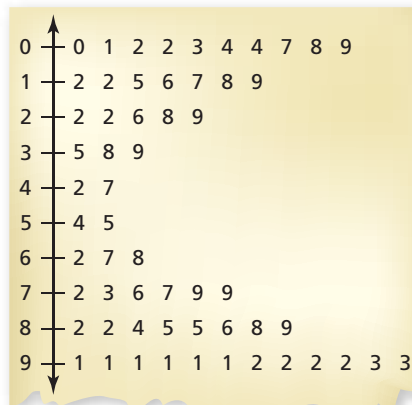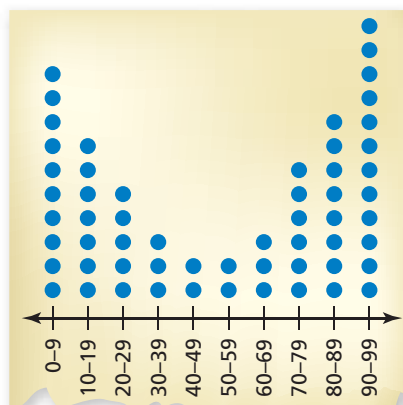# 8.1 Stem-and-Leaf Plots

Essential Question How can you use a stem-and-leaf plot to organize a set of numbers?

1 ACTIVITY: Decoding a Graph

Work with a partner. You intercept a secret message that contains two different types of plots. You suspect that each plot represents the same data. The graph with the dots indicates only ranges for the numbers.

Stem	Leaves
0	0 1 2 2 3 4 4 7 8 9
1	2 2 5 6 7 8 9
2	2 2 6 8 9
3	5 8 9
4	2 7
5	4 5
6	2 7 8
7	2 3 6 7 9 9
8	2 2 4 5 5 6 8 9
9	1 1 1 1 1 1 2 2 2 2 3 3

a. How many numbers are in the data set? How can you tell?

b. How many numbers are greater than or equal to 90? How can you tell?

c. Is 91 in the data set? If so, how many times is it in the set? How can you tell?

d. Make a list of all of the numbers in the data set.

e. You intercept a new secret message. Use the secret code shown below to decode the message.
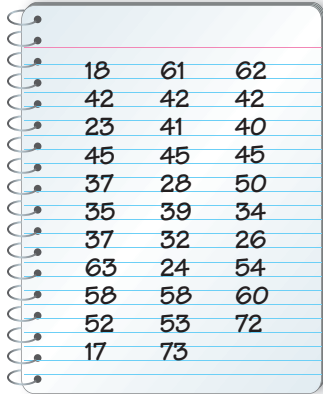
Secret Code

A = 29	F = 31	K = 18	P = 4	U = 19
B = 33	G = 8	L = 26	Q = 10	V = 17
C = 7	H = 16	M = 22	R = 21	W = 12
D = 20	I = 5	N = 3	S = 2	X = 25
E = 15	J = 11	O = 9	T = 32	Y = 13
				Z = 1

32 16 15   2 32 15 22   2 16 9 12 2   32 16 15   32 15 3 2

32 16 15   26 15 29 17 15 2   2 16 9 12   32 16 15   9 3 15 2

2 ACTIVITY: Organizing Data

Work with a partner. You are working on an archeological dig. You find several arrowheads.

18	61	62
42	42	42
23	41	40
45	45	45
37	28	50
35	39	34
37	32	26
63	24	54
58	58	60
52	53	72
17	73	

50 mm

As you find each arrowhead, you measure its length (in millimeters) and record it in a notebook.

a. Use a stem-and-leaf plot to organize the lengths.

b. Find the mean length.

c. Find the median length.

d. Describe the distribution of the data.

3 ACTIVITY: Conducting an Experiment

Work with a partner. Use two number cubes to conduct the following experiment.

● **Toss the cubes four times and total the results.**

Sample: $2 + 3 \;+\; 2 + 2 \;+\; 3 + 5 \;+\; 6 + 3 \;= 26$

    1st   2nd   3rd   4th
    toss   toss   toss   toss

So, 26 is the first number.

● **Repeat this process 29 more times.**

● **Use a stem-and-leaf plot to organize your results.**

● **Describe your results.**

What Is Your Answer?

4. IN YOUR OWN WORDS How can you use a stem-and-leaf plot to organize a set of numbers?

5. RESEARCH Find a career in which a person collects and organizes data. Describe how data are collected and organized in that career.

Practice

Use what you learned about stem-and-leaf plots to complete Exercises 4–7 on page 352.

Key Vocabulary
stem-and-leaf plot,
  p. 350
stem, *p. 350*
leaf, *p. 350*

Key Idea

Stem-and-Leaf Plots

A **stem-and-leaf plot** uses the digits of data values to organize a data set. Each data value is broken into a **stem** (digit or digits on the left) and a **leaf** (digit or digits on the right).

A stem-and-leaf plot shows how data are distributed.

Stem	Leaf
2	0 0 1 2 5 7
3	1 4 8
4	2
5	8 9

Key: 2|0 = 20

The *key* explains what the stems and leaves represent.

EXAMPLE 1 Making a Stem-and-Leaf Plot

	A	B
1	DATE	MINUTES
2	JULY 9	55
3	JULY 9	3
4	JULY 9	6
5	JULY 10	14
6	JULY 10	18
7	JULY 10	5
8	JULY 10	23
9	JULY 11	30
10	JULY 11	23
11	JULY 11	10
12	JULY 11	2
13	JULY 11	36

Make a stem-and-leaf plot of the length of the 12 cell phone calls.

Step 1: Order the data.

2, 3, 5, 6, 10, 14, 18, 23, 23, 30, 36, 55

Step 2: Choose the stems and leaves. Because the data values range from 2 to 55, use the *tens* digits for the stems and the *ones* digits for the leaves.

Step 3: Write the stems to the *left* of the vertical line.

Step 4: Write the leaves for each stem to the *right* of the vertical line.

Phone call lengths

Stem	Leaf
0	2 3 5 6
1	0 4 8
2	3 3
3	0 6
4	
5	5

Order the stems vertically. The stem for data values less than 10 is 0.

Write the leaves horizontally.

Include stems without leaves.

Key: 1|4 = 14 minutes

On Your Own

Now You're Ready
Exercises 8–11

1. Make a stem-and-leaf plot of the hair lengths.

Hair Length (centimeters)									
5	1	20	12	27	2	30	5	7	38
40	47	1	2	1	32	4	44	33	23

Multi-Language Glossary at BigIdeasMath.com.

EXAMPLE 2 Interpreting a Stem-and-Leaf Plot

Test Scores

Stem	Leaf
6	6
7	0 5 7 8
8	1 1 3 4 4 6 8 8 9
9	0 2 9
10	0

Key: 9 | 2 = 92 points

The stem-and-leaf plot shows student test scores. **(a) How many students scored less than 80 points? (b) How many students scored at least 90 points? (c) How are the data distributed?**

a. There are five scores less than 80 points: 66, 70, 75, 77, and 78.

⋮⋗ Five students scored less than 80 points.

b. There are four scores of at least 90 points: 90, 92, 99, and 100.

⋮⋗ Four students scored at least 90 points.

c. There are few low test scores and few high test scores. So, most of the scores are in the middle.

On Your Own

Now You're Ready
Exercises 16–19

2. Use the grading scale at the right.

a. How many students received a B on the test?

b. How many students received a C on the test?

A: 90–100
B: 80–89
C: 70–79
D: 60–69
F: 59 and below

EXAMPLE 3 Standardized Test Practice

Which statement is *not* true?

Ⓐ Most of the plants are less than 20 inches tall.

Ⓑ The median plant height is 11 inches.

Ⓒ The range of the plant heights is 35 inches.

Ⓓ The plant height that occurs most often is 11 inches.

Plant Heights

Stem	Leaf
0	1 2 4 5 6 8 9
1	0 1 1 5 7
2	2 5
3	6

Key: 1 | 5 = 15 inches

There are 15 plant heights. So, the median is the eighth data value, 10 inches.

⋮⋗ The correct answer is Ⓑ.

On Your Own

3. You are told that three plants are taller than 20 inches. Is the statement true? Explain.

✓ **Vocabulary and Concept Check**

1. **VOCABULARY** The key for a stem-and-leaf plot is $3|4 = 34$. Which number is the stem? the leaf?

2. **WRITING** Describe how to make a stem-and-leaf plot for the data values 14, 22, 9, 13, 30, 8, 25, and 29.

3. **WRITING** How does a stem-and-leaf plot show the distribution of data?

📝 **Practice and Problem Solving**

Use the stem-and-leaf plot at the right.

4. How many data values are in the set?

5. What is the least value? greatest value?

6. What is the median? range?

7. Is the value 32 in the set? Explain.

Stem	Leaf
0	4 6 8
1	0
2	3 4
3	0 6 6 9
4	2

Key: 3|6 = 36

Make a stem-and-leaf plot of the data.

① 8.

Books Read			
26	15	20	9
31	25	29	32
17	26	19	40

9.

Hours Online			
8	12	21	14
18	6	15	24
12	17	2	0

10.

Test Scores (%)				
87	82	95	91	69
88	68	87	65	81
97	85	80	90	62

11.

Points Scored				
58	50	42	71	75
45	51	43	38	71
42	70	56	58	43

12. **ERROR ANALYSIS** Describe and correct the error in making a stem-and-leaf plot of the data.

51, 25, 47, 42, 55, 26, 50, 44, 55

✗
Stem	Leaf
2	5 6
4	2 4 7
5	0 1 5 5

Key: 4|2 = 42

13. **PUPPIES** The weights (in pounds) of eight puppies at a pet store are 12, 24, 17, 8, 18, 31, 24, and 15. Make a stem-and-leaf plot of the data. Describe the distribution of the data.

Make a stem-and-leaf plot of the data.

14.

Bikes Sold			
78	112	105	99
86	96	115	100
79	81	99	108

15.

Minutes in Line			
4.0	2.6	1.9	3.1
3.6	2.2	2.7	3.8
1.6	2.0	3.1	2.9

VOLLEYBALL The stem-and-leaf plot shows the number of digs for the top 15 players at a volleyball tournament.

② **16.** How many players had more than 60 digs?

17. Find the mean, median, mode, and range of the data.

18. Describe the distribution of the data.

19. Which data value is the outlier? Describe how the outlier affects the mean.

Stem	Leaf
4	1 1 3 3 5
5	0 2 3 4
6	2 3 3 7
7	5
8	
9	7

Key: 5|0 = 50 digs

20. **RESEARCH** Use the Internet to find the heights of the players on your favorite professional sports team.

  a. Make a stem-and-leaf plot of the data.

  b. Analyze the stem-and-leaf plot and make two conclusions about the heights.

21. **OPEN-ENDED** Describe a real-life situation with eight data values that has a median of 33. Make a stem-and-leaf plot of the data.

22. **Critical Thinking** Make a frequency table and a stem-and-leaf plot of the bowling scores in the table. Compare and contrast the two data displays. Which display is better for showing how the data are distributed? Explain.

Bowling Scores					
131	108	115	140	152	122
120	118	156	142	112	107
136	85	127	119	136	125

Fair Game Review What you learned in previous grades & lessons

Draw the solid. *(Section 6.1)*

23. Square pyramid

24. Hexagonal prism

25. Cone

26. Cylinder

27. **MULTIPLE CHOICE** In a bar graph, what determines the length of each bar? *(Skills Review Handbook)*

  Ⓐ Frequency   Ⓑ Data value   Ⓒ Leaf   Ⓓ Change in data