World Climates

SECTION 2

If YOU lived there...

You live in Colorado and are on your first serious hike in the Rocky Mountains. Since it is July, it is hot in the campground in the valley. But your guide insists that you bring a heavy fleece jacket. By noon, you have climbed to 11,000 feet. You are surprised to see patches of snow in shady spots. Suddenly, you are very happy that you brought your jacket!

Why does it get colder as you climb higher?

BUILDING BACKGROUND While weather is the day-to-day changes in a certain area, climate is the average weather conditions over a long period. Earth's different climates depend partly on the amount of sunlight a region receives. Differences in climate also depend on factors such as wind, water, and elevation.

Major Climate Zones

In January, how will you dress for the weekend? In some places, you might get dressed to go skiing. In other places, you might head out in a swimsuit to go to the beach. What the seasons are like where you live depends on climate.

Earth is a patchwork of climates. Geographers identify these climates by looking at temperature, precipitation, and native plant life. Using these items, we can divide Earth into five general climate zones—tropical, temperate, polar, dry, and highland.

The first three climate zones relate to latitude. Tropical climates occur near the equator, in the low latitudes. Temperate climates occur about halfway between the equator and the poles, in the middle latitudes. Polar climates occur near the poles, in the high latitudes. The last two climate zones occur at many different latitudes. In addition, geographers divide some climate zones into more specific climate regions. The chart and map on the next two pages describe the world's climate regions.

READING CHECK **Drawing Inferences** Why do you think geographers consider native plant life when categorizing climates?

What You Will Learn...

Main Ideas

1. Geographers use temperature, precipitation, and plant life to identify climate zones.
2. Tropical climates are wet and warm, while dry climates receive little or no rain.
3. Temperate climates have the most seasonal change.
4. Polar climates are cold and dry, while highland climates change with elevation.

The Big Idea

Earth's five major climate zones are identified by temperature, precipitation, and plant life.

Key Terms

monsoons, *p. 58*
savannas, *p. 58*
steppes, *p. 59*
permafrost, *p. 61*

TAKING NOTES As you read, use a chart like the one here to help you note the characteristics of Earth's major climate zones.

Climate Zone	Characteristics

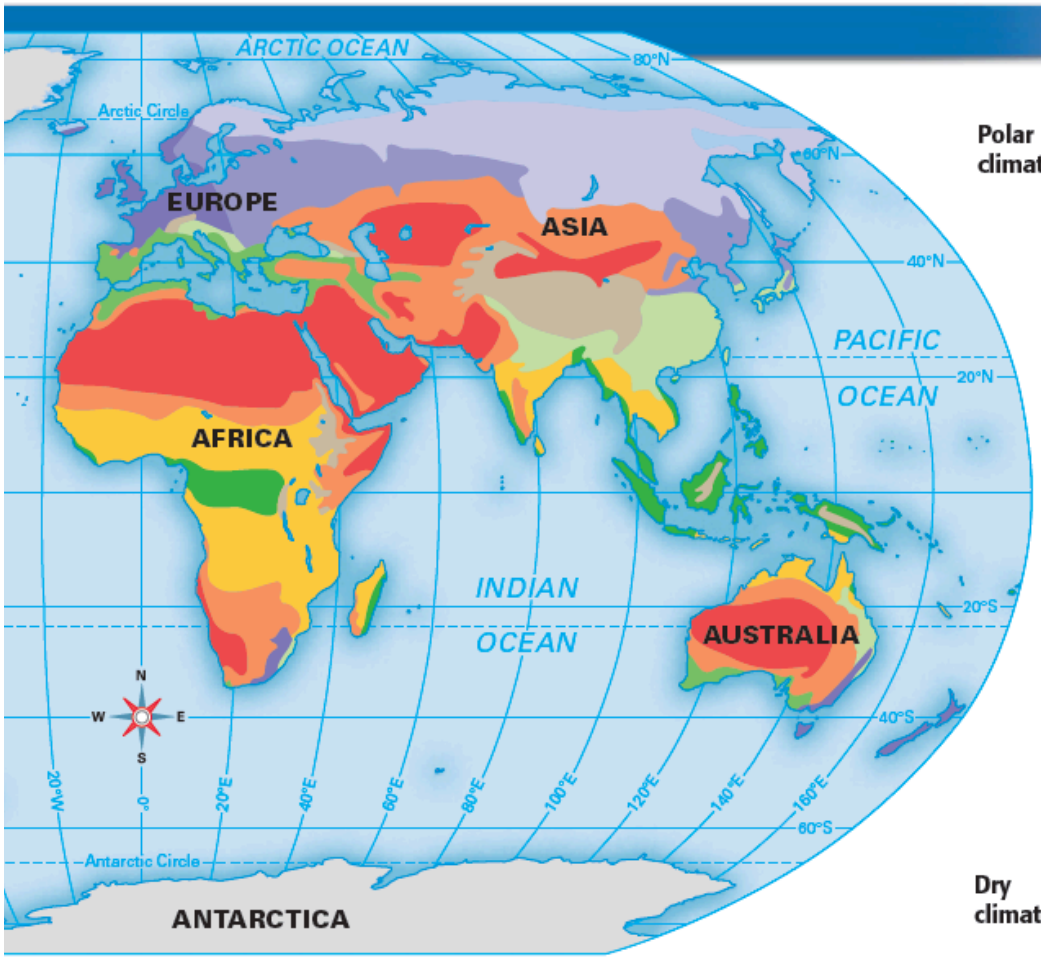
Interactive Map

World Climate Regions

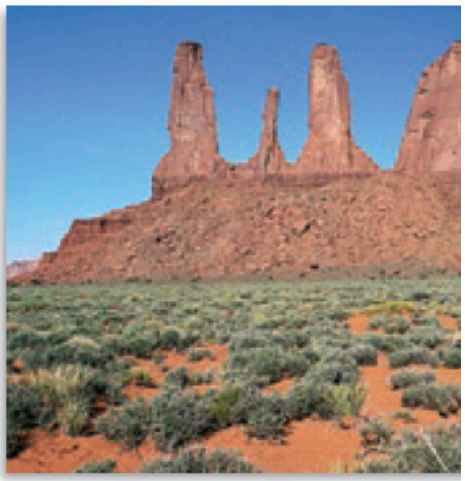
To explore the world's climate regions, start with the chart below. After reading about each climate region, locate the places on the map that have that climate. As you locate climates, look for patterns. For example, places near the equator tend to have warmer climates than places near the poles. See if you can identify some other climate patterns.

Tropical climate

Climate		Where is it?	What is it like?	Plants
Tropical	HUMID TROPICAL	On and near the equator	Warm with high amounts of rain year-round; in a few places, monsoons create extreme wet seasons	Tropical rain forest
	TROPICAL SAVANNA	Higher latitudes in the tropics	Warm all year; distinct rainy and dry seasons; at least 20 inches (50 cm) of rain during the summer	Tall grasses and scattered trees
Dry	DESERT	Mainly center on 30° latitude; also in middle of continents, on west coasts, or in rain shadows	Sunny and dry; less than 10 inches (25 cm) of rain a year; hot in the tropics; cooler with wide daytime temperature ranges in middle latitudes	A few hardy plants, such as cacti
	STEPPE	Mainly bordering deserts and interiors of large continents	About 10–20 inches (25–50 cm) of precipitation a year; hot summers and cooler winters with wide temperature ranges during the day	Shorter grasses; some trees and shrubs by water
Temperate	MEDITERRANEAN	West coasts in middle latitudes	Dry, sunny, warm summers; mild, wetter winters; rain averages 15–20 inches (30–50 cm) a year	Scrub woodland and grassland
	HUMID SUBTROPICAL	East coasts in middle latitudes	Humid with hot summers and mild winters; rain year-round; in paths of hurricanes and typhoons	Mixed forest
	MARINE WEST COAST	West coasts in the upper-middle latitudes	Cloudy, mild summers and cool, rainy winters; strong ocean influence	Evergreen forests
	HUMID CONTINENTAL	East coasts and interiors of upper-middle latitudes	Four distinct seasons; long, cold winters and short, warm summers; average precipitation varies	Mixed forest



Polar climate



Dry climate

Climate		Where is it?	What is it like?	Plants
Polar	SUBARCTIC	Higher latitudes of the interior and east coasts of continents	Extremes of temperature; long, cold winters and short, warm summers; little precipitation	Northern evergreen forests
	TUNDRA	Coasts in high latitudes	Cold all year; very long, cold winters and very short, cool summers; little precipitation; permafrost	Moss, lichens, low shrubs
	ICE CAP	Polar regions	Freezing cold; snow and ice; little precipitation	No vegetation
Highland	HIGHLAND	High mountain regions	Wide range of temperatures and precipitation amounts, depending on elevation and location	Ranges from forest to tundra

map zone
Geography Skills

Regions Note how Earth's climate regions relate to different locations.

1. **Locate** Which climates are found mainly in the Northern Hemisphere?
2. **Identify** What climate does most of northern Africa have?
3. **Make Generalizations** Where are many of the world's driest climates found on Earth?
4. **Interpreting Charts** Examine the chart. Which two climates have the least amount of vegetation?

go.hrw.com KEYWORD: SK7 CH3

FOCUS ON CULTURE

The Tuareg of the Sahara

In the Sahara, the world's largest desert, temperatures can top 130°F (54°C). Yet the Tuareg (TWAH-reg) of North and West Africa call the Sahara home—and prefer it. The Tuareg have raised camels and other animals in the Sahara for more than 1,000 years. The animals graze on sparse desert plants. When the plants are gone, the Tuareg move on.

In camp, Tuareg families live in tents made from animal skins. Some wealthier Tuareg live in adobe homes. The men traditionally wear blue veils wrapped around their face and head. The veils help protect against windblown desert dust.

Summarizing How have the Tuareg adapted to life in a desert?

Tropical and Dry Climates

Are you the type of person who likes to go to extremes? Then tropical and dry climates might be for you. These climates include the wettest, driest, and hottest places on Earth.

Tropical Climates

Our tour of Earth's climates starts at the equator, in the heart of the tropics. This region extends from the Tropic of Cancer to the Tropic of Capricorn. Look back at the map to locate this region.

Humid Tropical Climate At the equator, the hot, damp air hangs like a thick, wet blanket. Sweat quickly coats your body. Welcome to the humid tropical climate. This climate is warm, muggy, and rainy year-round. Temperatures average about 80°F (26°C). Showers or storms occur almost daily, and rainfall ranges from 70 to more than 450 inches (180 to 1,140 cm) a year. In comparison, only a few parts of the United States average more than 70 inches (180 cm) of rain a year.

Some places with a humid tropical climate have **monsoons**, seasonal winds that bring either dry or moist air. During one part of the year, a moist ocean wind creates an extreme wet season. The winds then shift direction, and a dry land wind creates a dry season. Monsoons affect several parts of Asia. For example, the town of Mawsynram, India, receives on average more than 450 inches (1,140 cm) of rain a year—all in about six months! That is about 37 feet (11 m) of rain. As you can imagine, flooding during wet seasons is common and can be severe.

The humid tropical climate's warm temperatures and heavy rainfall support tropical rain forests. These lush forests contain more types of plants and animals than anywhere else on Earth. The world's largest rain forest is in the Amazon River basin in South America. There you can find more than 50,000 species, including giant lily pads, poisonous tree frogs, and toucans.

Tropical Savanna Climate Moving north and south away from the equator, we find the tropical savanna climate. This climate has a long, hot, dry season followed by short periods of rain. Rainfall is much lower than at the equator but still high. Temperatures are hot in the summer, often as high as 90°F (32°C). Winters are cooler but rarely get cold.

This climate does not receive enough rainfall to support dense forests. Instead, it supports **savannas**—areas of tall grasses and scattered trees and shrubs.

Dry Climates

Leaving Earth's wettest places, we head to its driest. These climates are found in a number of locations on the planet.

Desert Climate Picture the sun baking down on a barren wasteland. This is the desert, Earth's hottest and driest climate. Deserts receive less than 10 inches (25 cm) of rain a year. Dry air and clear skies produce high daytime temperatures and rapid cooling at night. In some deserts, highs can top 130°F (54°C)! Under such conditions, only very hardy plants and animals can live. Many plants grow far apart so as not to compete for water. Others, such as cacti, store water in fleshy stems and leaves.

Steppe Climate Semidry grasslands or prairies—called **steppes** (STEPS)—often border deserts. Steppes receive slightly more rain than deserts do. Short grasses are the most common plants, but shrubs and trees grow along streams and rivers.

READING CHECK **Contrasting** What are some ways in which tropical and dry climates differ?

Temperate Climates

If you enjoy hot, sunny days as much as chilly, rainy ones, then temperate climates are for you. *Temperate* means "moderate" or "mild." These mild climates tend to have four seasons, with warm or hot summers and cool or cold winters.

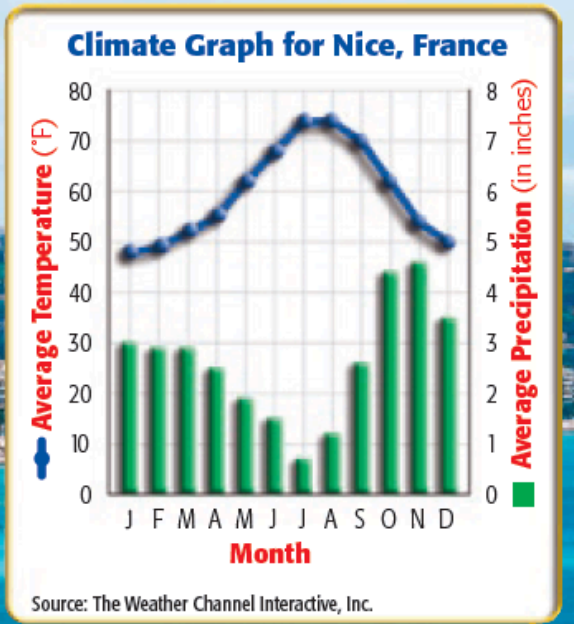
Temperate climates occur in the middle latitudes, the regions halfway between the equator and the poles. Air masses from the tropics and the poles often meet in these regions, which creates a number of different temperate climates. You very likely live in one, because most Americans do.

Mediterranean Climate Named for the region of the Mediterranean Sea, this sunny, pleasant climate is found in many popular vacation areas. In a Mediterranean climate, summers are hot, dry, and sunny. Winters are mild and somewhat wet. Plant life includes shrubs and short trees with scattered larger trees. The Mediterranean climate occurs mainly in coastal areas. In the United States, much of California has this climate.

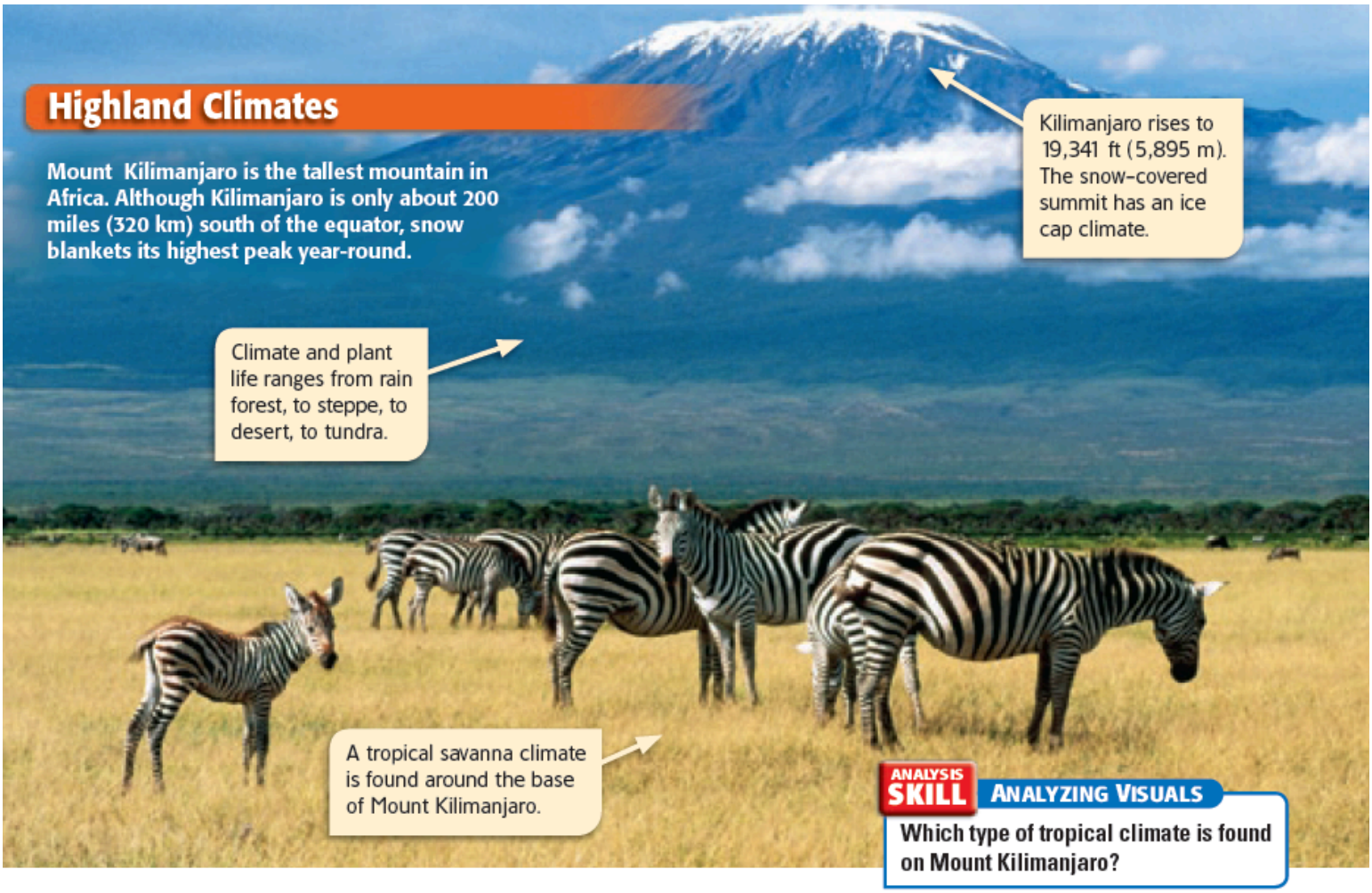
Mediterranean Climate

The climate graph shows average temperatures and precipitation for Nice (NEECE), France, which has a Mediterranean climate.

ANALYZING GRAPHS **During which month is precipitation lowest?**



Source: The Weather Channel Interactive, Inc.



Humid Subtropical Climate The southeastern United States is an example of the humid subtropical climate. This climate occurs along east coasts near the tropics. In these areas, warm, moist air blows in from the ocean. Summers are hot and muggy. Winters are mild, with occasional frost and snow. Storms occur year-round. In addition, hurricanes can strike, bringing violent winds, heavy rain, and high seas.

A humid subtropical climate supports mixed forests. These forests include both deciduous trees, which lose their leaves each fall, and coniferous trees, which are green year-round. Coniferous trees are also known as evergreens.

Marine West Coast Climate Parts of North America's Pacific coast and of western Europe have a marine west coast climate. This climate occurs on west coasts where winds carry moisture in from the seas. The moist air keeps temperatures mild year-round. Winters are foggy, cloudy, and rainy, while summers can be warm and sunny. Dense evergreen forests thrive in this climate.

Humid Continental Climate Closer to the poles, in the upper–middle latitudes, many inland and east coast areas have a humid continental climate. This climate has four <u>distinct</u> seasons. Summers are short and hot. Spring and fall are mild, and winters are long, cold, and in general, snowy.

This climate's rainfall supports vast grasslands and forests. Grasses can grow very tall, such as in parts of the American Great Plains. Forests contain both deciduous and coniferous trees, with coniferous forests occurring in the colder areas.

ACADEMIC VOCABULARY
distinct clearly different and separate

READING CHECK **Categorizing** Which of the temperate climates is too dry to support forests?

Polar and Highland Climates

Get ready to feel the chill as we end our tour in the polar and highland climates. The three polar climates are found in the high latitudes near the poles. The varied highland climate is found on mountains.

Subarctic Climate The subarctic climate and the tundra climate described below occur mainly in the Northern Hemisphere south of the Arctic Ocean. In the subarctic climate, winters are long and bitterly cold. Summers are short and cool. Temperatures stay below freezing for about half the year. The climate's moderate rainfall supports vast evergreen forests called taiga (TY-guh).

Tundra Climate The tundra climate occurs in coastal areas along the Arctic Ocean. As in the subarctic climate, winters are long and bitterly cold. Temperatures rise above freezing only during the short summer. Rainfall is light, and only plants such as mosses, lichens, and small shrubs grow.

In parts of the tundra, soil layers stay frozen all year. Permanently frozen layers of soil are called **permafrost**. Frozen earth absorbs water poorly, which creates ponds and marshes in summer. This moisture causes plants to burst forth in bloom.

Ice Cap Climate The harshest places on Earth may be the North and South poles. These regions have an ice cap climate. Temperatures are bone-numbingly cold, and lows of more than –120°F (–84°C) have been recorded. Snow and ice remain year-round, but precipitation is light. Not surprisingly, no vegetation grows. However, mammals such as penguins and polar bears thrive.

Highland Climates The highland climate includes polar climates plus others. In fact, this mountain climate is actually several climates in one. As you go up a mountain, the climate changes. Temperatures drop, and plant life grows sparser. Going up a mountain can be like going from the tropics to the poles. On very tall mountains, ice coats the summit year-round.

FOCUS ON READING
What is the effect of elevation on climate?

READING CHECK **Comparing** How are polar and highland climates similar?

SUMMARY AND PREVIEW As you can see, Earth has many climates, which we identify based on temperature, precipitation, and native plant life. In the next section you will read about how nature and all living things are connected.

Section 2 Assessment

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Online Quiz
KEYWORD: SK7 HP3

Reviewing Ideas, Terms, and Places

1. **a. Recall** Which three major climate zones occur at certain latitudes?
   b. Summarize How do geographers categorize Earth's different climates?
2. **a. Define** What are **monsoons**?
   b. Make Inferences In which type of dry climate do you think the fewest people live, and why?
3. **a. Identify** What are the four temperate climates?
   b. Draw Conclusions Why are places with a Mediterranean climate popular vacation spots?
4. **a. Describe** What are some effects of **permafrost**?
   b. Explain How are highland climates unique?

Critical Thinking

5. **Categorizing** Create a chart like the one below for each climate region. Then use your notes to describe each climate region's average temperatures, precipitation, and native plant life.

Climate Region →	Temperature	Precipitation	Plant Life

FOCUS ON VIEWING

6. **Discussing World Climates** Add information about the climate of the place you have selected, such as average temperature and precipitation.