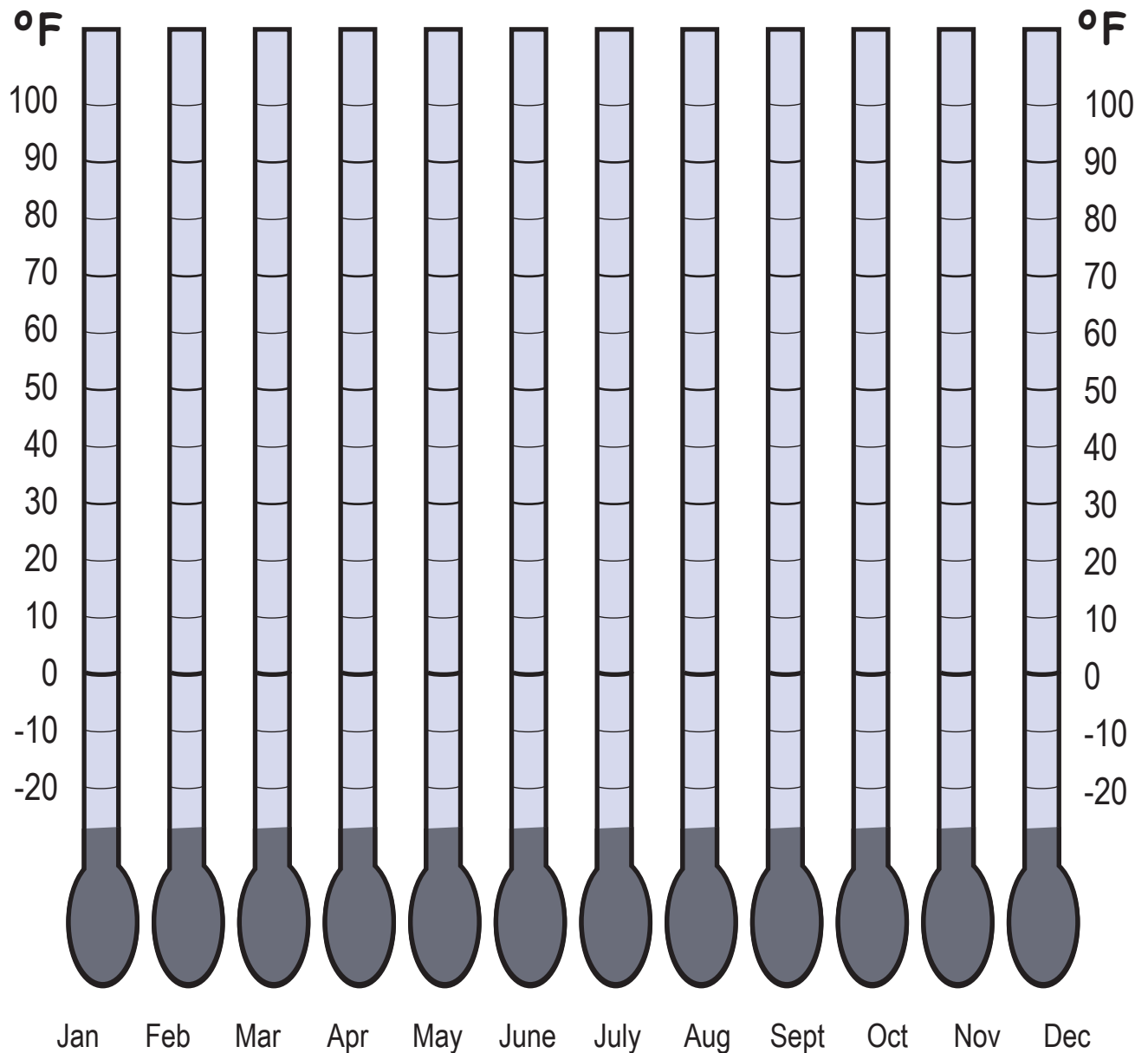


# A Thermometer Graph That Shows the Temperature in Each Month At

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Describe the weather in this place:

## Making ThermoGraphs for Places in Ecuador

A thermometer graph is a special kind of graph that shows the temperature at a place in every month of the year. To make a thermometer graph, first find a table of data that shows the temperature in every month. Then color the thermometer for that month up to the line that shows the correct temperature.

For example, suppose the temperature for a month is 70 degrees (room temperature). You should color the thermometer up to the 70-degree line. If the temperature is 65 degrees, then you should color up to the space between 60 and 70. If it is 23 degrees, color up to the space between 20 and 30, a little closer to the 20 than the 30.

Here is a table that shows the temperatures at some places we have been studying.

Chicago 600 feet	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
	23	27	38	50	60	69	74	72	66	54	41	28	50
Porto Viejo 150 feet	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
	78	79	79	79	78	76	75	75	75	76	76	77	77
Ospina Perez 5550 feet	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
	65	66	66	66	66	66	67	67	67	66	65	65	66
Quito 9200 feet	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
	56	56	56	56	56	56	56	56	56	55	55	56	56
Cotopaxi 11700 feet	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
	46	46	46	46	46	45	45	45	45	46	46	46	46

Make a thermometer graph to show temperature through the year in each of these cities. Then write three complete comparison sentences to describe how these places are similar or different. One of your sentences should be a generalization about the relationship between temperature and elevation. Here is an example of a simple comparison:

*The coldest month in Porto Viejo is warmer than the hottest month in Chicago.*

## Making ThermoGraphs for Places in Bolivia

A thermometer graph is a special kind of graph that shows the temperature at a place in every month of the year. To make a thermometer graph, first find a table of data that shows the temperature in every month. Then color the thermometer for that month up to the line that shows the correct temperature.

For example, suppose the temperature for a month is 30 degrees (just below freezing). You should color the thermometer up to the 30-degree line. If the temperature is 65 degrees, then you should color up to the space between 60 and 70. If it is 22 degrees, color up to the space between 20 and 30, a little closer to the 20 than the 30.

Here is a table that shows the temperatures at some places we have been studying.

New York City (5000 people in 1700 50 feet above sea level)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	30	31	37	50	60	68	74	73	70	60	44	35
Puerto Suarez (near Corumba, Brazil 500 feet above sea level)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	84	83	82	80	77	74	74	78	81	84	85	85
Santa Cruz (center of oil region 2000 feet above sea level)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	79	79	78	75	71	68	68	70	74	78	79	79
Cochabamba (COACH-a-BAHM-ba, 8000 feet elevation)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	66	65	64	63	60	56	57	61	64	66	67	67
Potosi (potoSEE) (silver mining center. 200,000 people in 1700, 13000 feet elevation)	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	53	53	53	52	50	48	47	49	51	53	54	54

Make a thermometer graph to show temperature through the year in each of these cities.

Then write three generalizations (using complete sentences) to describe how these places are similar or different. Here is a way to start each one:

*New York City is in the northern hemisphere. Bolivia is in the southern hemisphere.  
As a result, . . .*

*As you go higher above sea level, temperatures tend to . . . .*

*New York is much farther from the equator than any city in Bolivia. As a result,  
New York has . . . .*

## Making ThermoGraphs for Places in Chile

A thermometer graph is a special kind of graph that shows the temperature at a place in every month of the year. To make a thermometer graph, first find a table of data that shows the temperature in every month. Then color the thermometer for that month up to the line that shows the correct temperature.

For example, suppose the temperature for a month is 30 degrees (just below freezing). You should color the thermometer up to the 30-degree line. If the temperature is 65 degrees, then you should color up to the space between 60 and 70. If it is 23 degrees, color up to the space between 20 and 30, a little closer to the 20 than the 30.

Here is a table that shows the temperatures at some places we have been studying.

Chicago 42°N	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	23	27	38	50	60	69	74	72	66	54	41	28
Antofagasta 24°S	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	70	70	68	64	61	59	57	58	59	61	64	67
Santiago 33°S	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	69	68	64	59	53	49	48	50	54	59	63	67
Valdivia 40°S	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	63	62	59	54	50	47	46	47	50	54	57	60
Punta Arenas 53°S	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	52	51	48	44	40	37	36	38	41	44	47	50

Make a thermometer graph to show temperature through the year in each of these cities.

Then write three complete comparison sentences to describe how these places are similar or different. One of your sentences should be a generalization about the relationship between temperature and latitude. Here is an example of a simple comparison:

*Every place in Chile has less difference between winter and summer than Chicago.*

## Teacher's Guide: **Thermographs in the Andes Region of South America**

Overview: students make thermometer graphs (thermographs) for several cities in South America (and the US for comparison). Then they compare the graphs and try to make generalizations about the influence of elevation and latitude on temperature.

Grade: 5-8

Related Discipline: Math, ELA

GLCE: 6G 211, 311, 312

Time: 20-40 minutes

**Preparation:** Make plenty of copies of the basic thermograph form; the data pages can be duplicated for groups of students or displayed on a whiteboard or screen. Find broad markers or colored pencils that can be used to fill the thermometer bars efficiently (with the right size marker, an adequate line can be made with a single stroke).

**Setup:** Temperature is obviously an important consideration in human comfort. You might take advantage of the moment to clarify that the average temperature for a month can hide a lot of daily variation, both from day to day and from afternoon to midnight on a single day.

**Procedure:** Use any familiar procedure to make students aware that they are responsible for constructing one or two graphs, after which they will compare the graphs and make generalizations that might be applicable anywhere in the world.

Some teachers choose to spread this activity out over several days, doing one country per day (and perhaps doing an additional country or two as an extension, using Wikipedia or worldclimate.com or the Weather Channel as a source of information about additional cities.

**Answers:** The form of the generalizations may vary, but students should “discover” these ideas:

1. All of the cities in this part of South America have less season-to-season variation in temperature than New York or Chicago.
2. Places at low elevation near the equator tend to be hot every month of the year.
3. Temperatures tend to go down every month as you go higher above sea level in a given region.
4. “Winter” comes in June, July, and August in the southern hemisphere.
5. As you go away from the equator, average annual temperatures go down, and temperatures in winter months go down faster than in summer months.
6. (Optional at this stage, more sophisticated) Temperature differences between winter and summer are a little more extreme for places that are farther inland from the coast in the same general part of the world. Land heats and cools more quickly than water, which is why Omaha and Kansas City have more extreme temperatures than New York and San Francisco.

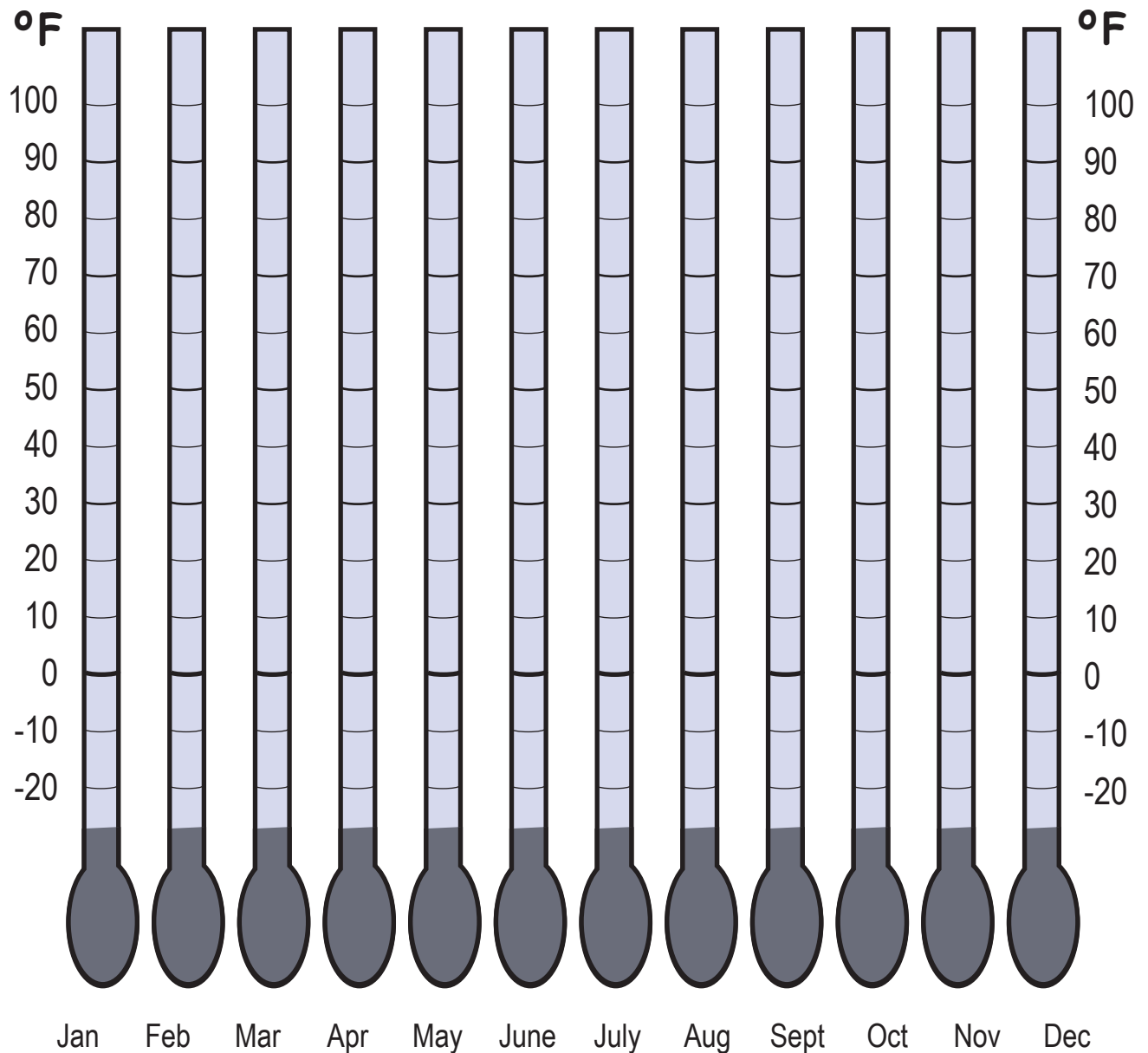
**Debrief:** Later, we will turn the thermograph bars into a line and add precipitation bars to the graph. This will give us the classic Climagraph, which is the topic of one of the GLCEs that are an important part of the information we need to know from a geography class. Knowing the general pattern of temperature and precipitation can then help us understand a lot of other geographic patterns, like where certain animals live, crops can grow, diseases occur. This information can also help us understand many other topics, such as construction problems, recreational opportunities, military strategy, and the use of energy in different places.

**Vocabulary:** temperature season thermograph elevation latitude

**Extension:** make thermographs for any place, using data from Wikipedia, Worldclimate.com, etc.

# A Thermometer Graph That Shows the Temperature in Each Month At

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Describe the weather in this place: