Frequency Distribution and Graphical Representation

Lecture 2

Raw Data (Collected Data)

Frequency Distribution/Tables

Statistical Charts And Graphs

Raw Data

- For example, if a researcher wishes to study the number of people who were bitten by poisonous snakes in a specific geographic area over the past several years, he or she has to gather the data from various doctors, hospitals, or health departments. After that he will organize data in table(Frequency Distribution) then in graphs and charts

Frequency Distribution

A frequency distribution is the organization of raw data in table form, using classes and frequencies. For Example

Twenty-five army inductees were given a blood test to determine their blood type. The data set is

A	B	B	AB	O
O	O	B	AB	B
B	B	O	A	O
A	O	O	O	AB
AB	A	O	B	A

Construct a frequency distribution for the data.

Make a table as shown.

A Class	B Tally	C Frequency	D Percent
A B O AB			

A Class	B Tally	C Frequency	D Percent
A	𝍸	5	20
B	𝍸 //	7	28
O	𝍸 ////	9	36
AB	////	4	16
		Total 25	100%

For the sample, more people have type O blood than any other type.

Grouped Frequency Distribution

Class limits	Class boundaries	Tally	Frequency
58–64	57.5–64.5	/	1
65–71	64.5–71.5	𝍸 /	6
72–78	71.5–78.5	𝍸 𝍸	10
79–85	78.5–85.5	𝍸 𝍸 ////	14
86–92	85.5–92.5	𝍸 𝍸 //	12
93–99	92.5–99.5	𝍸	5
100–106	99.5–106.5	//	2
			Total 50

Grouped Frequency Distribution

Upper Class Limit

Lower Class Limit

Class/group

Here total Classes are 7

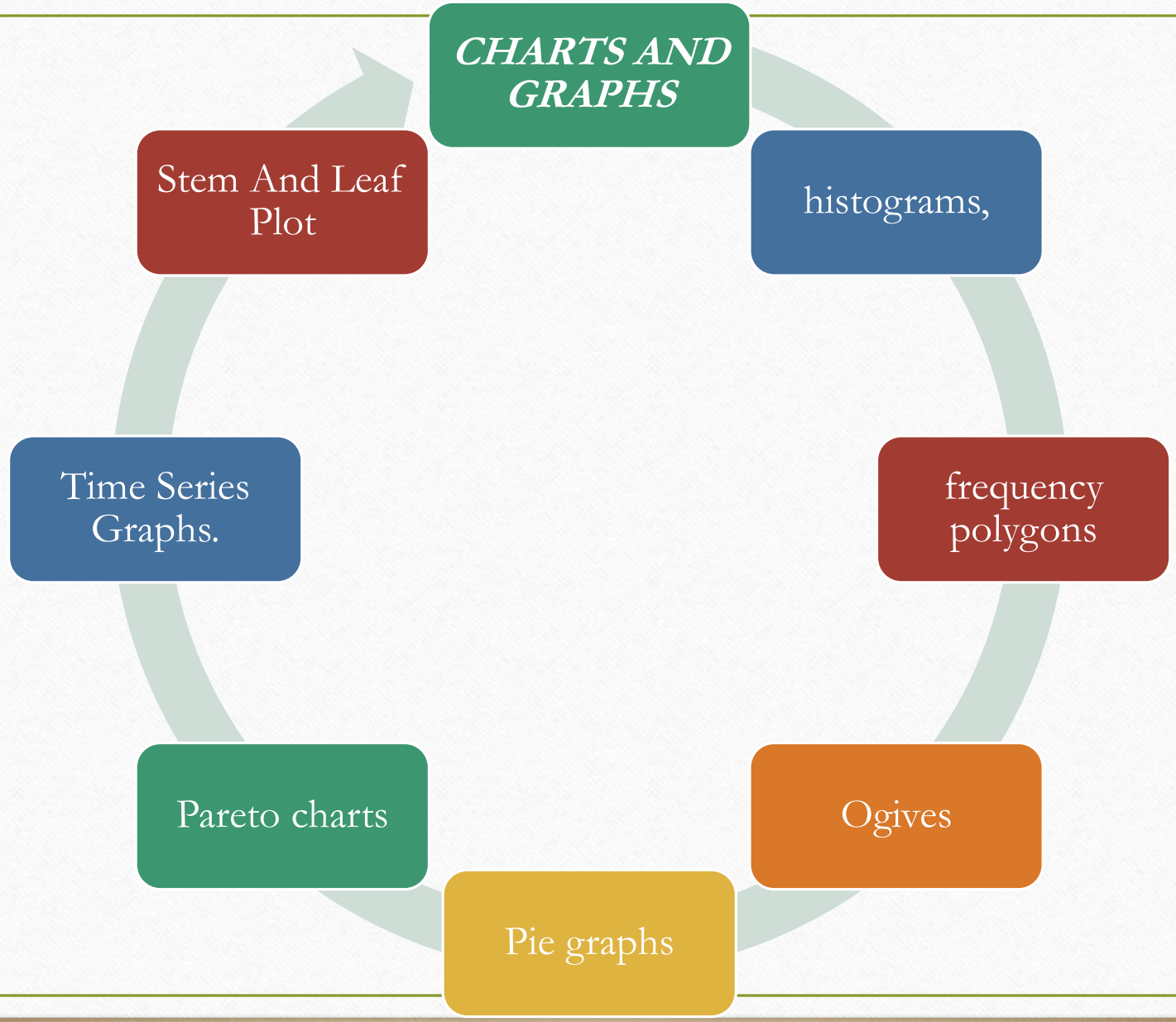
Class limits	Class boundaries	Tally	Frequency
58–64	57.5–64.5	/	1
65–71	64.5–71.5	𝍸 /	6
72–78	71.5–78.5	𝍸 𝍸	10
79–85	78.5–85.5	𝍸 𝍸 ////	14
86–92	85.5–92.5	𝍸 𝍸 //	12
93–99	92.5–99.5	𝍸	5
100–106	99.5–106.5	//	2
			Total 50

Graphs and Charts

Graphs are effectively useful in getting the audience's attention in a publication or a speaking presentation.

Most commonly used graphs in research are

1. The histogram. 2. The frequency polygon.
3. The cumulative frequency graph, or ogive (pronounced o-jive).


CHARTS AND GRAPHS
histograms,
frequency polygons
Ogives
Pie graphs
Pareto charts
Time Series Graphs.
Stem And Leaf Plot

The Histogram

The histogram is a graph that displays the data by using contiguous vertical bars (unless the frequency of a class is 0) of various heights to represent the frequencies of the classes.
For Example

Construct a histogram to represent the data shown for the record high temperatures for each of the 50 states (see Example 2–2).

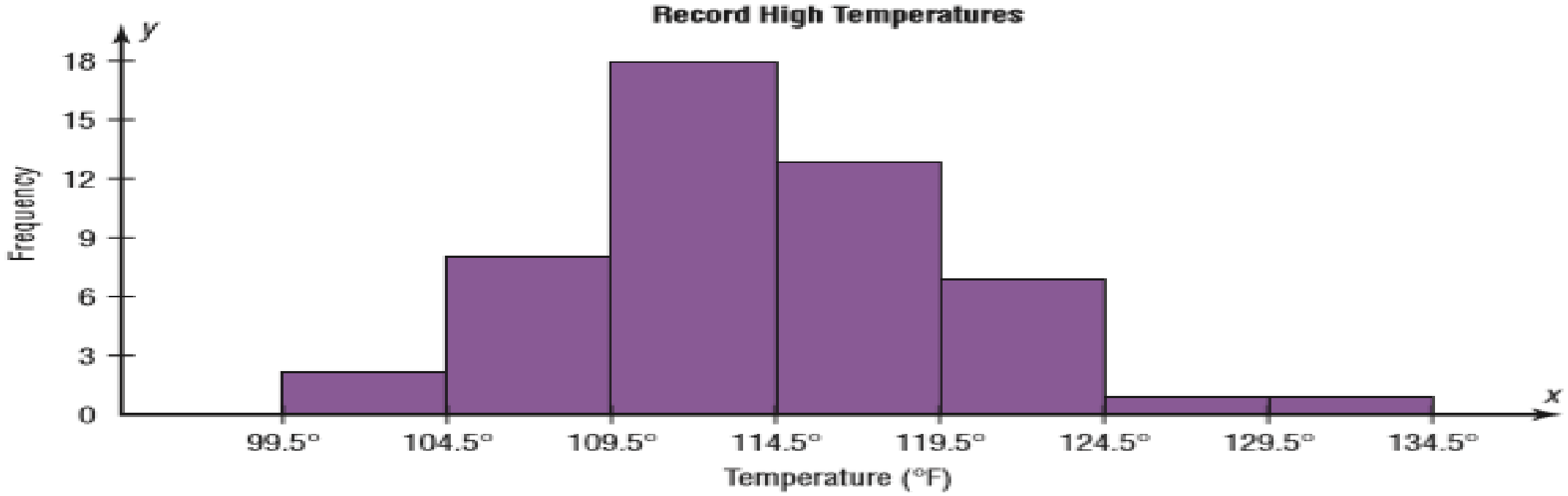
Class boundaries	Frequency
99.5–104.5	2
104.5–109.5	8
109.5–114.5	18
114.5–119.5	13
119.5–124.5	7
124.5–129.5	1
129.5–134.5	1

Step 1 Draw and label the x and y axes. The x axis is always the horizontal axis, and the y axis is always the vertical axis.

Step 2 Represent the frequency on the y axis and the class boundaries on the x axis.

Step 3 Using the frequencies as the heights, draw vertical bars for each class. See Figure 2–1.

FIGURE 2–1 Histogram for Example 2–4



The Frequency Polygon

The frequency polygon is a graph that displays the data by using lines that connect points plotted for the frequencies at the midpoints of the classes. The frequencies are represented by the heights of the points.

For Example: Construct the Frequency Polygon

Class boundaries	Frequency
99.5–104.5	2
104.5–109.5	8
109.5–114.5	18
114.5–119.5	13
119.5–124.5	7
124.5–129.5	1
129.5–134.5	1

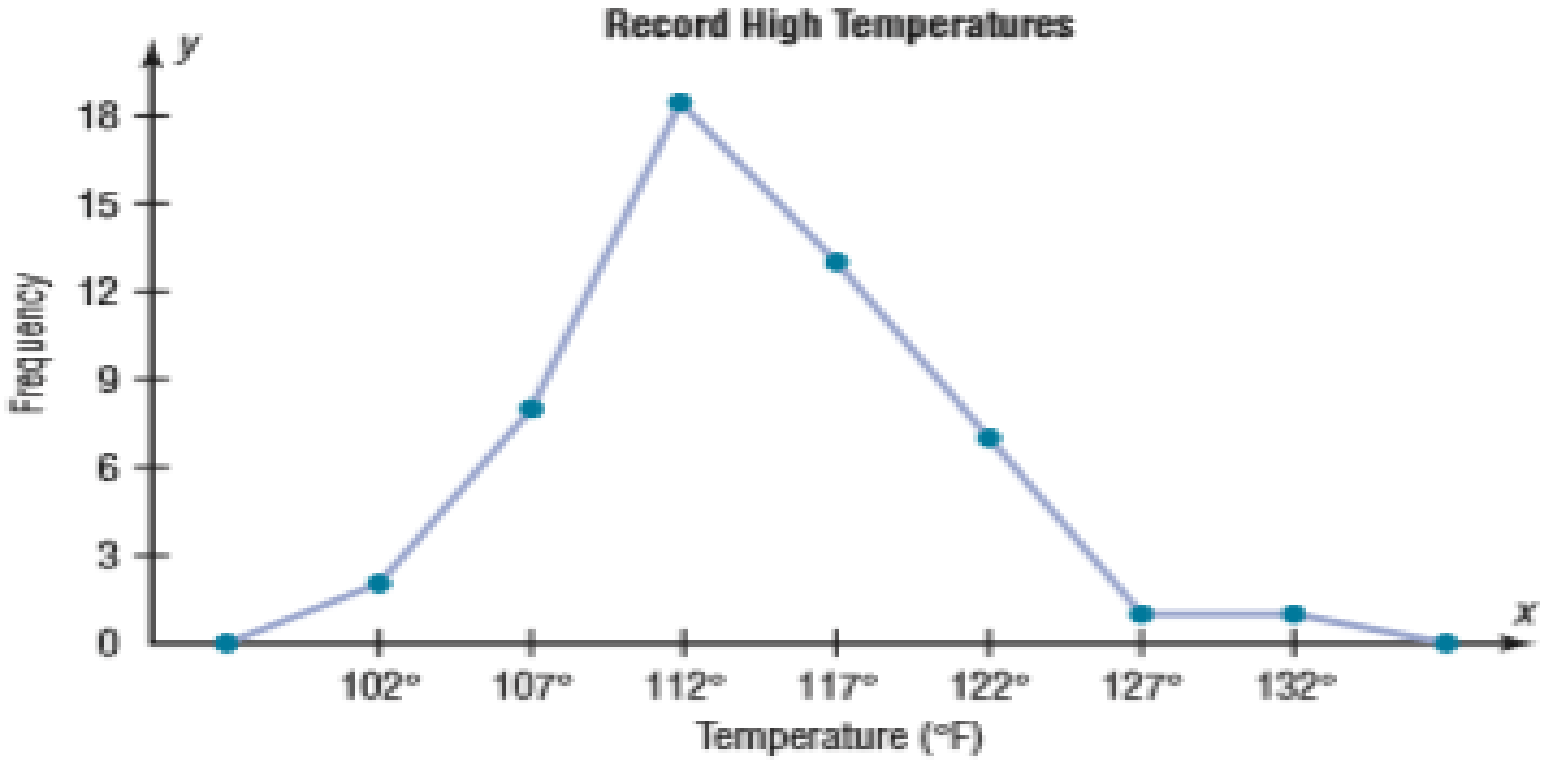
Solution: Step 1 Find the midpoints of each class.

Class boundaries	Midpoints	Frequency
99.5–104.5	102	2
104.5–109.5	107	8
109.5–114.5	112	18
114.5–119.5	117	13
119.5–124.5	122	7
124.5–129.5	127	1
129.5–134.5	132	1

Step 2 Draw the x and y axes. Label the x axis with the midpoint of each class, and then use a suitable scale on the y axis for the frequencies.

Step 3 Using the midpoints for the x values and the frequencies as the y values, plot the points.

Step 4 Connect adjacent points with line segments. Draw a line back to the x axis at the beginning and end of the graph, at the same distance that the previous and next midpoints would be located, as shown in Figure 2–2.



The Ogive

The ogive is a graph that represents the cumulative frequencies for the classes in a frequency distribution.

For Example: Construct the Ogive

Class boundaries	Frequency
99.5–104.5	2
104.5–109.5	8
109.5–114.5	18
114.5–119.5	13
119.5–124.5	7
124.5–129.5	1
129.5–134.5	1

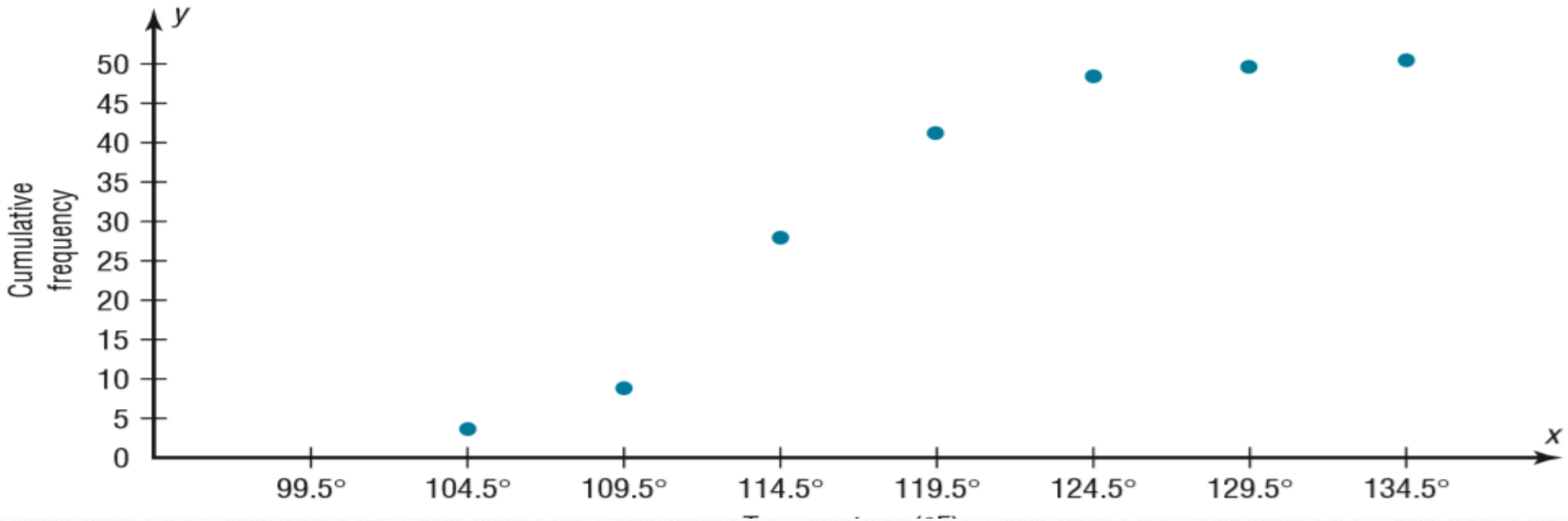
Step 1 Find the cumulative frequency for each class.

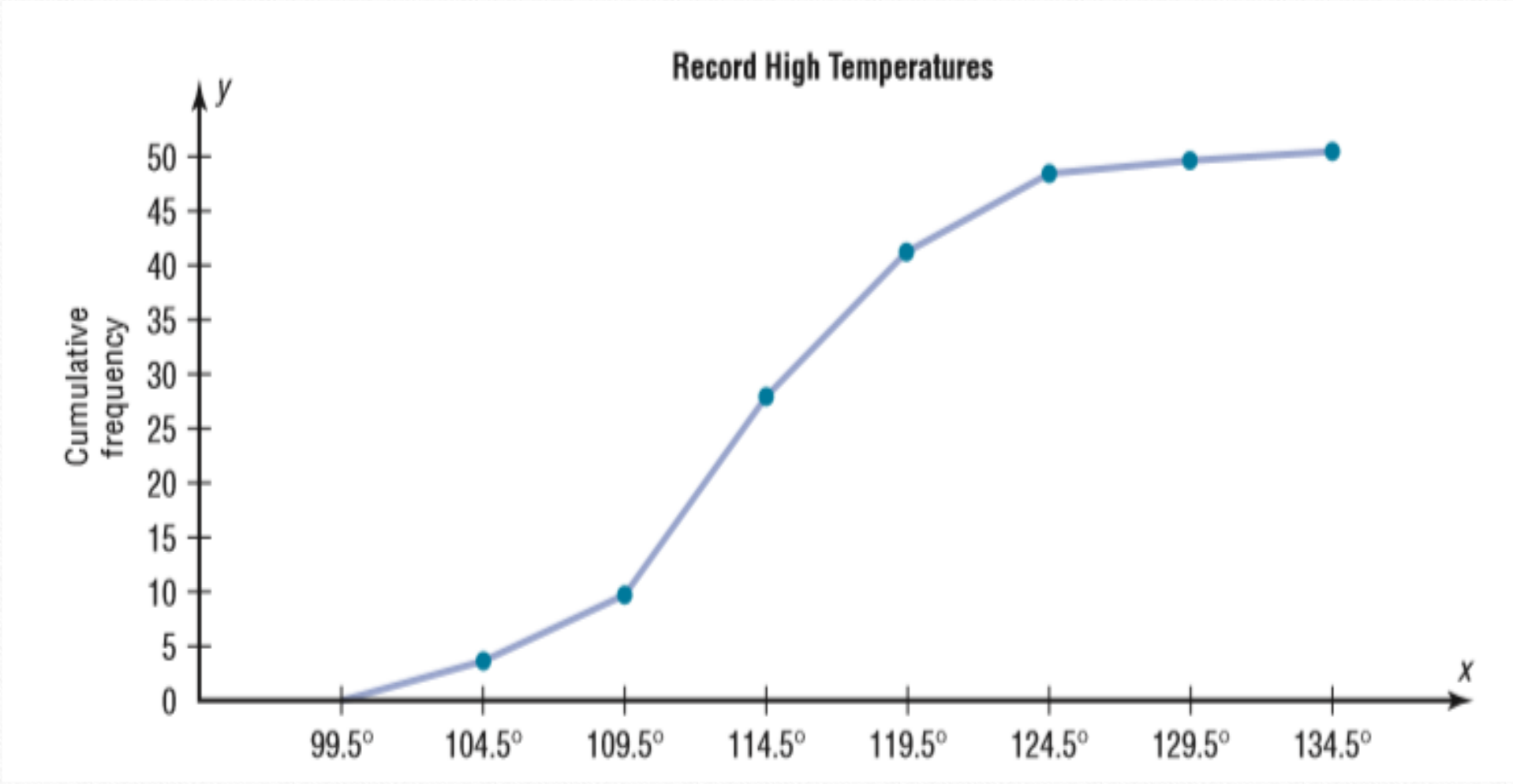
	Cumulative frequency
Less than 99.5	0
Less than 104.5	2
Less than 109.5	10
Less than 114.5	28
Less than 119.5	41
Less than 124.5	48
Less than 129.5	49
Less than 134.5	50

Step 2 Draw the x and y axes. Label the x axis with the class boundaries. Use an appropriate scale for the y axis to represent the cumulative frequencies. (Depending on the numbers in the cumulative frequency columns, scales such as 0, 1, 2, 3, . . . , or 5, 10, 15, 20, . . . , or 1000, 2000, 3000, . . . can be used. Do *not* label the y axis with the numbers in the cumulative frequency column.) In this example, a scale of 0, 5, 10, 15, . . . will be used.

Step 3 Plot the cumulative frequency at each upper class boundary, as shown in Figure 2–3. Upper boundaries are used since the cumulative frequencies represent the number of data values accumulated up to the upper boundary of each class.

Step 4 Starting with the first upper class boundary, 104.5, connect adjacent points with line segments, as shown in Figure 2–4. Then extend the graph to the first lower class boundary, 99.5, on the *x* axis.




Record High Temperatures
y
Cumulative frequency
50
45
40
35
30
25
20
15
10
5
0
x
99.5°
104.5°
109.5°
114.5°
119.5°
124.5°
129.5°
134.5°

The Pie Graph

A pie graph is a circle that is divided into sections or wedges according to the percentage of frequencies in each category of the distribution.

Example

Construct and analyze a pie graph for the calls received each shift by a local municipality for 2011. (Data obtained by author.)

Shift	Frequency
1. Day	2594
2. Evening	2800
3. Night	2436
	7830

Solution:

Step 1 Find the number of degrees for each shift, using the formula:

$$\text{Degrees} = \frac{f}{n} \cdot 360^\circ$$

For each shift, the following results are obtained:

$$\text{Day: } \frac{2594}{7830} \cdot 360^\circ = 119^\circ$$

$$\text{Evening: } \frac{2800}{7830} \cdot 360^\circ = 129^\circ$$

$$\text{Night: } \frac{2436}{7830} \cdot 360^\circ = 112^\circ$$

Step 2 Find the percentages:

$$\text{Day: } \frac{2594}{7830} \cdot 100 = 33\%$$

$$\text{Evening: } \frac{2800}{7830} \cdot 100 = 36\%$$

$$\text{Night: } \frac{2436}{7830} \cdot 100 = 31\%$$

Step 3 Using a protractor, graph each section and write its name and corresponding percentage as shown in Figure 2–15.