Core units: Inquiry and skills
Illustration 1: Weather maps and climate graphs – Year 7

Climate graphs

Climate graphs are used to illustrate the average temperature and rainfall experienced at a particular place over the course of a year. The graphs consist of a red line graph showing average monthly temperature, and a simple column graph showing average monthly rainfall figures. Rainfall is, by tradition, shown in blue.

Some graphs show both the average daily high and low temperatures for each month. They do this by including two line graphs – the average monthly maximum temperature in red and the average monthly minimum in blue.

Climate statistics

Governments around the world collect climate data. This makes it possible to compare the climate of different places. In Australia, the data is collected by the Bureau of Meteorology from more than 1,000 sites. While many sites have records going back more than 100 years, data is normally released to the public once the Bureau has records dating back 10 years.

Example: New York City

Key climate data for New York City in the United States of America are provided below in Figure 1.

Daily recordings of temperature and precipitation (rainfall) have been processed to produce the average temperature and precipitation for each month.

A yearly average for temperature has been calculated using the monthly averages.

A total rainfall figure has been calculated by adding up all twelve months.

Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
Average maximum temperature (°C)	3.9	5.8	10.3	16.7	22.0	26.7	29.4	28.6	24.4	18.1	12.6	6.6	Av. 17.1
Average minimum temperature (°C)	-2.8	-1.7	1.8	7.1	12.2	17.6	20.5	19.9	16.0	10.0	5.3	0.0	Av. 8.8
Rainfall (mm)	92.7	78.5	110.7	114	106.4	112	116.8	112.8	108.7	111.8	102.1	101.8	Total 1,268

Figure 1: Climate data for New York City, United States of America

Students can use climate data such as these to develop their own climate graphs. An example is provided on the next page.
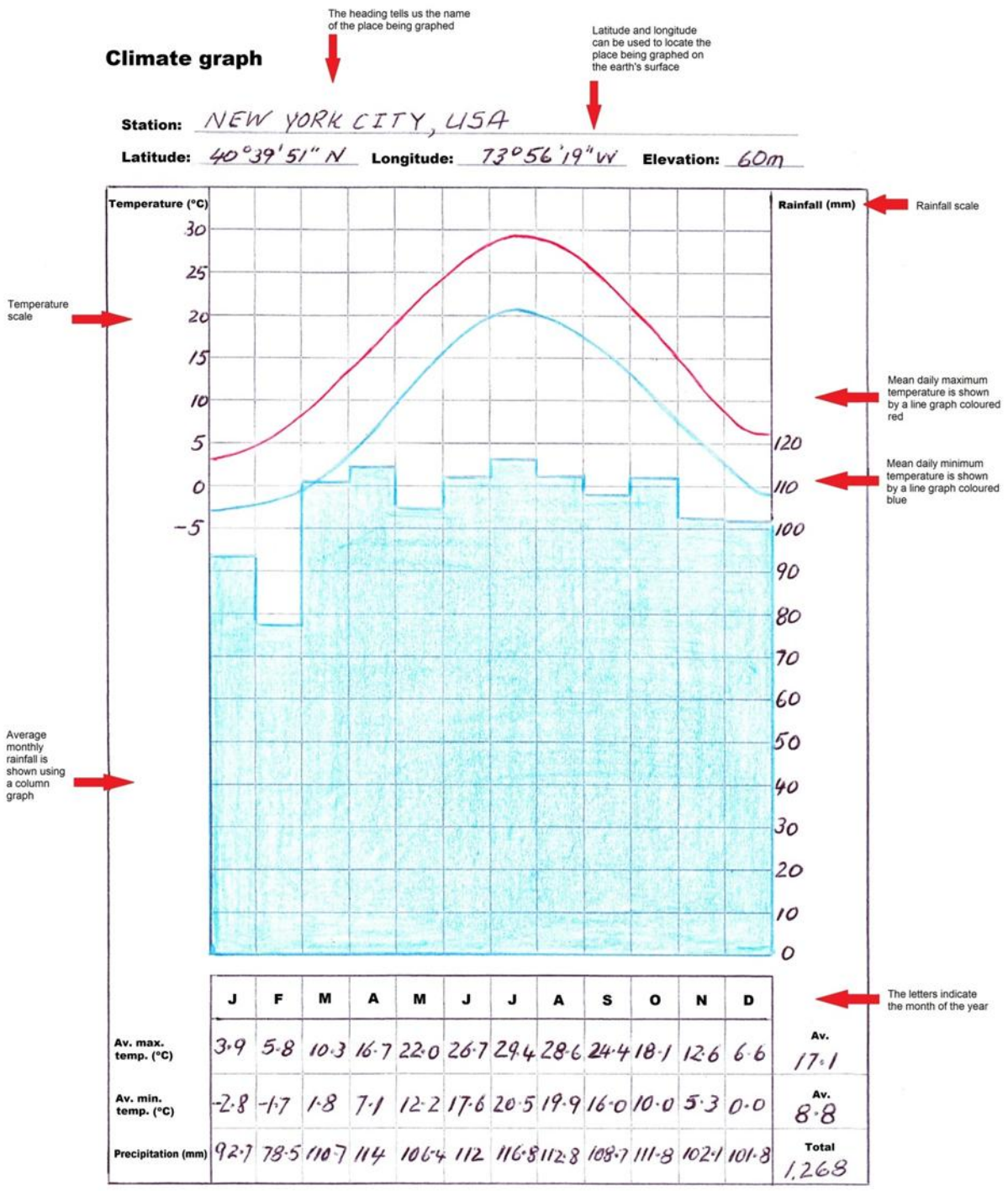
Climate graph

The heading tells us the name of the place being graphed

Latitude and longitude can be used to locate the place being graphed on the earth's surface

Station: NEW YORK CITY, USA

Latitude: 40°39'51" N   Longitude: 73°56'19" W   Elevation: 60m

Temperature (°C)

Rainfall (mm) ← Rainfall scale

Temperature scale →

Mean daily maximum temperature is shown by a line graph coloured red

Mean daily minimum temperature is shown by a line graph coloured blue

Average monthly rainfall is shown using a column graph →

The letters indicate the month of the year

	J	F	M	A	M	J	J	A	S	O	N	D	
Av. max. temp. (°C)	3.9	5.8	10.3	16.7	22.0	26.7	29.4	28.6	24.4	18.1	12.6	6.6	Av. 17.1
Av. min. temp. (°C)	-2.8	-1.7	1.8	7.1	12.2	17.6	20.5	19.9	16.0	10.0	5.3	0.0	Av. 8.8
Precipitation (mm)	92.7	78.5	110.7	114	106.4	112	116.8	112.8	108.7	111.8	102.1	101.8	Total 1,268

Figure 2: Hand-drawn climate graph of New York City using the data in Figure 1

Finding climate data

The websites of the following organisations can be used to locate climate data for a city of your choice.

- World Meteorological Organisation <http://www.wmo.int/pages/index_en.html>
- UK National Weather Service <http://www.metoffice.gov.uk/>
- US National Oceanic and Atmospheric Administration. National Weather Service <http://www.weather.gov/>
- BBC. Weather <http://www.bbc.co.uk/weather/>
- World Climate <http://www.climate-charts.com/>
- The Weather Company. Weatherzone <http://www.weatherzone.com.au/world/ >

Month	J	F	M	A	M	J	J	A	S	O	N	D	Year
Average minimum temperature (°C)	28.5	28.1	24.7	20.1	15.8	12.3	11.5	13.5	16.2	19.6	23.5	26.5	Av. 20.0
Average maximum temperature (°C)	13.5	13.8	11.5	7.0	4.2	1.4	0.0	1.3	4.0	6.7	9.7	11.9	Av. 7.1
Rainfall (mm)	59.8	51.2	55.6	49.3	47.5	37.9	52.4	47.6	65.2	61.9	58.7	46.1	Total 632.6

Figure 3: Climate data for Canberra, Australia

Constructing climate graphs

Climate graphs are constructed using data collected by meteorologists. The main features of a climate graph are shown in Figure 2 (on the previous page).

To construct a climate graph, use the climate graph template and follow the steps below.

1. Select a data source. You can find climate data on the world climate websites mentioned on the previous page.

2. Transfer the temperature and rainfall data from your data source into the table at the base of the climate graph.

3. Locate the wettest month and the months with the highest and lowest temperatures. Use this information to add a suitable scale for both temperature and precipitation (rainfall). Place temperature scale on the graph's left-hand axis and rainfall on the right-hand axis.

4. Plot the rainfall figures. Then colour the columns blue.

5. Plot the average maximum and minimum temperature data, making sure each dot is placed in the centre of the month. Use a red pen or pencil to join the points plotted for the average maximum temperature with a smooth, red curve. Use blue for the line joining the points marking the lowest monthly temperature.

6. Add a heading that includes the name of the place being graphed and its latitude, longitude and elevation.

Describing climate

Figures 4–8 provide the terminology needed to describe the climate of places.

Average monthly temperatures	
Temperature range	**Description**
above 30˚C	very hot
20˚C–30˚C	hot
10˚C–20˚C	warm
0˚C–10˚C	cool
-10˚C–0˚C	cold
below -10˚C	very cold

Figure 4: Describing average monthly temperatures

Annual temperature range	
Temperature range	**Description**
below 5˚C	small
5˚C–15˚C	moderate
15˚C–30˚C	large
above 30˚C	very large

Figure 5: Describing annual temperature range

Annual precipitation		
Cold to warm climates	**Description**	**Hot to very hot climates**
below 250 mm	slight	below 375 mm
250 mm–500 mm	small	375 mm–625 mm
500 mm–1000 mm	adequate	625 mm–1125 mm
1000 m–1500 mm	large	1125 mm–1750 mm
above 1500 mm	very large	above 1750 mm

Figure 6: Describing annual precipitation (rainfall)

Monthly average rainfall	
Amount	**Description**
below 50 mm	dry month
50mm to 150 mm	wet month
above 150 mm	very wet month

Figure 7: Describing monthly averages

Rainfall distribution
Summer rainfall maximum: over 60 per cent in the summer half of the year
Winter rainfall maximum: over 60 per cent in the winter half of the year
Evenly distributed rainfall: no summer or winter maximum

Figure 8: Describing distribution

Activities

1. Access the Bureau of Meteorology's <www.bom.gov.au> long-term climate data for the station closest to where you live. Use this data to construct a climate graph. Compare the climate of the place in which you live with that of New York.

2. Construct climate graphs for Calcutta (in India) and Canberra (in Australia). The data for Calcutta can be accessed at the World Climate <http://www.climate-charts.com/> website. The data for Canberra is provided in Figure 3. Compare the climate of Calcutta to that of the place in which you live and also to Canberra.

3. Use one of the world climate websites to find climate data for a city of your choice. Use this data to construct a climate graph similar to the one shown in Figure 2.

4. Compare your Activity 3 graph with those drawn by your classmates. How do the climates of the cities compare? For example:

    •   Which city has the hottest summer or coldest winter?

    •   Which receives the most precipitation (rainfall)?

5. Using the information in Figures 4–8 to write a paragraph describing the climate of the place in which you live.

6. Using the information in Figures 4–8 to write a paragraph describing the climate of the place you selected in Activity 3.