

Name: \_\_\_\_\_

Period: \_\_\_\_\_

## Climate Factor: Coastal Influence on Temperature

**Purpose:** To determine the relationship between the nearness of a city to a large body of water, annual average temperature, and annual temperature range.

**Background:** San Francisco has a latitude of  $38^{\circ}\text{N}$ , and is located on the Pacific coast of California. St. Louis and Cincinnati have about the same latitude and elevation, but they are far from the ocean. All three cities are in the belt of prevailing southwesterlies. A study of their monthly average temperatures reveals, however, a striking difference between San Francisco and the other two cities. In this exercise, we will plot the temperature curves of San Francisco (representing a "coastal" climate) and St. Louis and Cincinnati (representing a "inland" climate). Then, we will study them to see what differences are produced by the nearness of San Francisco to the Pacific Ocean.

**Materials:** Colored pencils, graph, map of the United States.

### Predictions:

- 1) Plot the latitude and longitude coordinates for each city below on the world map provided.
  - a. San Francisco:  $38^{\circ}\text{N}$ ,  $122^{\circ}\text{W}$
  - b. St. Louis:  $39^{\circ}\text{N}$ ,  $90^{\circ}\text{W}$
  - c. Cincinnati:  $39^{\circ}\text{N}$ ,  $85^{\circ}\text{W}$
- 2) Based on the locations of the three cities above, predict which city will have the greatest annual average temperature.
- 3) Based on the locations of the three cities above, predict which city will have the greatest annual temperature range.

**Procedure:** Use the data table and graph on the next page to complete the following steps.

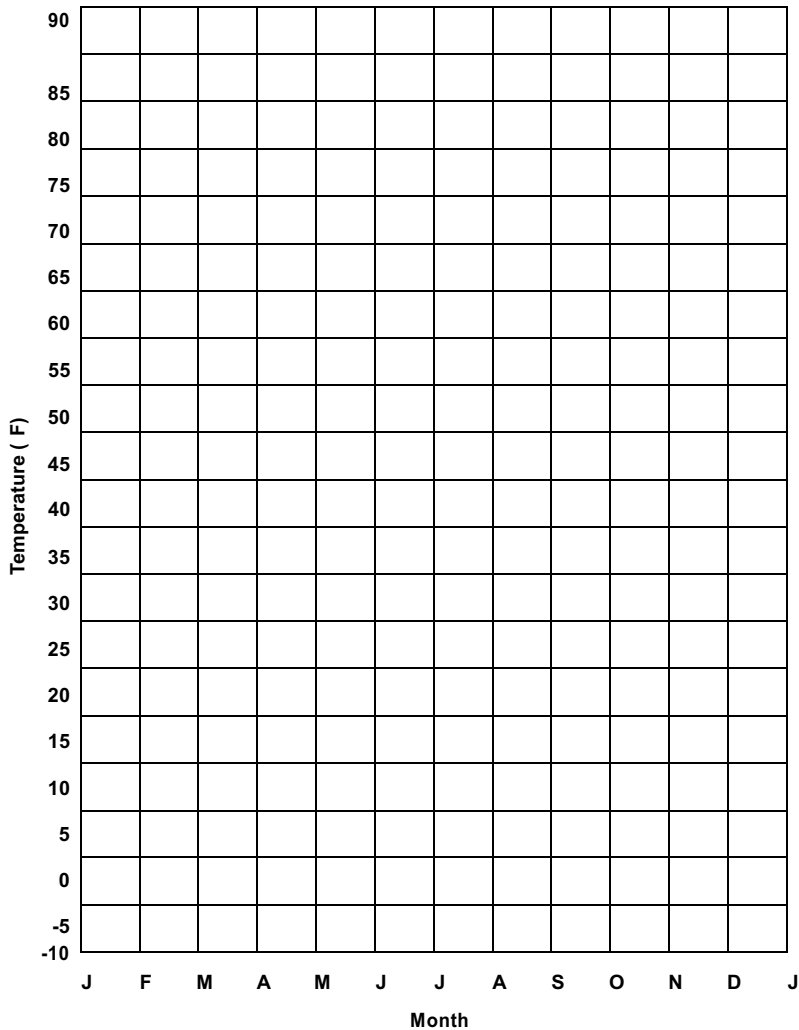
- 1) Calculate the annual average temperature for each city. Record the Annual Average for each city in the space on the data table.
- 2) State the annual temperature range by determining the warmest temperature and the coldest temperature for each city. Record the Annual Range for each city in the last line of the table.
- 3) At the top of the graph paper, create a title for the graph.
- 4) Plot the temperatures for San Francisco using a colored pencil. Connect the thirteen points with a smooth curve. Label the curve using the key. Repeat this procedure for St. Louis and Cincinnati.
- 5) Answer the discussion questions.

**Data Table:**

| <b>Average Monthly Temperatures (Degrees Fahrenheit)</b> |                      |                  |                   |
|--|----------------------|------------------|-------------------|
| City   | <i>San Francisco</i> | <i>St. Louis</i> | <i>Cincinnati</i> |
| Latitude   | 38°N, 122.5°W        | 39°N, 90°W       | 39°N, 85°W        |
| January  | 50                   | 33               | 35                |
| February   | 53                   | 37               | 36                |
| March  | 55                   | 45               | 44                |
| April  | 56                   | 56               | 55                |
| May  | 57                   | 66               | 65                |
| June   | 59                   | 76               | 74                |
| July   | 59                   | 81               | 78                |
| August   | 59                   | 79               | 76                |
| September  | 62                   | 71               | 70                |
| October  | 61                   | 61               | 59                |
| November   | 57                   | 46               | 46                |
| December   | 52                   | 36               | 37                |
| January  | 50                   | 33               | 35                |
| Annual Average   |                      |                  |                   |
| Annual Range   |                      |                  |                   |

**Graph:**

**TITLE:** \_\_\_\_\_



| <b>KEY</b>           |               |
|----------------------|---------------|
| <input type="text"/> | San Francisco |
| <input type="text"/> | St. Louis     |
| <input type="text"/> | Cincinnati    |

**Discussion Questions:**

- 1) How does your prediction for the city with the greatest average annual temperature compare to the data?
- 2) State the relationship shown by the table between nearness to the ocean and average annual temperature.
- 3) How can you explain the similarity of the average annual temperature?
- 4) How does your prediction for the city with the greatest annual temperature range compare to the data?
- 5) State the relationship shown by the table between nearness to the ocean and average temperature range.

- 6) Summarize the differences between the coastal climate of San Francisco and the inland climate of the other cities with respect to:

|                     | Coastal City<br>(San Francisco) | Inland Cities<br>(St. Louis & Cincinnati) |
|---------------------|---------------------------------|---|
| Temperature Range   |                                 |   |
| Summer Temperatures |                                 |   |
| Winter Temperatures |                                 |   |

- 7) All three cities are in the prevailing southwesterlies, have similar latitudes, and similar elevations. What explains the differences in their temperatures?

- 8) a. Which is the warmest month in San Francisco? \_\_\_\_\_
- b. Which is the warmest month in St. Louis & Cincinnati? \_\_\_\_\_
- c. Why is the warmest month in San Francisco later?

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