ScienceCompanion®
CHICAGO SCIENCE GROUP

www.sciencecompanion.com

Dear Families,

Our class is beginning a Science Companion® topic which will guide children through a hands-on exploration of *Weather and Climate*. Weather's dynamic and unpredictable character gives children insight into the wonderful complexity of nature.

The *Weather and Climate* topic encourages children to build on their natural sense of wonder and curiosity about the world while they:

- Observe, analyze, and describe scenes of various weather conditions.
- Locate places that have ideal weather conditions for an activity.
- Build and use tools to collect weather data.
- Create and compare graphs of weather measurement data and identify patterns in that data.
- Create a weather map of the United States.
- Explore severe weather such as hurricanes and tornadoes.
- Interpret graphs and observe scenes in nature to classify climate zones.
- Observe tree rings to describe climatic conditions over a historic period.

You and your child can explore this topic together at home by:

- Helping your child find resources about the weather that he or she would like to learn more about. Reading books together about any aspects of the weather.
- Visiting the web site at *www.ScienceCompanion.com* to find a list of recommended web sites about weather.

The *Weather and Climate* topic encourages children to explore new ways to look at the weather and climate that affects their lives. We hope they will bring their discoveries and enthusiasm home, inviting you to learn alongside them—asking questions, discussing their work, and sharing their adventures in science.

Sincerely,

Weather Poems

Morning Rain

Tu Fu

A slight rain comes, bathed in dawn light.
I hear it among treetop leaves before mist
Arrives. Soon it sprinkles the soil and,
Windblown, follows clouds away. Deepened

Colors grace thatch homes for a moment.
Flocks and herds of things wild glisten
Faintly. Then the scent of musk opens across
Half a mountain — and lingers on past noon.

Mull Weather

Anonymous Scottish poet

It rained and rained and rained and rained,
The average was well maintained;
And when our fields were simply bogs,
It started raining cats and dogs.
After a drought of half an hour,
There came a most refreshing shower;
And then the queerest thing of all,
A gentle rain began to fall.

Next day 'twas pretty fairly dry,
Save for a deluge from the sky.
This wetted people to the skin,
But after that the rain set in.
We wondered what's the next we'd get,
As sure as fate we got more wet.
But soon we'll have a change again,
And we shall have
A drop of rain

A Fine Day

Katherine Mansfield

After all the rain, the sun
Shines on hill and grassy mead;
Fly into the garden, child,
You are very glad indeed.

For the days have been so dull,
Oh, so special dark and drear,
That you told me, "Mr. Sun
Has forgotten we live here."

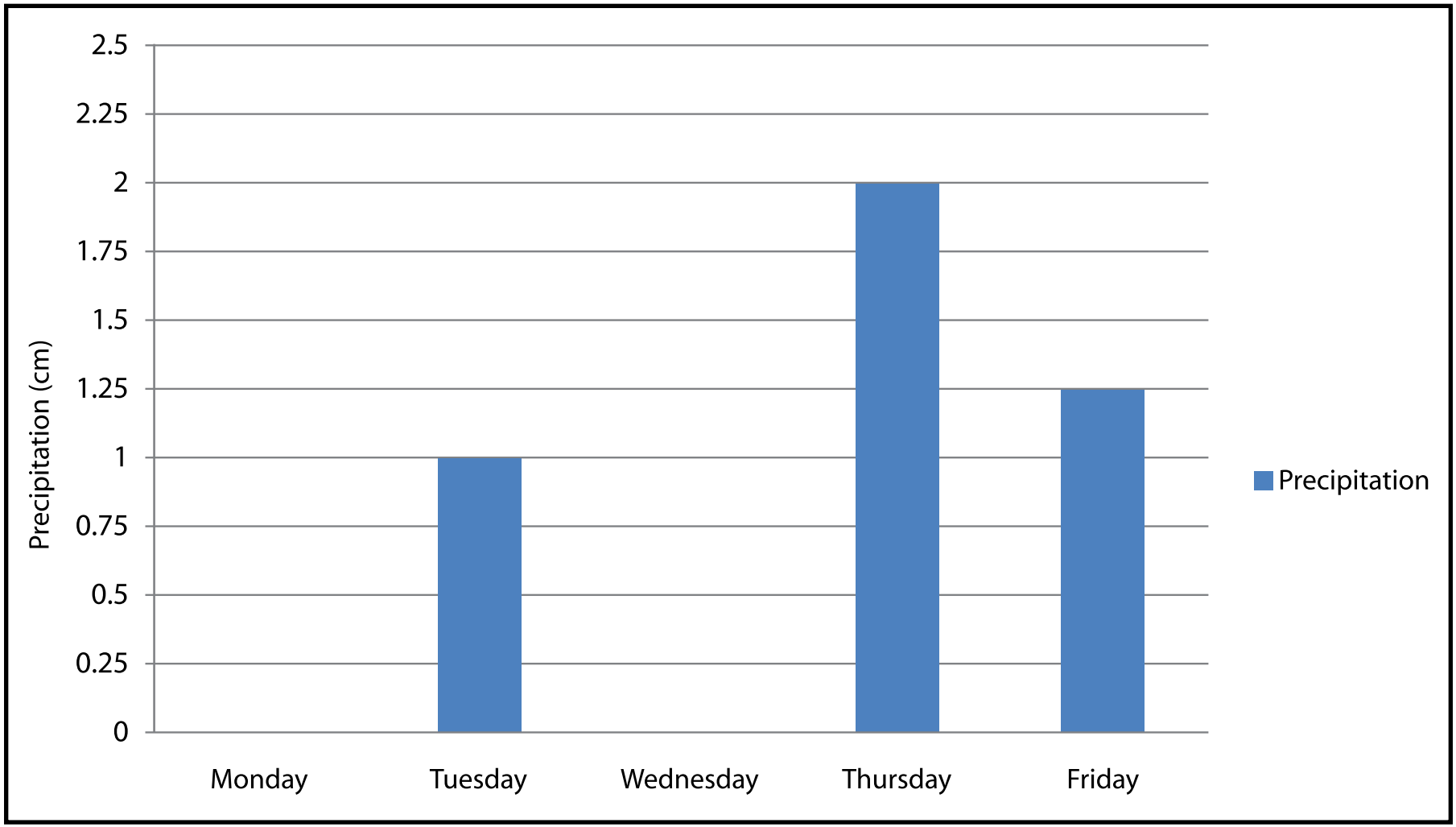
Dew upon the lily lawn,
Dew upon the garden beds;
Daintly from all the leaves
Pop the little primrose heads.

And the violets in the copse
With their parasols of green
Take a little peek at you;
They're the bluest you have seen.

On the lilac tree a bird
Singing first a little not,
Then a burst of happy song
Bubbles in his lifted throat.

O the sun, the comfy sun!
This the song that you must sing,
"Thank you for the birds, the flowers,
Thank you, sun, for everything."

A Week in Seattle



Using a Rain Gauge (Homemade)

1. Identify the weather data you will collect with the rain gauge (precipitation.)
2. Setup the rain gauge in a level spot that is open to the sky.
3. Make readings by observing where the water level is compared to the centimeter markings on the masking tape.
4. Identify the units (centimeters.)
5. Make readings in the morning starting on Tuesday of each week.
6. Make sure the water in the rain gauge measures zero after each reading.

How the rain gauge works:

1. Precipitation falls and collects inside the rain gauge.
2. If the precipitation is frozen (such as snow or hail), it melts inside the rain gauge and partially fills the rain gauge.
3. If the precipitation is liquid (such as rain), it partially fills the rain gauge.

Using a Rain Gauge (Manufactured)

1. Identify the weather data you will collect with the rain gauge (precipitation.)
2. Setup the rain gauge in a level spot that is open to the sky.
3. Read the direction for the rain gauge to learn how to make measurements.
4. Identify the units (centimeters.)
5. Make readings in the morning starting on Tuesday of each week.
6. After each reading, make sure the water in the rain gauge measures zero by pouring out the water.

How the rain gauge works:

1. Precipitation falls and collects inside the rain gauge.
2. If the precipitation is frozen (such as snow or hail), it melts inside the rain gauge and adds water to the gauge.
3. If the precipitation is liquid (such as rain), it adds water to the rain gauge.

Using an Anemometer (Homemade)

1. Identify the weather data you will collect with the anemometer (wind speed.)
2. Bring a watch with a second hand.
3. Find a spot outside where the wind is not blocked by a building or any other objects.
4. Hold the pencil straight up and down.
5. Count the number of times the colored cup spins around in one minute.
6. Identify the units (spins per minute.)
7. If it spins around too fast to count, you can write "too fast" as its speed.
8. Make readings once in the morning and once in the afternoon.

How the anemometer works:

1. Wind collects in the cups and causes them to spin.
2. The greater the wind speed, the faster the cups will spin.

Using an Anemometer (Manufactured)

1. Identify the weather data you will collect with the anemometer (wind speed.)
2. Find a spot outside where the wind is not blocked by a building or any other objects.
3. Hold the handle of the anemometer straight up and down.
4. Follow the directions that come with the anemometer to measure the wind speed.
5. Identify the units (meters per second.)
6. Make readings once in the morning and once in the afternoon.

How the anemometer works:

1. Wind collects in the cups and causes them to spin.
2. The greater the wind speed, the faster the cups will spin.

Using a Pinwheel (Homemade)

1. Identify the weather data you will collect with the pinwheel (wind speed.)
2. Find a spot outside where the wind is not blocked by a building or any other objects.
3. Hold the pencil straight up and down.
4. Observe how quickly the pinwheel spins around.
5. Decide whether the wind is calm, light, medium, or heavy based on how fast the pinwheel is spinning.
6. Make readings once in the morning and once in the afternoon.

How the pinwheel works:

1. Wind collects in the pinwheel blades and causes them to spin.
2. The greater the wind speed, the faster the blades will spin.

Using a Weathervane (Homemade)

1. Identify the weather data you will collect with the weathervane (wind direction.)
2. Bring a compass.
3. Find a spot outside where the wind is not blocked by a building or any other objects.
4. Hold the pencil straight up and down.
5. Determine the compass direction that the weathervane arrow is pointing too. (This is where the wind is coming from.)
6. Make readings once in the morning and once in the afternoon.

How the weathervane works:

Since the back of the weathervane is larger than the arrow, the wind forces the arrow to point in the direction from which the wind is coming.

Using a Thermometer (Manufactured)

1. Find a spot outside that is not in direct sunlight.
2. Wait for about two minutes until the fluid in the thermometer is no longer moving.
3. Read the number next to the top of the fluid.
4. Identify the units (Celsius.)
5. Make readings once in the morning and once in the afternoon.

How the thermometer works:

1. When the temperature goes up, the fluid in the thermometer expands and goes up.
2. When the temperature drops, the fluid in the thermometer contracts and goes down.

Using a Cloud Cover Chart (Homemade)

1. Find a spot outside with a large opening to the sky where you can see as much of the sky as possible.
2. Compare the cloud coverage in the sky with the clouds on the Cloud Cover Chart. Which set of clouds are closest to what you see in the sky?
3. Make readings once in the morning and once in the afternoon.

Cloud Cover Chart

Shutterstock.com, Palo_ok

Sunny

Shutterstock.com, Pakhnyushcha

Partly Sunny

Shutterstock.com, catshila

Partly Cloudy

Shutterstock.com, Jason Patrick Ross

Mostly Cloudy

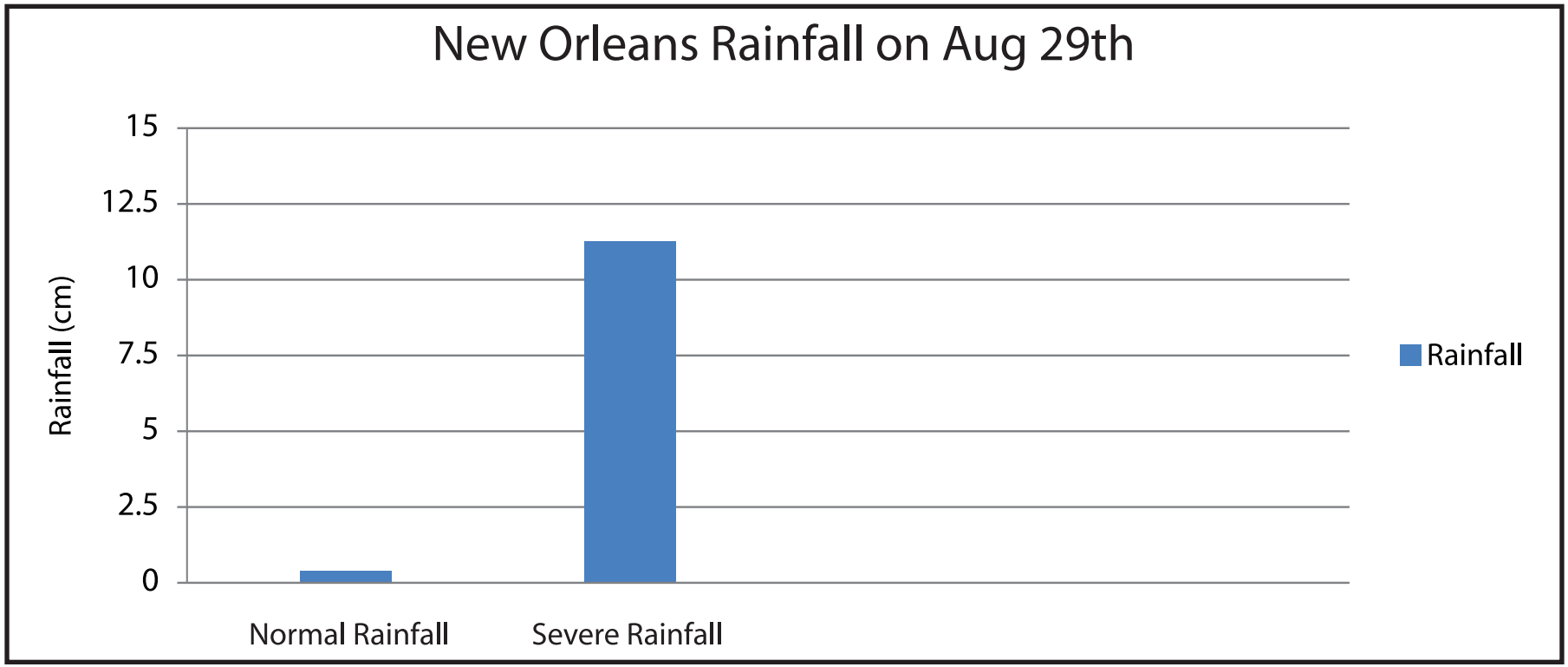
Shutterstock.com, leedsn

Overcast

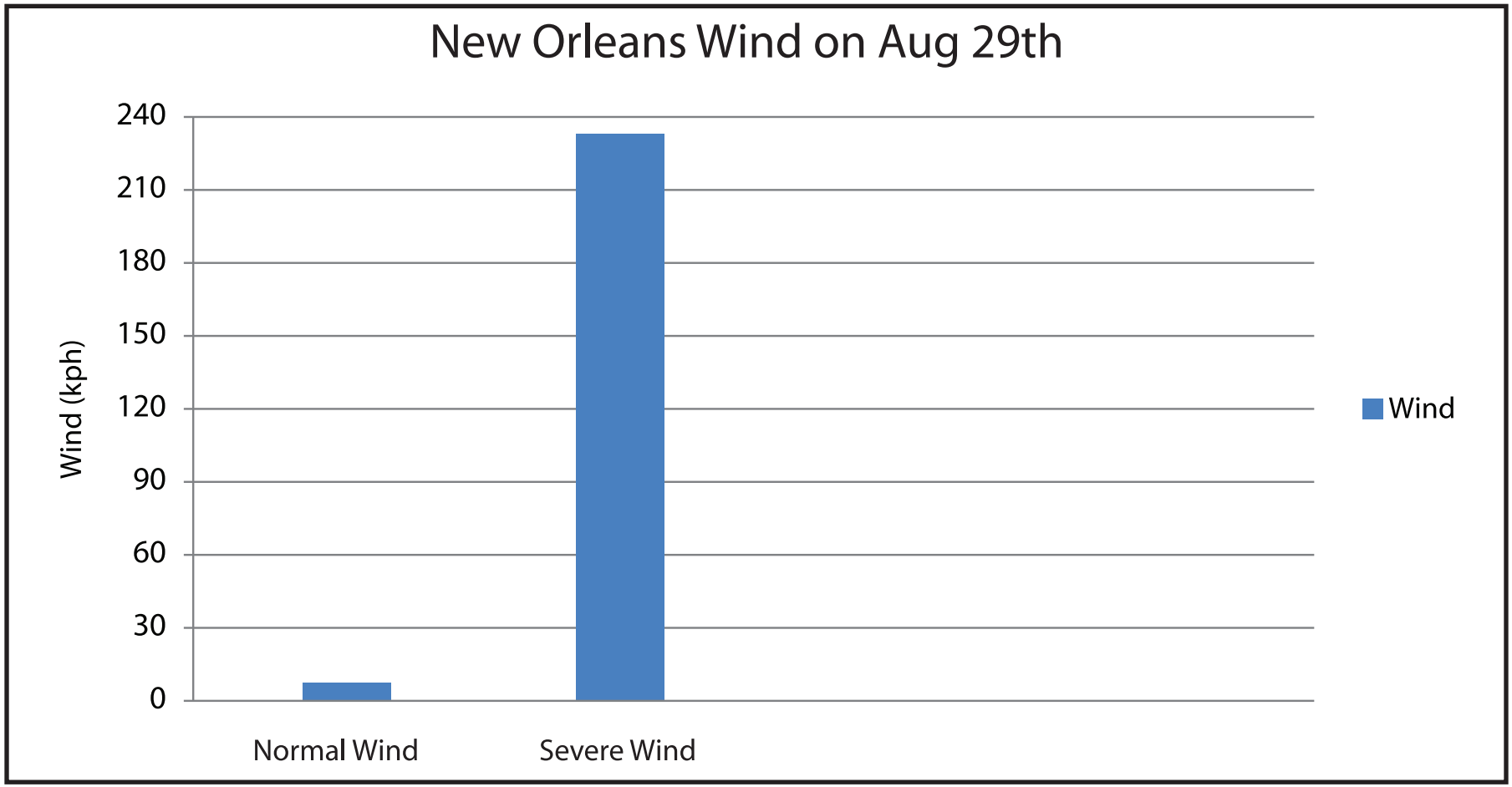
Shutterstock.com, StockThings

Foggy

Rain in New Orleans



Wind in New Orleans



Predicting and Tracking Severe Weather

Event	Methods	Challenges
Hurricane		
Tornado		
Thunderstorm		
Blizzard		
Drought		

Severe Weather Web Links

The following are some Web Links to get you started:

http://www.ready.gov/kids/know-the-facts

Information on being prepared for drought, extreme heat, floods, thunder and lightning, hurricanes, tornadoes, winter storms and extreme cold

http://www.weatherwizkids.com/weather-safety.htm

Information on heat waves, hurricanes, thunderstorms, tornadoes, winter storms

http://www.nssl.noaa.gov/education/students/

Information on severe weather safety

http://www.sesamestreet.org/parents/topicsandactivities/toolkits/ready

Information on emergency preparedness

United States Climates Tour

In this lesson, students look at views of five largest climate zones in the United States. Below are the map locations, using longitude and latitude, for the guided exploration using Google Earth™ or Google Maps™. These locations are near the cities used in Session 2. In order to give children a sense of the plants and landscape, locations in a natural setting inside or close to the city are listed.

Using Google Earth™

Use the Street View tool to view the local scenery around the location. You may also want to use the visuals available in the Photos layer, including **Panoramio** and **360 Cities**. Panoramio images show panoramic views of the scene. 360 Cities puts the viewer inside a 360° "bubble" of the scene that you can navigate using the Google Earth™ controls.

Using Google Maps™

Turn on the Earth View feature of Google Maps™. Copy and paste the entire Longitude and Latitude location into the search bar of Google Maps. Use the Street View tool to view the local scenery around the location. You might also select the images available at the bottom of the screen.

	Location	Longitude and Latitude	Notes
Humid continental	Kansas City, Missouri	39° 9'56.00"N, 94°23'10.00"W	Liberty Bend Conservation Area on the banks of the Missouri River. Located 18 km (11 mi) from downtown Kansas City. You may want to show images of the natural scenery as well as nearby views of the river.
	Detroit, Michigan	42°16'10.00"N, 83° 5'21.00"W	Black Oak Heritage Park, near Windsor, Ontario. This is located 7 km (4.5 mi) from downtown Detroit. You may also want to show images of the Detroit River and Ojibway Prairie Provincial Nature Reserve on the east side of the adjacent highway.
	Albany, New York	42°38'42.00"N, 73°51'13.00"W	This location is at Normanskill, about 8 km (5 mi) from downtown Albany. In addition to Street View images, the nearby Panaramio photos provide good images of plants and landscape.

	Location	Longitude and Latitude	Notes
Humid sub-tropical	Houston, Texas	29°35'55.00"N, 95° 4'45.00"W	Armand Bayou Park, about 33 km (20.5 mi) from downtown Houston. Explore the bayou scenery along Bay Area Blvd, at these coordinates. In Google Earth™ explore the Panoramio photos to the south of the placemark.
	Memphis, Tennessee	35° 7'6.00"N, 89°49'54.00"W	Wolf River, located about 20km (12 mi) from downtown Memphis. Look at the scenery along the road. In Google Earth™, look at the Panoramio images along the trail that parallels the road.
	Orlando, Florida	28°42'34.00"N, 81°27'33.00"W	Wekiwa Springs State Park is 20 km (12 mi) from downtown Orlando. In Street View, look into the park along the north side of Wekiva Springs Road. In Google Earth™, look for Panaramio photos of the park itself.
Semi-arid (steppe)	Boise, Idaho	43°30'54.00"N, 116° 3'42.00"W	Located 16 km (10 mi) from downtown Boise, Lucky Peak Dam and Reservoir provide a number of views of undeveloped scenery. Look at street view images from Highway 21, or select from the Panaramio images around this location, particularly those just to the west. You may want to point out that although the scene may look dry, there is evidence that there is some water (the reservoir).
	Odessa, Texas	31°55'2.00"N, 102°19'47.00"W	There are no nearby undeveloped areas, so this stretch of road 9 km (5.5 mi) from downtown Odessa, provides the best opportunities to view the scenery. Look at the landscape in Street View.
	Rapid City, South Dakota	44° 7'5.00"N, 103° 1'46.00"W	Both Interstate 90 and the surrounding rural roads provide good views of the scenery outside Rapid City. This placemark is 17 km (10.5 mi) to the east of the city center. You may point out to children that most of this area has become farmland and may not look like it did before Europeans settled in the area in the 1870s.

	Location	Longitude and Latitude	Notes
Arid	Death Valley, California	36°19'58.04"N, 116°48'10.46"W	Artist's Drive has a 360° view of this extremely arid landscape, as well as a number of Panaramio views. If you're using Google Maps™, use street view.
	Las Vegas, Nevada	36° 8'35.33"N, 115°25'52.17"W	Red Rock Canyon, 22 km (14 mi) from Las Vegas. Highway 159 and the road to the Visitor's Center contain street views.
	Ajo, Arizona	32° 5'19.33"N, 112°50'40.48"W	Located 30 km (19 mi) from Ajo, AZ, Organ Pipe Cactus National Park provides exceptional views of an arid landscape with plants that have adapted to the low annual precipitation.
Mediterranean	Medford, Oregon	42°18'33.20"N, 122°52'21.29"W	The Rogue River Valley, where Medford is situated, includes a number of side roads where you can find views of this Mediterranean climate. Although cooler in winter than most people think of for a Mediterranean climate, Medford and other areas along the Pacific Coast are classified in this climate zone because of their mild year-round temperatures and dry summers.
	Sacramento, California	38°47'59.92"N, 120°53'29.24"W	Gold Discovery Historic State Park is located on the American River, in the Sierra foothills, about 57 km (35 mi) from Sacramento.
	Los Angeles, California	34° 5'58.25"N, 118°43'4.41"W	Located 45 km (28 mi) east of Los Angeles, the Santa Monica Mountain National Recreation Area has some of the best preserved chaparral in Southern California. Look along the roads near the Headquarters or select the Panaramio images to view the scenery and plant life typical of this Mediterranean climate.

City Climate Data

	City, State	January Average monthly temperature	July Average monthly temperature	Average annual precipitation
Humid continental	Kansas City, Missouri	-2°C (29°F)	26°C (79°F)	99 cm (39 in)
	Detroit, Michigan	-4°C (25°F)	23°C (73°F)	85 cm (33 in)
	Albany, New York	-5°C (23°F)	22°C (72°F)	99 cm (39 in)
Humid sub-tropical	Houston, Texas	12°C (53°F)	29°C (84°F)	127 cm (50 in)
	Memphis, Tennessee	5°C (41°F)	28°C (83°F)	137 cm (54 in)
	Orlando, Florida	16°C (60°F)	28°C (83°F)	127 mm (50 in)
Semi-arid (steppe)	Boise, Idaho	1°C (31°F)	24°C (75°F)	30 cm (12 in)
	Midland, Texas	7°C (44°F)	28°C (82°F)	37 cm (15 in)
	Rapid City, South Dakota	-4°C (25°F)	23°C (73°F)	41 cm (16 in)
Arid	Death Valley, California	12°C (53°F)	39°C (102°F)	0.5 cm (2 in)
	Las Vegas, Nevada	9°C (48°F)	33 °C (92°F)	11 cm (4 in)
	Ajo, Arizona	14°C (57°F)	33 °C (91°F)	24 cm (9 in)
Mediterranean	Medford, Oregon	4°C (40°F)	23°C (74°F)	47 cm (18 in)
	Sacramento, California	8°C (47°F)	24°C (76°F)	47 cm (18 in)
	Los Angeles, California	15°C (59°F)	24°C (75°F)	38 cm (15 in)

Source: National Oceanic and Atmospheric Administration

Climate Zones Fact Sheet

Tropical	Tropical Wet	• Hot and humid all year. • Average monthly temperatures do not fall below 18° C (64° F), even during the coolest months of the year. • Frost and freezing temperatures never occur. • Monthly precipitation is always greater than 6 cm (2 in), often as heavy rainfall. • Annual precipitation is between 180 cm and 250 cm (70-100 in). • There is no winter season.
	Tropical Wet & Dry (Savannah)	• Warm to hot temperatures all year. • Average monthly temperatures do not fall below 18° C (64° F), even during the coolest months of the year. • Frost and freezing temperatures never occur. • There is a dry winter season. Monthly precipitation in winter is less than 6 cm (2 in).
Dry	Arid	• Hot to very hot summers, with mild winters. • Average annual temperature is more than 18°C (64° F). • Winter nights can be very cold. Some areas can get light snow. • Less than 25 cm (10 in) of precipitation each year.
	Semi-arid (Steppe)	• Similar to arid climates but with more precipitation. • More than 25 cm (10 in) of precipitation each year. • Annual precipitation is between 38 and 76 cm (15 and 30 in). • At least one month has an average temperature below 0° C (32° F).

Moderate	Mediterranean	• Average temperature of the coldest month is between 0° C (27° F) and 18° C (64°F). • In the summer, the average temperature is more than 10°C (50° F). The average temperature of the warmest month is more than 22°C (72°F). • Nearly all precipitation occurs in winter, autumn, and spring. • Precipitation in summer months is less than 3 cm (1 in) in a month. It is possible for there to be no rain from four to six months around summer.
	Humid Subtropical	• Average temperature of the coldest month between 0° C (27° F) and 18° C (64°F). • The average temperature of the warmest month is more than 22°C (72°F). • Annual precipitation is between 65 and 250 cm (26 and 98 in). Precipitation is higher in summer months than the rest of the year.
	Marine	• Average temperature of the coldest month is more than 0° C (32° F). • Average temperature of the warmest month is less than 22°C (72°F). • Precipitation occurs year round. Most precipitation comes in the form of rain, but brief snowfall is possible in winter months.

Continental	Humid continental	• Very large temperature differences between the winter months and summer months. • The lowest average monthly temperature is below 0° C (32° F). • The average monthly temperature is more than 10°C (50° F) for at least four months. • The average annual precipitation is 81 cm (32 in). Precipitation occurs all year, but snow is more common in winter than rain.
	Subarctic	• Summers last no more than three months of the year. At least one month must have an average temperature of at least 10° C (50° F). • The average temperature for five to seven months of winter is below 0° C (32° F). Winter temperatures can drop to -40°C (-40° F). • Most locations receive little precipitation, usually no more than 38 cm (15 in).
Polar	Tundra	• No month has an average temperature above 10° C (50°F). • At least one month has an average temperature above 0° C (32°F). • There is usually little rain or snow. The average annual precipitation is 20 cm (8 in).
	Ice cap	• All twelve months have average temperatures below 0° C (32° F). • The daily temperature almost never rises above 0° C (32° F). • A permanent layer of ice covers the land, and no plants live in this zone. They may have animal life that feeds from the ocean. • Due to their high latitudes, ice cap climates experience 24 hours of sunlight in summer, and no sunshine in winter.