

# Global Climates

No investigation of the atmosphere is complete without examining the global distribution of the major atmospheric elements and the impact that humans have on weather and climate. Each day we become more aware of the complex relations and delicate balances that exist in the environment. To help understand this complexity, scientists have devised a variety of classification systems that simplify and describe the general weather conditions that occur at various places on Earth.

***Meteorology = the study of the Earth's atmosphere, weather, and climate***

***Weather = the general conditions of the atmosphere at a particular time and place (including temperature, air movements, and moisture content)***

***Climate = the summary of weather conditions at a particular place over a long period of time.***

Climatology involves grouping those geographic areas that have similar weather characteristics. Temperature and precipitation are the two elements most commonly used in climate classifications. However, other methods, using different criteria, have also been developed. It should be remembered that any climate classification is artificial, and its value depends on the intended use.

Since its introduction, the Köppen system, with some modification, has become the best-known and most-used classification for presenting the general world pattern of climates. Before you proceed, it may be beneficial to examine the map of world climates on page 594 in your text, and read section 21-2.

## Using a Climograph

Temperature and precipitation are presented on a climograph (or "climatogram") such as the ones shown in chapter 21 of your text. Average monthly temperatures are connected with a single line and use the scale on one vertical axis. Average precipitation for each month is represented with a bar and uses the scale on the other vertical axis side. The letters across the bottom represent the months of the year.

Refer to the climograph (Figure 1) to answer questions 1-6.

1. At the place represented by the climograph, which month receives the greatest amount of precipitation?
2. The lowest temperature occurs during which month?
3. The location represented in the climograph is most likely in which hemisphere?
4. Which season receives the greatest amount of precipitation?

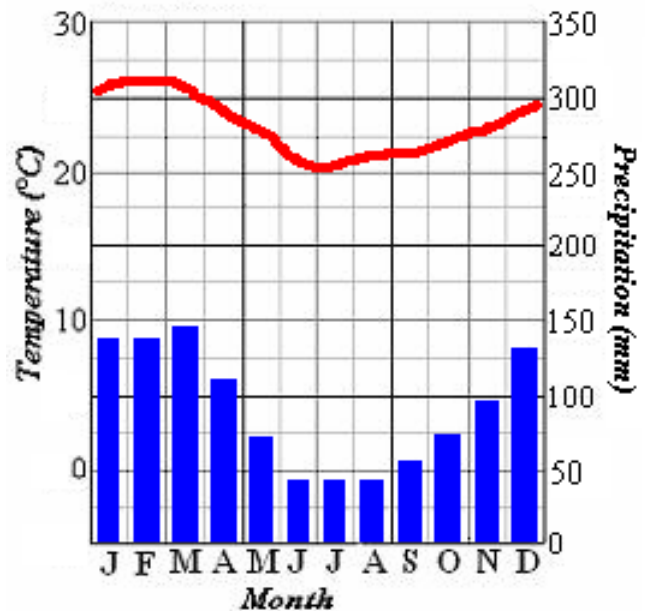


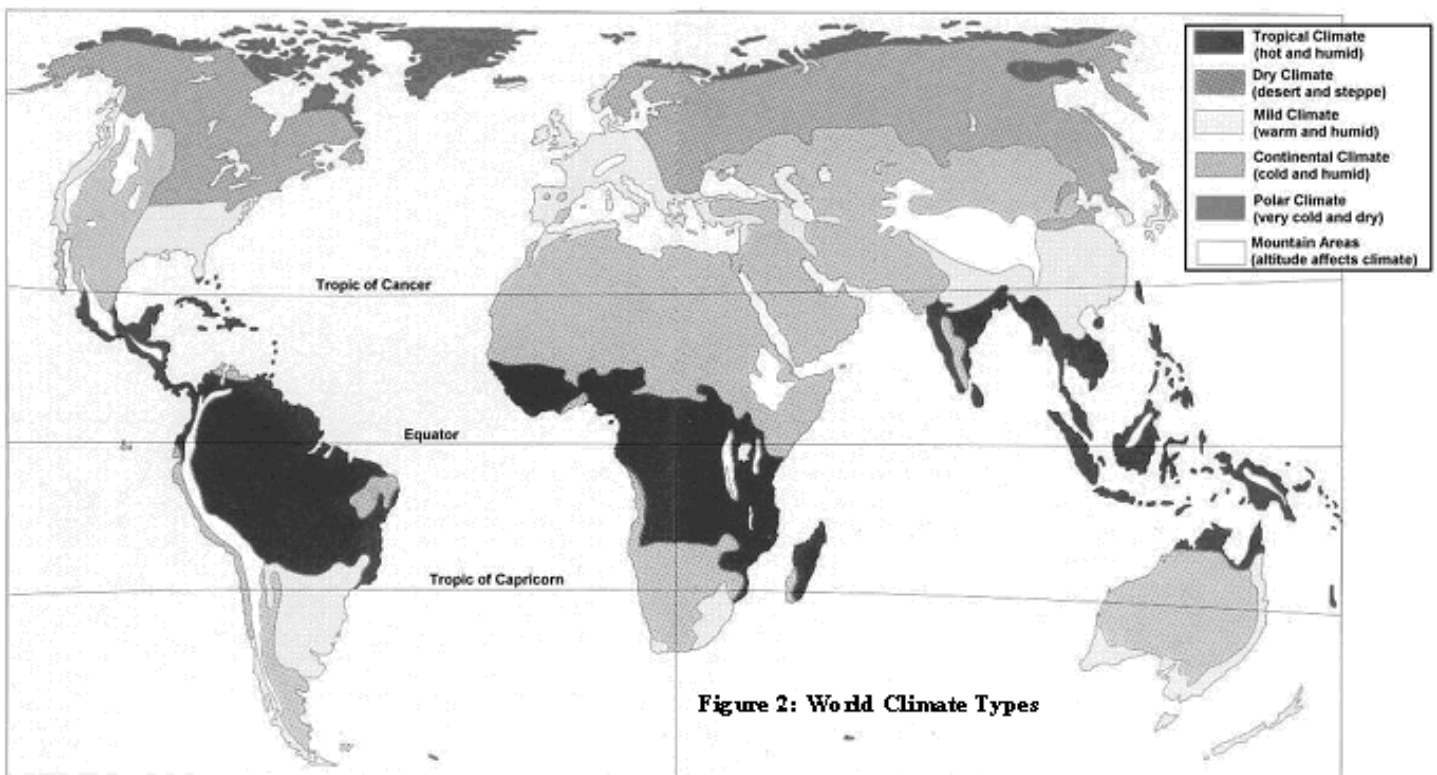
Figure 1: Typical Climograph

# Köppen System of Climate Classification

The Köppen system of climatic classification employs five principal climate groups. Four of the groups are defined on the basis of temperature characteristics and the fifth uses precipitation as its primary criteria. Further division of the groups into climatic types allows for a more detailed description. Wladimir Köppen, a German meteorologist, believed that the distribution of natural vegetation was the best expression of climate types. Therefore, the boundaries chosen between the types are based largely on the limits of certain vegetation growth areas.

- Using your text, list the general characteristics of each principal climate group next to its name and designated classification letter:

Climate Group	Name	Temperature and/or Precipitation Characteristics
A	Humid Tropical	
B	Dry	
C	Humid Mid-Latitude w/ mild winters	
D	Humid Mid-Latitude w/ severe winters	
E	Polar	



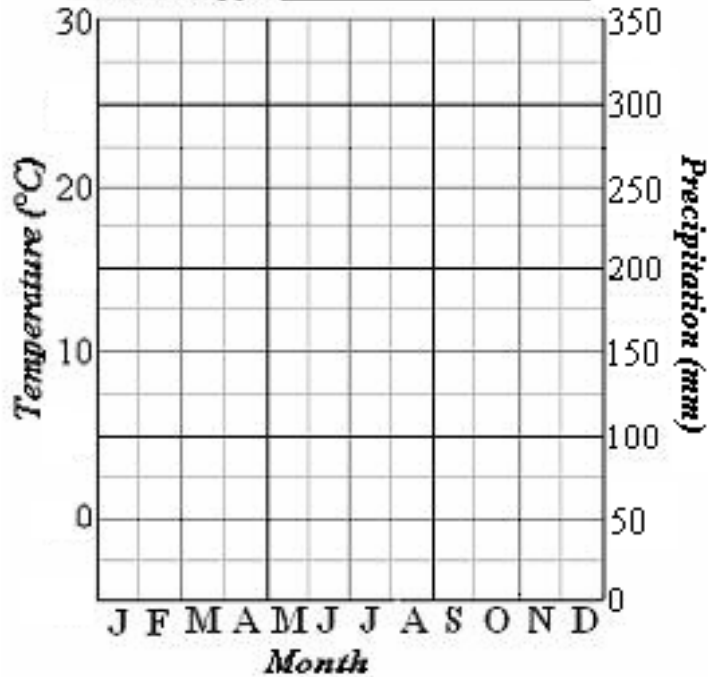
## Humid Tropical (A) Climates

Iquitos, Peru	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	268	254	323	301	267	208	163	166	190	231	249	258	2879
Avg. Temp (°C)	26	26	26	26	26	26	25	26	26	27	27	27	26

With the exception of the dry climates, no other climate covers as large an area on Earth as the humid tropical climates.

Location: \_\_\_\_\_

Climate Type: \_\_\_\_\_



- Plot the monthly temperature and precipitation data for Iquitos, Peru (an A climate) on the blank climograph to the right. Make sure you label the location and climate type.

Use the Iquitos, Peru, climograph you prepared in question 6 to answer questions 7 and 8.

- Describe the yearly variability of temperature for A climates.
- Is the precipitation at Iquitos concentrated in one season or distributed throughout the year? How do you know?

Use the world climate map on pages 594-5 and Figure 2 to answer question 9.

- In what latitude range are Humid Tropical (A) climates located?

## Dry (B) Climates

Of all the climate groups, the dry climates cover the greatest portion of Earth's surface. To be classified as a dry climate does not necessarily imply little or no precipitation, but rather indicates that the yearly precipitation is not as great as the potential loss of moisture by evaporation.

- What are the two types of Dry (B) climates described in your text?
- At what latitudes, North and South, are the most extensive arid areas located?

## Humid Middle-Latitude with Mild Winters (C) Climates

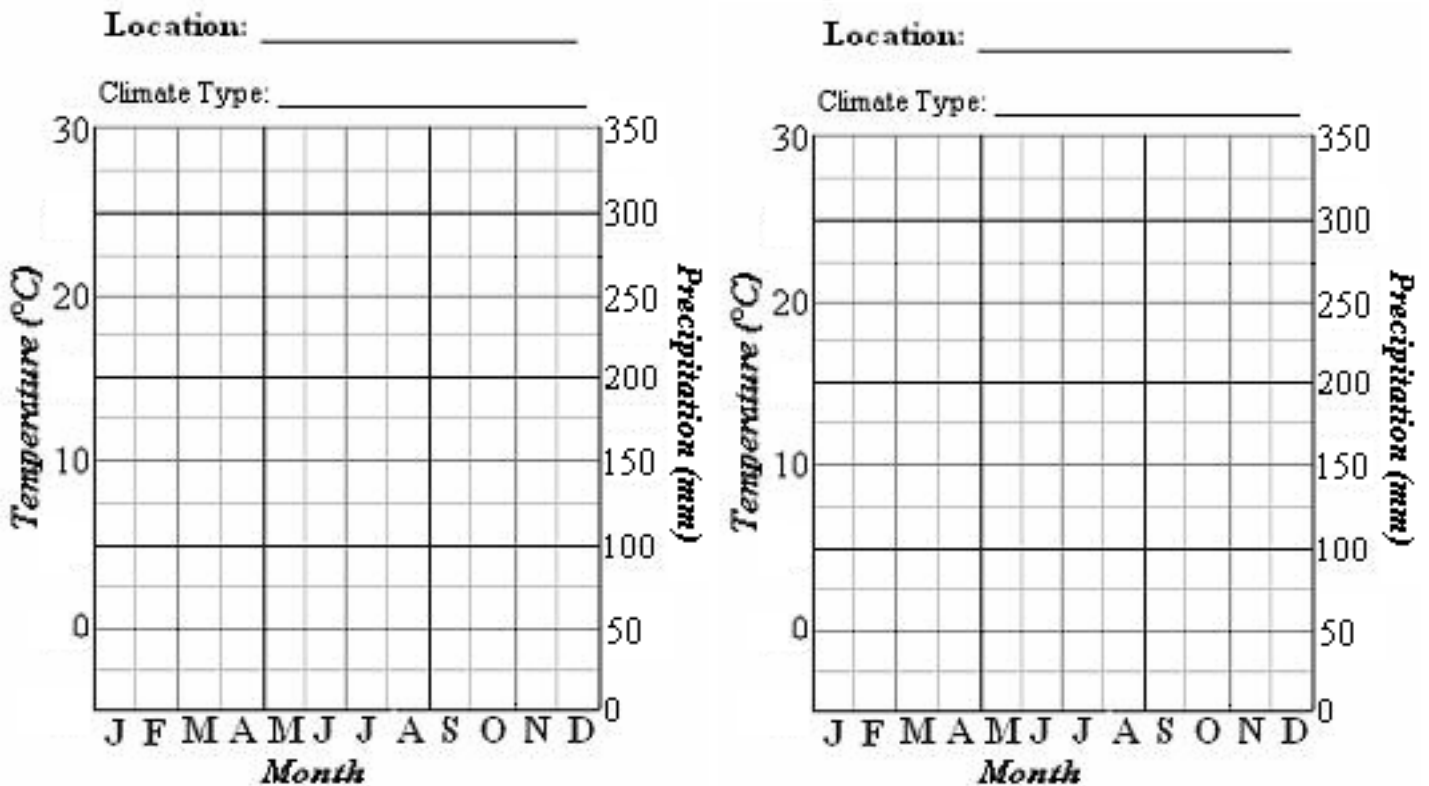
<b>Cary, NC</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	90	92	106	84	93	98	121	117	90	84	82	88	1145
Avg. Temp (°C)	3	5	9	14	19	23	25	24	21	15	10	5	14

<b>San Francisco</b>	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	112	77	78	34	10	4	1	2	7	28	73	91	517
Avg. Temp (°C)	14	16	16	17	17	18	18	19	20	20	17	14	17

A large percentage of the world's population is located in areas with C climates. It is a climate characterized by weather contrasts brought about by changing seasons. On average, the C climate regions are dominated by contrasting air masses and middle-latitude cyclones.

12. What temperature criteria are used to define a C climate?

13. Using the data table, prepare climographs for Cary, NC and San Francisco, CA:



Answer questions 14-16 using the completed climographs

14. In which ways are the temperature curves for Cary and San Francisco similar?

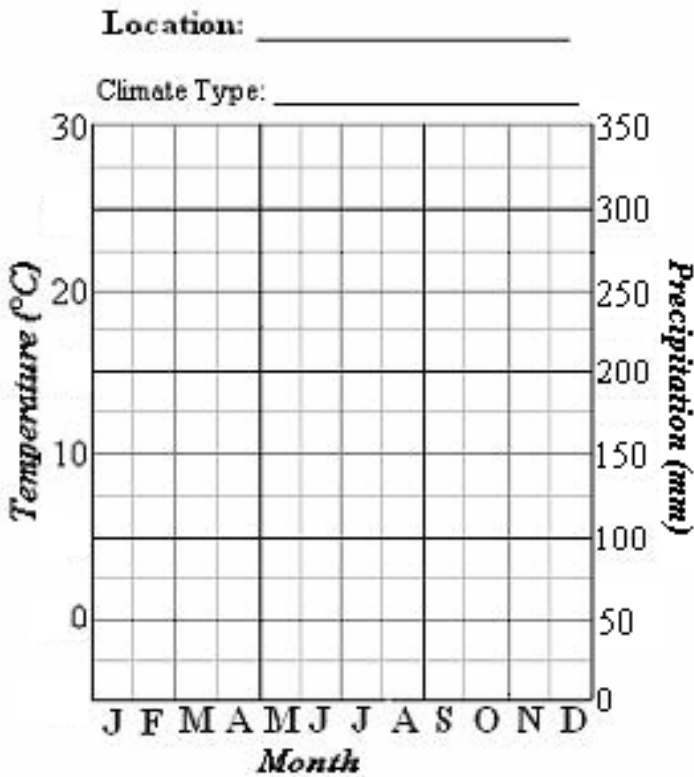
15. How does the annual distribution of precipitation vary between the two cities?

16. What is the difference between the climate of Cary and San Francisco?

## Humid Middle-Latitude with Severe Winters (D) Climates

Detroit, MI	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Rainfall (mm)	48	43	62	77	73	91	79	86	72	57	68	66	822
Avg. Temp (°C)	-5	-4	2	9	15	20	22	21	17	11	5	-2	9

The harsh winters and relatively short growing season restrict agricultural activity in much of the area of D climates. The northern portions of D climate regions are covered by coniferous (evergreen or taiga) forests, with lumber being a significant economic industry.



17. What criteria are used for determining a D climate?

18. Use the data table to plot a climograph for Detroit, MI:

Use the climograph you just constructed for Detroit, MI to answer questions 19 and 20.

19. What is the annual range of temperature in Detroit, MI?

20. During what season does Detroit receive its greatest precipitation and how does this compare with the seasonal distribution of precipitation for San Francisco, CA?

Use the World Climate map (Figure 2 or pages 593-5) to answer the following questions

21. In which hemisphere are D climates only located?

22. Suggest a reason why D climates are located in only one hemisphere.

## Polar (E) Climates

The polar climates, found at high latitudes and scattered high altitudes in mountains, are regions of cold temperatures and sparse populations. Low evaporation rates allow these regions to be classified as humid, even though the annual precipitation is moderate at best.

23. What criteria are used to define an E climate?

24. Contrast the characteristics and locations of the two basic polar climates.