

Do You Have a Good Latitude?

Application

Challenge: How do rainfall and average temperature data compare for a number of cities around the world?

Materials: Source of climatic information on various cities. These might include Internet access and/or textbooks with current information.

Let's Dig In:

Make a data table that includes a column for latitude and longitude, average rainfall, average temperature and elevation. After your table has been constructed, find the following information for each of the cities listed: Rio de Janeiro, Brazil
Quito, Ecuador
Chicago, Illinois
Helsinki, Finland
Barrow, Alaska

Go Figure:

1. Looking at your data table, describe any patterns or observations noted with temperature when compared to the latitude. Explain any data that doesn't fit the pattern. Do the same for longitude.
2. Explain how factors other than latitude might affect average temperature.
3. Explain any patterns seen with the given information about average rainfall. (in relation to latitude, trade-winds, elevation, etc.)
4. What effect does living in a coastal region seem to have on temperature and rainfall?

Teacher Notes
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GEOMES Topic: Meteorology - Climate

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|-------------------------|--------------------------|----------------------|------------------|-----------|
| Lab setup: | none | <u>easy</u> | moderate | difficult |
| Reasoning level: | easy | <u>moderate</u> | difficult | |
| Time required: | <u>20-40 minutes</u> | 40-60 minutes | 60-90 minutes | |
| Process skills: | <u>classifying</u> | <u>communicating</u> | <u>comparing</u> | |
| | <u>interpreting data</u> | | | |

Objectives: Students will better understand the effects of latitude on average temperature and rainfall totals as well as other intervening factors.

National Science Education Standards: Structure of the earth system, unifying concepts of evidence, models, and explanation.

Materials: A current textbook might have the information, but Internet access would really aid the collection of information.

Teaching Strategies:

It is recommended that you have at least 2 students or less for each computer. Depending on student abilities and/or computer speed, it may take more than 40 minutes. If necessary, you may need to remember to reserve the computer lab ahead of time.

Sample Data and Observations:

| City | Lat. And Long. | Ave. rainfall (mm) | Ave. temp. (°C) | Elevation (meters above sea level) |
|------------------------|------------------------|--------------------|-----------------|------------------------------------|
| Barrow, Alaska | 71.30° N and 156.69° W | 109.9 | -12.4° | 13 |
| Chicago, Illinois | 41.73° N and 87.76° W | 923.6 | 10.2° | 189 |
| Helsinki, Finland | 60.32° N and 24.90° E | 635.4 | 4.5° | 51 |
| Quito, Ecuador | 00.22° S and 78.50° W | 1172.3 | 13.5° | 2811 |
| Rio de Janeiro, Brazil | 22.92° S and 43.10° W | 1101.1 | 23.3° | 3 |

Sample Responses to Go Figure:

1. Generally, the higher the latitude, the lower the temperature. Quito has a lower average temperature than one might predict from its latitude. There doesn't seem to be any pattern resulting from different longitudes with temperature.

2. Quito has a high elevation, so that may have something to do with its lower temperature than expected. Helsinki is near an ocean, and that makes the climate warmer than normal for similar latitudes not near an ocean.
3. Generally, the closer to the equator, the higher the rainfall. There doesn't seem to be any relationship between elevation and rainfall from the data given in the table.
4. Cities near the coastal regions tend to have higher rainfall and tend to have higher average temperatures.

Internet Connection:

Suggested keywords to find sites with related information: climate, climatic regions, and climatology.