

HOW DO WE DESCRIBE CLIMATE?

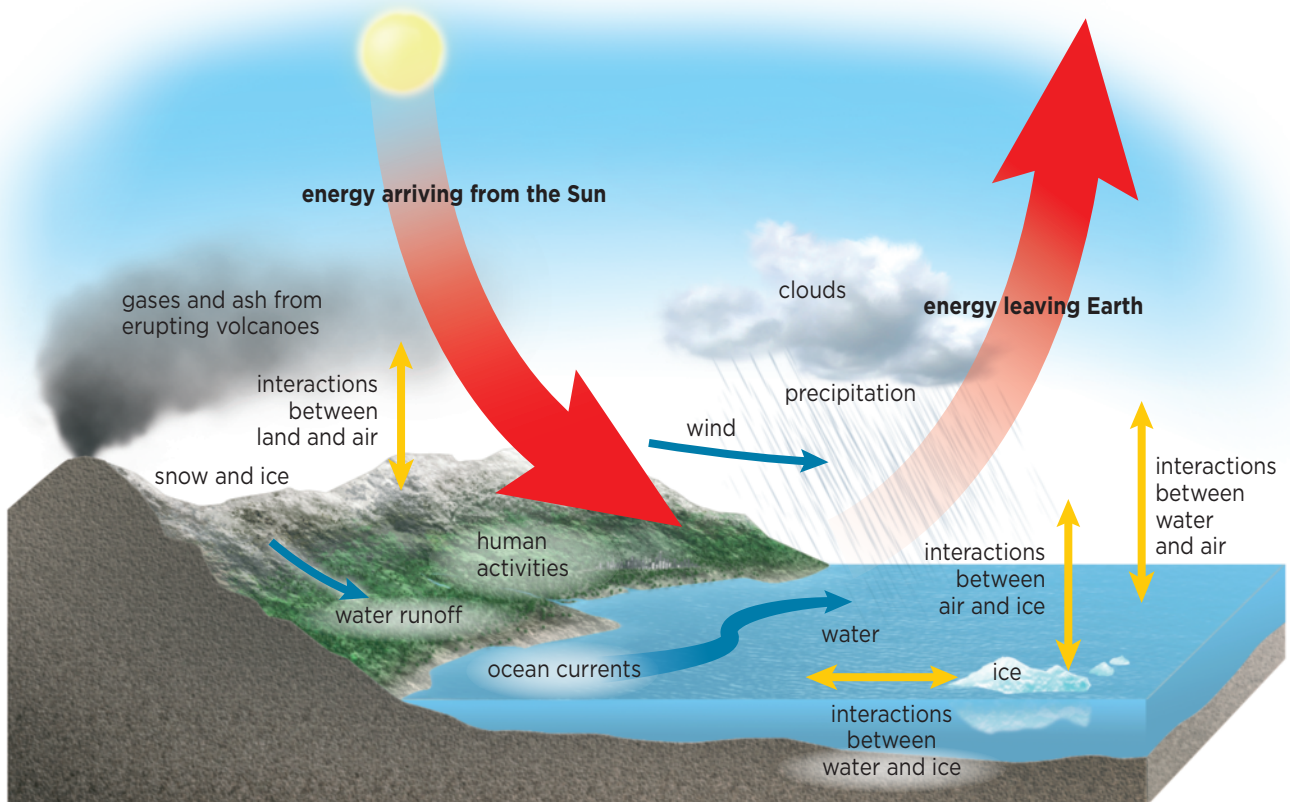
To describe climate, geographers start by gathering data about weather. Meteorologists, the scientists who study weather, supply the data by measuring weather conditions like those in the table below:

Temperature	Precipitation	Wind Conditions
<ul style="list-style-type: none"> • maximum (highest) daily temperature • minimum (lowest) daily temperature 	<ul style="list-style-type: none"> • amount of moisture in the air (relative humidity) • amount of precipitation • type of precipitation • cloud cover (amount and type of clouds) 	<ul style="list-style-type: none"> • wind speed • wind direction

The climate on Earth works as a system. The global climate system, shown in **Figure 2.8**, is made up of five parts: Earth's surface, the atmosphere, all the water on Earth, all the ice on Earth, and all life on Earth. With energy from the Sun, these parts interact in several ways to produce the climates of different places. Geographers group together places with similar climates into **climate regions**.

climate regions areas of Earth identified as having similar climate characteristics

FIGURE 2.8 This diagram shows the global climate system. The Sun's energy powers the climate on Earth.

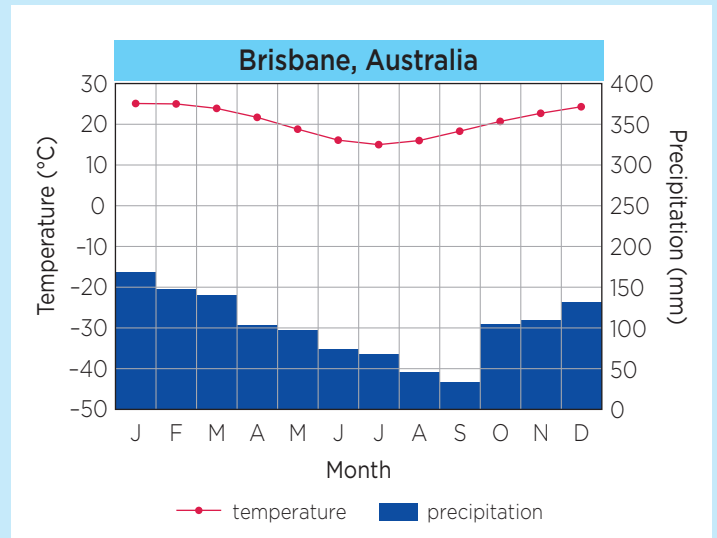


READING

CLIMATE GRAPHS

Climate graphs combine bar and line graphs to show both average monthly temperatures and average monthly precipitation amounts for a place. Geographers use climate graphs to show and analyze climate data. When you read a climate graph, you analyze the data. Look at the climate graph in **Figure 2.9**. The average monthly temperature is shown by the line graph. The average monthly precipitation is shown by the bar graph.

FIGURE 2.9 Climate graph for Brisbane, Australia



Climate Data for Brisbane, Australia

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average monthly temperature (°C)	25.1	25.0	23.9	21.7	18.8	16.1	15.0	16.0	18.3	20.7	22.7	24.3
Average monthly precipitation (mm)	169	148	140	104	97	74	68	46	33	105	110	132

FIGURE 2.10 Climate data for Brisbane, Australia

HOW TO READ A CLIMATE GRAPH

Determine the average annual temperature. Using the data in **Figure 2.10**, add up the monthly temperatures. Divide by 12.

STEP 1

Determine the precipitation pattern by looking at when most of the city's precipitation occurs. Most places in the world match one of these three patterns:

- winter maximum—most precipitation occurs in the coldest months of the year
- summer maximum—most precipitation occurs in the warmest months of the year
- evenly distributed—each month has about the same amount of precipitation

As you can see, you need to look at both temperature and precipitation to figure out the precipitation pattern.

STEP 4

Determine the temperature range. This is the number of degrees from the highest monthly temperature to the lowest. Subtract the lowest monthly temperature from the highest monthly temperature.

STEP 2

Determine the total annual precipitation. This is calculated by adding up the monthly precipitation totals.

STEP 3

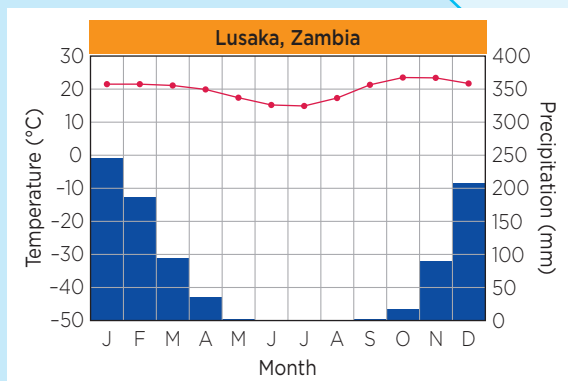
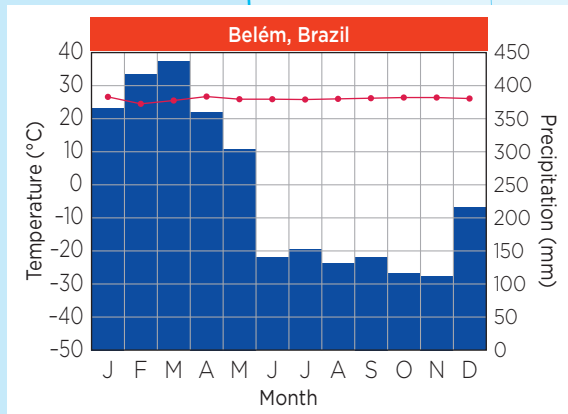
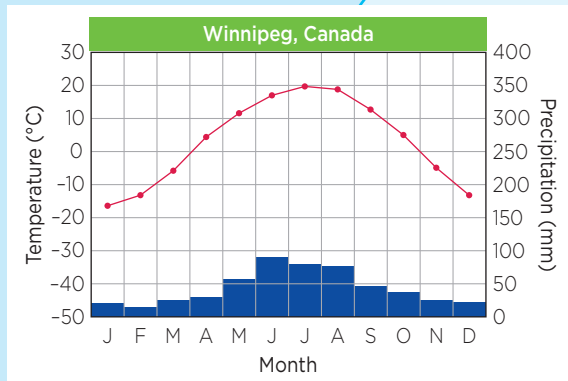
GLOBAL CLIMATE PATTERNS

Climate regions are found in different parts of the world. Geographers group them into nine overall climate regions as seen here in Figure 2.11.

FIGURE 2.11 This map shows climate regions around the world and climate graphs for each region. Which climate region is the least like the climate from where you live? Why do you think it is so different?

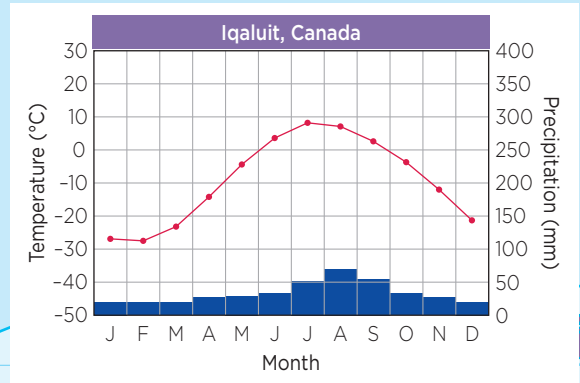
Climate Graphs

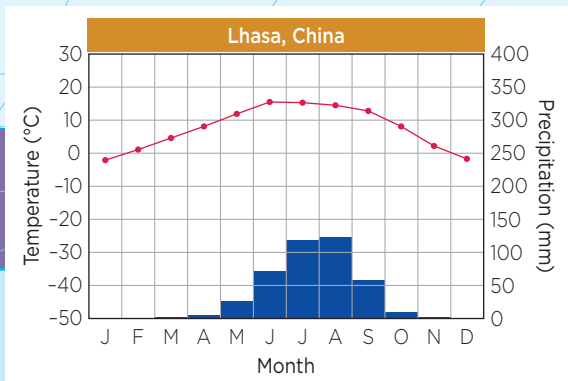
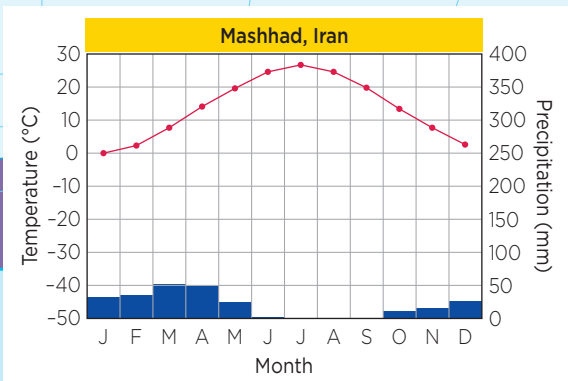
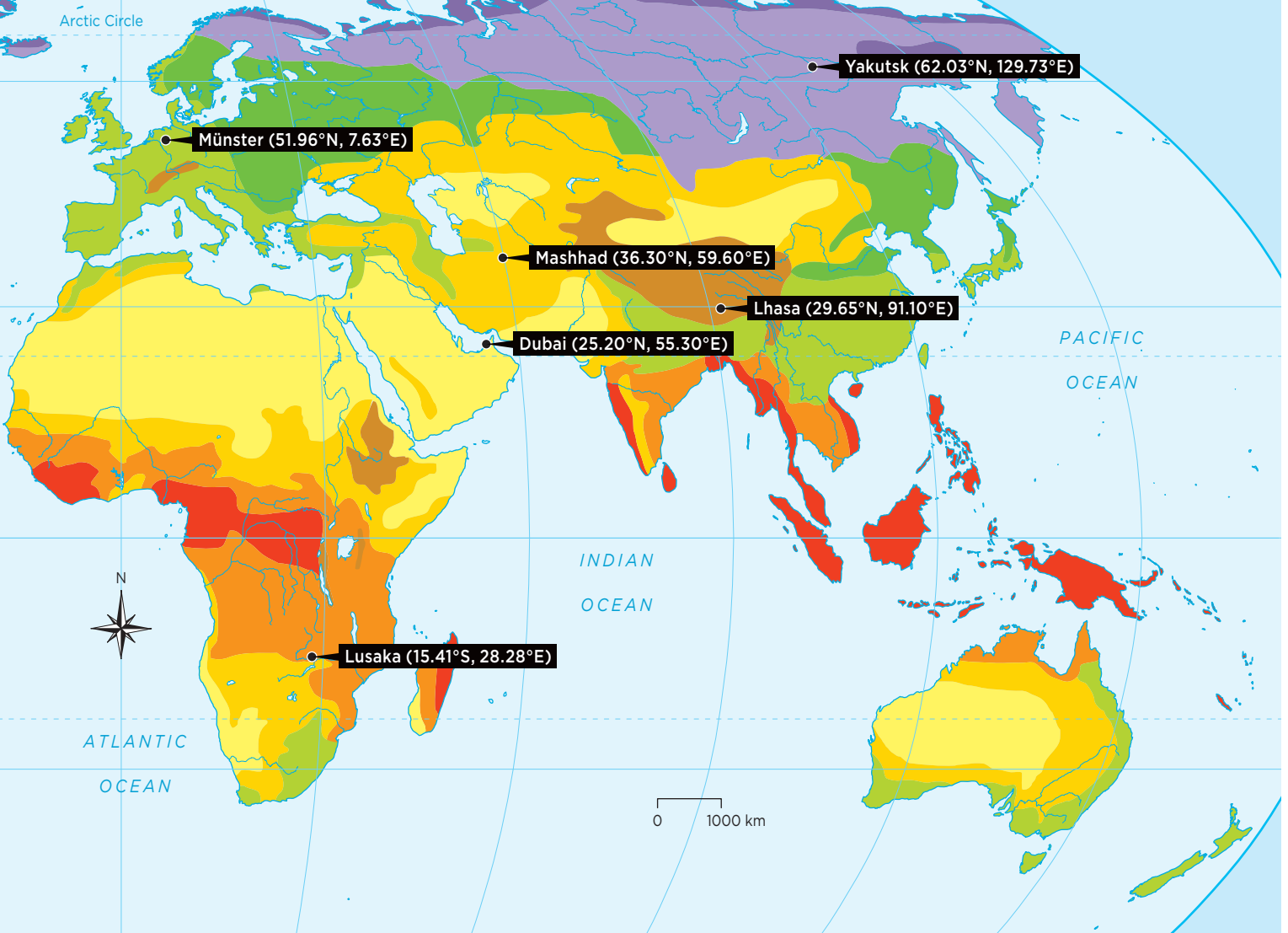
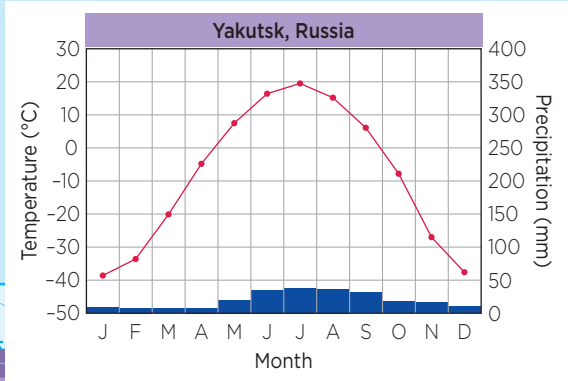
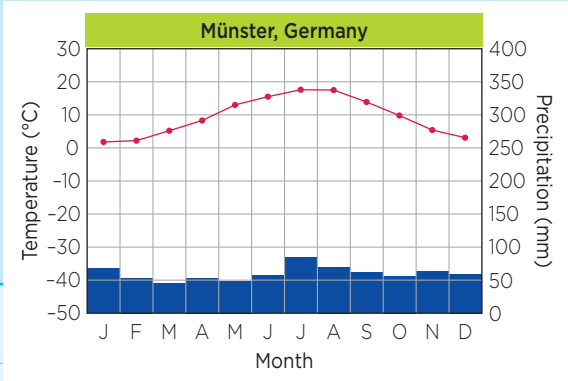
- temperature
- precipitation



World Climate Regions

- tropical (hot with rain all year)
- savannah (hot with dry season)
- steppe (warm and dry)
- desert (hot and very dry)
- mild (warm and wet)
- continental (dry with cold winter)
- subarctic (very cold winter)
- polar (very cold and dry)
- mountainous (altitude affects climate)





MAKING CLIMATE GRAPHS

You already know how to read a climate graph. In this activity, you will learn how to make one.

Climate Data for Beijing, China

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Average monthly temperature (°C)	-4.3	-1.9	5.1	13.6	20.0	24.2	25.9	24.6	19.6	12.7	4.3	-2.2
Average monthly precipitation (mm)	3	5	8	21	34	78	185	160	45	22	7	3

FIGURE 2.12 Climate data for Beijing, China. How might you draw a graph using two sets of numbers and keep them separate on the graph?

HOW TO MAKE A CLIMATE GRAPH

STEP 1

Draw the x axis for the climate graph on graph paper. Label 12 spaces along the x axis (horizontal) with the initials of the months of the year.

STEP 2

Your graph needs two y axes (vertical). Draw the left axis for temperature first.

- Label the lines from -50°C to 30°C . The temperature labels can be adjusted depending on the highest and lowest temperatures of the place you are graphing. For example, you might start at -20°C if there are no very low temperatures for the place.
- Label this axis "Temperature."

STEP 3

Now draw the right y axis for precipitation.

- Label the lines with 0 mm on the bottom line and intervals of 50 mm to the top. Precipitation labels can also be adjusted, but 0 mm must always be on the bottom line.
- Label this axis "Precipitation."

STEP 4

Make a line graph to show temperature.

- Find the temperature for each month from the data table for Beijing (**Figure 2.12**). Put a red dot in the middle of each column for each month using the left y axis.
- Once you have plotted all 12 points, join the dots with a red line.

STEP 5

Make a bar graph to show precipitation.

- Find the precipitation amount for each month from the data table for Beijing. Draw a bar for each month using the right y axis.
- Colour the bars blue.

STEP 6

Add a title above your climate graph, giving the name of the place.

HOW CLIMATE DATA TELLS US CLIMATE IS CHANGING

Climate graphs can help us identify how climate is changing. Comparisons can be made among climate graphs of the same locations over periods of 10, 20, or more years. In many parts of the world, detailed climate statistics have been kept for over 100 years (**Figure 2.13**). Changes in temperature and precipitation trends are good indicators of climate change.

These are some aspects to compare:

- **Monthly temperatures:** Changes to the hottest and coldest monthly temperatures tell us whether there is a warming or cooling trend.
- **Temperature ranges:** Changes to the temperature range tell us whether the range is becoming larger, with hotter summers and colder winters, or whether the range is becoming smaller, with cooler summers and warmer winters.
- **Precipitation totals:** Changes to precipitation totals tell us whether there is more or less precipitation.
- **Precipitation patterns:** Changes to precipitation patterns tell us whether there are drier summers or wetter winters.

Comparing climate graphs for just one location will not give us a very good understanding of the ways that the climate is changing around the world. Geographers will compare climate graphs over a wide area and over long periods of time to create a detailed understanding of the changing climate.

What can precipitation patterns tell us about the climate of a particular place?

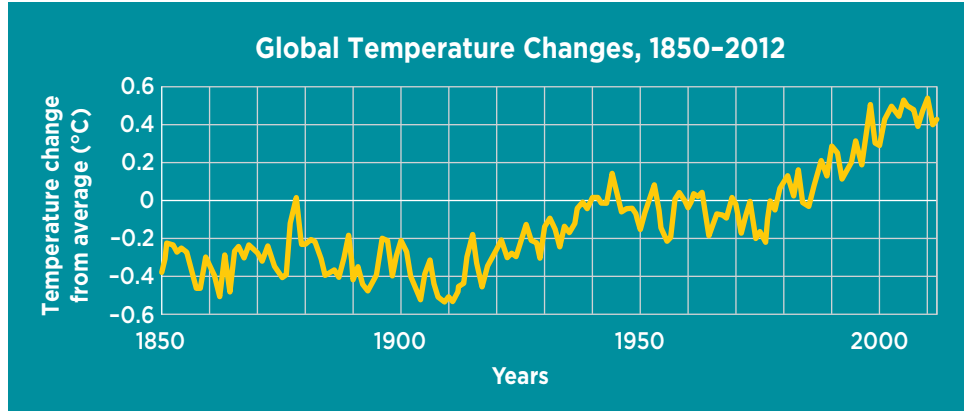


FIGURE 2.13 This graph shows changes in temperature from 1850 to 2012.

CHECK-IN

1. **INTERRELATIONSHIPS** Review **Figure 2.8** on page 54 and explain the global climate system to a partner in your own words.
2. **GATHER AND ORGANIZE** Choose one of the climate regions from **Figure 2.11** on pages 56 and 57. Find more information about that climate type and places in the world with that climate type. Decide on an appropriate way to share your information.
3. **PATTERNS AND TRENDS** **Figure 2.11** shows the climate regions around the world. Study the map and think about what you know about the natural environment. Using your prior knowledge, predict three factors or forces that might create the patterns shown on the map.