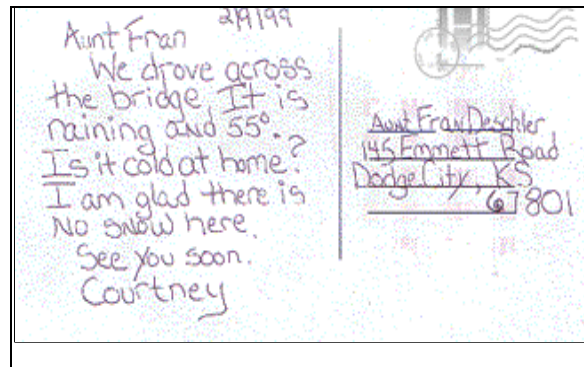


Center for Technology and Teacher Education

Climate, Latitude and Longitude



Curry School of Education
University of Virginia

Credits
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Climate, Latitude and Longitude

Description of Module

- **Discipline:** Elementary United States history or geography
- **Specific Lesson Topic:** How climate is effected by factors other than latitude and longitude
- **Methodology:** Critical thinking

K-12 Objectives:

1. Identify the mean temperatures and range of monthly mean temperatures for selected United States cities.
2. Describe the effect of the Pacific Ocean on the climate of western California.
3. Compare the climates of several places in the United States

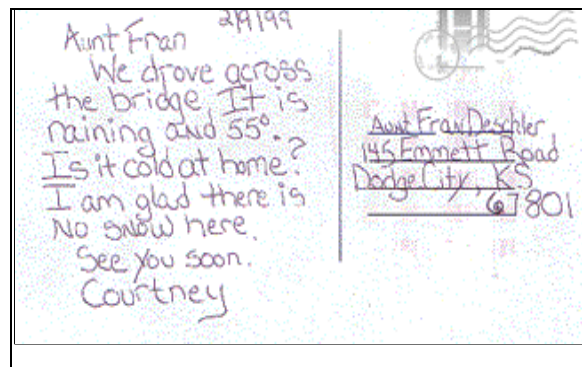
Materials Needed:

- Excel 97 or Claris Works
- Internet access to climate data

Procedures:

Step 1 Start this lesson with the presentation of a postcard from a fictitious student named Courtney.

On a recent trip to San Francisco, CA, Courtney, a 4th grade student, sent this postcard to her Aunt Fran in Dodge City, KS.



Step 2 Conduct a brief discussion about the postcard. Based on what Courtney wrote, what can students say about the weather in San Francisco? When did Courtney write this postcard? What might Courtney have written on the postcard if she had visited San Francisco in July?

Step 3 Students will use data about the temperature six cities to make comparisons about the climate in the different regions.

Data set 1	Data set 2
Helena, MT	Richmond, VA
Salt Lake City, UT	Dodge City, KS
Flagstaff, AZ	San Francisco, CA

Step 4 Have students look at a map of the United States that shows the six cities. Discuss the location of these cities relative to each other. You can create maps using the commercial sites MapQuest.com and MapBlast.com or the public site United States National Atlas. Ask students

some of the following questions. What similarities do they in terms of their location? What do you think the weather is like in these cities in January and July? How might each city's climate differ from one another?

Step 5 Arrange students into groups of three. Give them [data from one of the two data sets](#). The National Climatic Data Center has a vast amount of online weather data. Students will enter the data into a spreadsheet and make charts using the data. Directions for imputing the data are below. You might want to go to the following ftp (File Transfer Protocol) site to view the monthly average temperatures for other U.S. cities: **ftp://ftp.ncdc.noaa.gov/pub/data/ccd-data/nrmavg.dat**

Data Set 1

City	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Helena, MT	19.6	26.4	33.6	43.4	52.5	62.1	69.2	67.4	55.4	45.1	31.6	21.2
Salt Lake City, UT	27.9	34.1	41.8	49.7	58.8	69.1	77.9	75.6	65.2	53.2	40.8	29.7
Flagstaff, AZ	28.7	31.5	35.3	42.3	50.4	59.8	66.3	64.1	57.3	47.2	36.8	29.6

Data Set #2

City	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Richmond, VA	35.7	38.7	48	57.3	66	73.9	78	76.8	70	58.6	49.6	40.1
Dodge City, KS	29.8	35	43.5	54.7	64.2	74.4	80.3	78.2	69	57.5	43.2	32.5
San Francisco, CA	51.1	52.6	52.8	54.8	57.1	60.7	63.1	64	63.6	61	55.5	51.1

Directions for entering the data into an Excel spreadsheet.

- Open a copy of Microsoft Excel.
- Type city 1 in cell A2, city 2 in cell A3, and city 3 in cell A4.
- Enter the months in row 1 beginning with cell B1.

- Enter the data in the corresponding cell. For example The January temperature for Helena, MT should be entered in cell B2.
- This data can be copied from this web site. To do this, copy the above table. Open a copy of Microsoft Excel and paste the data into cell A1.

Directions for entering the data into a Claris spreadsheet.

- Open a Claris Works spreadsheet document.
- Type city 1 in cell A2, city 2 in cell A3, and city 3 in cell A4.
- Enter the months in row 1 beginning with cell B1.
- Enter the data in the corresponding cell. For example The January temperature for Helena, MT should be entered in cell B2.
- This data can be copied from this web site. To do this, copy the above table. Open a copy of Claris Works and paste the data into cell A1.

Step 6 Calculate the mean yearly temperature for each city as well as the range from the highest monthly average to the lowest average. *For each city*, have students [answer the following questions](#):

1. What month had the highest average temperature? Lowest?
2. Is this month the same for each city?
3. Is this what you expected?
4. What is the yearly average temperature?
5. Which measure of central tendency, mean or median would be best to use for reporting the average? Why? What season of the year has temperatures most similar to the yearly average?

How to calculate mean temperatures in Excel

- To calculate an average, click the cell where the average will be displayed.
- With the cell displayed, click the equal (=) sign just above the chart.
- Next click on the "Average" button on the pull down menu to the left of the equal button.
- A box will appear.
- Next to number 1 enter the range of cells for the percentages you want to average.
- For the first city either Helena or Richmond enter B2:B13.
- Click OK.
- Repeat the steps above for the other cities

How to calculate mean temperatures in Claris

- Highlight the numbers you wish to average as well an empty cell at the end of the row where a number can be displayed.
- Pull down the file menu, go to shortcuts and click display shortcuts.
- On the shortcuts menu click the sum button Σ . The sum of the temperatures you selected will appear in the empty cell at the end of the row.
- Look at the formula by clicking on the cell with the total. You can type in the formula exactly as it appears.
- In the cell next to the total cell enter the formula for calculating the average. This formula for the first city will read $=N2/12$.
- Repeat the steps for the other two cities.

Repeat the steps above for the other cities

Step 7 Create a line graph containing the monthly averages for all three cities. Describe the similarities and differences between the graph for each city.

How to make a line graph in Excel

- Highlight all the cells with information on the spreadsheet.
- Click the chart button on the tool bar or pull down the insert menu and click chart
- A box will appear allowing you to choose the type of chart.
- Select line and click next.
- The next screen is a verification of the data to be charted. Click next.
- Label the chart and axis. The x-axis is temperature. The y-axis is the city. Click next.
- The last box is a confirmation, click finished.

How to make a line graph in Claris

- Highlight all the cells with information on the spreadsheet.
- Click on the Insert pull down menu.
- A box will appear allowing you to format the chart.

Step 8 Ask students to compare the three lines on the graphs and look for anything unusual. Students should discover that latitude and longitude do not effect temperature the way they may have thought it would.

Step 9 Introduce the idea that things other than latitude (or distance from the equator) can effect temperature. The two effects in this lesson are altitude and the Pacific Ocean.

Step 10 Have students get the monthly temperatures for the city they live in. Graph this data and compare it to the data that has already been graphed.

Assessment

K-12:

- Have students draw a picture and write a letter on a “postcard” that describes the weather in one of the cities in the data sets. Students should be sure to date their postcard to reflect the month and year.
- Create chart temperature data from other cities (found on the ftp site listed above).
- Ask students to share their chart with the class and explain what the lines on the chart mean. Write a paragraph that describes their chart.

Have students pack a suitcase for a trip to San Francisco. Tell students what month it is so that their clothes reflect the climate for that time of year. Compare student responses. They should be similar. This will reinforce the idea that San Francisco's climate does not change much during the year.

Methods:

- Using the data sets from either [The Weather Channel](#) or [The NOAA Weather Page](#), develop a geography lesson in which students use spreadsheets to manipulate and interpret data.

Related Resources:

- [The Weather Channel](#)
- [The NOAA Weather Page](#)