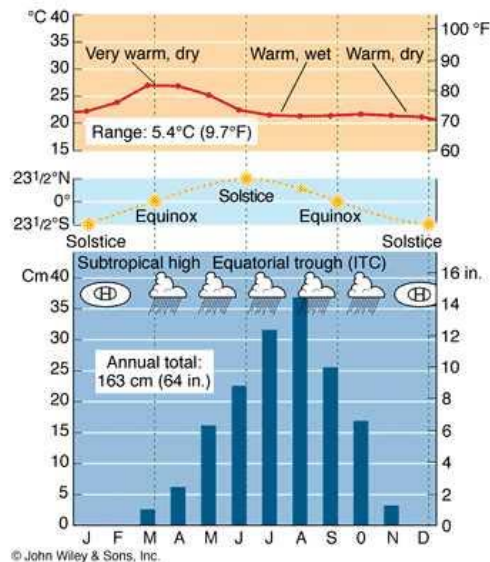


Climographs: Temperature, Precipitation, and the Human Condition

Subject Area: Physics, Physical Science, Social Study, Geography, Mathematics
Associated Unit: None
Associated Lesson: None
Activity Title: Read, analyze, and construct Climographs



Group Size: 2-4
Expendable Cost per Group: US\$0.00
Grade Level: 6-10
Time required: 4 to 6 hours

Summary:

Climographs are a graphic way of displaying climate information; specifically, average temperature and precipitation. They are a valuable tool in studying climate, but also can be used to infer connections between climate and human conditions. In this lesson, students learn about how to read, analyze, and construct climographs. They also practice matching climographs to locations in the United States and in [Africa](#), and discerning climate patterns and making some predictions about their effects on humans in different places in Africa.

Connections to the National Geography Standards:

Standard 7: "The Physical Processes That Shape the Patterns of Earth's Surface"
 Standard 15: "How Physical Systems Affect Human Systems"

NYS MATH STANDARDS

6.S.4 Determine and justify the most appropriate graph to display a given set of data (pictograph, bar graph, line graph, histogram, or circle graph).
 6.S.7 Read and interpret graphs

Keywords:

Climographs, Temperature, Precipitation, Human Condition, Bar Graph, Map,

Materials Required:

- Computer with Internet access
- [Map of World](#)
- [Map of Africa](#)
- Pencils, pens, markers
- Computer spreadsheet and/or graphing program (optional)
- [Climograph of Minneapolis, Minnesota](#) (PDF, [Adobe Reader](#) required)
- [What Can You Say About the Climate of These Cities?](#) (PDF)
- [Climographs of Places in Africa: Group Assignments](#) (PDF)
- [Creating a Climograph in Excel](#) (PDF)
- [Standardized Climograph Template](#) (PDF)
- [Climographs: Key Vocabulary](#) (PDF)
- [Climograph Questions](#) (PDF)
- [Kvppen Climate Classification System](#) (PDF)

Objectives:

Students will

- learn how to read and understand a climograph;
- learn how to construct a climograph;
- construct climographs for places in the United States and Africa;
- associate climographs with places in the United States;
- associate climographs with places in Africa; and
- detect patterns between climate patterns and human conditions in certain locations in Africa.

Geographic Skills:

Acquiring Geographic Information

Organizing Geographic Information

Answering Geographic Questions

Analyzing Geographic Information

Suggested Procedure

Guiding Question: What can temperature and precipitation information tell us about the way people live in different locations?

Review with students the difference between weather and climate. Explain that weather is the state of the atmosphere, at any given moment in time, with regard to temperature, atmospheric pressure, wind, humidity, precipitation, and cloudiness, while climate is the average of weather conditions for a given location over a period of time. Ask students how their lives are affected by the climate of the place where they live. What specific things are strongly influenced by the climate? Answers should include things such as the clothing they wear, the vegetation and animal life of the area, recreation opportunities, etc.

Development:

Distribute to students a copy of the climograph for [Minneapolis](#) (PDF, [Adobe Reader](#) required). (Note to Teacher: students should examine the climograph without the data tables below it to help them make sense of the visual format of the graph. If this is too confusing for students, feel free to have them examine the data tables provided.) Explain that they are looking at a *climograph*. Climographs were developed to make it easier to characterize the climate of specific places. A climograph graphically depicts two different sets of information: average temperature and average precipitation data for a location. The precipitation information is shown as a bar for each month, and the temperature information is shown as a line connecting twelve points (one for each month). Have students identify the scale used on each axis of the climograph. Then ask them to interpret the graph.

- What is the warmest month of the year in Minneapolis? (Answer: July)
- What is the wettest month of the year in Minneapolis? (Answer: June)
- What does the temperature chart tell you about the growing season in Minneapolis? (Answer: It is limited primarily to May through September because average temperatures drop below freezing from November through March, and there could still be frost in April and October.)
- Is it as long as where you live? (Answers will vary)
- Does it start and end at the same time as where you live? (Answers will vary)
- In which months is the average temperature in Minneapolis below freezing? (Answer: November through April)
- Do you think that Minneapolis gets many blizzards with more than ten inches of snow at one time? (Answer: not likely)
- Which do you think sells better in Minneapolis—long underwear or bathing suits? (Answer: long underwear)

After the students have familiarized themselves with how to read the climograph of Minneapolis, divide the class into groups. Give each group one of the unnamed U.S. cities climographs along with the worksheet titled [What Can You Say About the Climate of These Cities?](#) (PDF). Have students answer the questions based on the climograph assigned to their group, including trying to guess the city, or general location, the climograph is based on. When each group has finished, have the groups report on their findings and their hypothesis of which city the climograph represents. Use labels on a map to keep track of student guesses about the cities. Encourage discussion and critique of student conclusions. When each group has made its presentation, reveal the identity of the actual cities.

Next, ask students to hypothesize what the climograph of where they live would look like. (Note to Teacher: if your class is in Minneapolis or one of the other cities for which climographs are provided, you may want to use a different climograph to start the lesson, or ask students to speculate on the climograph of another city.) Have the same five groups attempt to sketch such a climograph without finding actual data. Emphasize that they should think about the shape of the temperature and precipitation curves, and how they should reflect weather patterns. It will probably be more difficult for them to guess the absolute numbers for precipitation and temperature, but they should make their best guess or estimate. Have the groups examine and compare results.

Ask students what data they would need to make an actual climograph of where they live (or another place.) Where do they think they could find this data? Explain that they can find it at the [World Climate](#) website. Have students use this site to create their own climographs and an accompanying chart of data for the community where they live. (They can do this in either Fahrenheit or Celsius, and either inches or metric units.) Students can construct the climographs by hand, with or without the aid of graph paper, or they can use a program such as Excel to prepare the graph. (See [Creating a Climograph in Excel](#) [PDF]), for instructions for preparing a climograph using Excel). When students have completed the climograph, discuss how the data reflects the lifestyle, clothing, recreation, etc. in their community.

Now that students know how to gather data for a climograph and how to construct climographs for places in the United States, ask them what they already know about the climate of different places in Africa. Use a map of [Africa](#) or of the [World](#) to identify places students name. Then explain that they will be creating climographs for places in Africa so the class as a whole can get more information about the climate of Africa. Again working with five groups, distribute copies of [Climographs of Places in Africa](#) (PDF) to each group. (Note to Teacher: feel free to shorten or

alter the assignment lists in any way you see fit. This list is designed to provide information about the major climate areas, but the assignment can be completed with a shorter list.) The groups should work cooperatively to complete a climograph and answer questions about the location.

When the students have finished their climographs, have them locate the places assigned to them on a wall map of Africa or the world and describe the climate to the class. When all of the locations have been placed on the map, ask the students if they see any patterns in the arrangement of the points on the map. What *biomes* do they think they might find in the places indicated on the map? What other comments or ideas does the map generate for them?

Climographs are used to classify climate around the world. Share with students the [Kvppen Climate Classification \(PDF\)](#), which classifies climates based on the annual and monthly averages of temperature and precipitation into five categories: Tropical Moist (A), Dry (B), Moist Mid-latitude with Mild Winters (C), Moist Mid-latitude with Cold Winters (D), and Polar. Within each category, there are additional sub-categories, although this lesson is mostly concerned with sub-categories of Tropical Moist (A) and Dry (B). Thus some Tropical Moist climates are very wet (tropical rain forest—Af), while others have dry seasons (tropical savanna—Aw). Ask students to use the data they have gathered about African places to identify the climate type of each place.

Conduct a class discussion on the following topics:

What would you pack if they were visiting different parts of Africa? Would it be easier to pack if they were going from east to west (or vice versa) or if they were going from north to south (or vice versa)? Why? (Students should consider the predominant climates when answering. East/west travel would have less change in climate, while north/south could potentially have more changes.)

Remind students that food shortages and drought have often been problems in Africa. While there are many reasons for famine that are not related to climate, how do the climographs help explain what areas of Africa might be prone to drought, which in turn could threaten food supplies? Explain why famine is such a frequent threat in Africa, especially north of the equator. (Students should address the predominant desert climate of the north of Africa, and accompanying shortage of rain, when answering.)

Draw students' attention to the climographs of locations in southern Africa. Point out that these locations are in the Southern hemisphere, and ask students how these climographs are different from the climographs of locations in the United States or anywhere in the northern hemisphere. (Students should understand that seasons, and therefore weather patterns, apply to different months of the year in the two hemispheres, and therefore the climographs for the locations in the two hemispheres might depict opposite seasonal patterns.)

Internet Related Links:

[Content Guide: Contemporary Issues of Africa](#)

[Content Guide: Geographic Perspective](#)

[Content Guide: Physical Geography of Africa](#)

[Essay: Earth as a Natural/Physical Environmental System](#)

[National Geographic News: South African Desert Becomes Global Warming Lab](#)

[National Geographic: Interactive Map of Africa](#)

[Weatherbase: Temperature and Precipitation Information](#)

[World Climate](#)