water surplus: _____
_____
Months of water deficit: _____
_____

(15) Washington is famous for its evergreen forests, but they are not found all over the state. For lush forests to exist they need long tree growth season (5 months minimum) and long periods of water surplus. (7 months minimum).
Using your data, what cities are they most likely located near? _____

(16) Some regions of Washington are desert-like. They might not be excessively high in temperature (like in Arizona), but there are long periods of time with a water deficit. Chelan is a good example. How long is its water deficit period? _____ months.

WRAP UP: The location of Washington's mountain ranges and its important bodies of water have a significant effect on the climate of that state. Write three conclusion statements about Washington's climate. Include terms like *range, mean, water deficit, etc*. when it is appropriate.
1. _____
_____

2. _____
_____

3. _____
_____