9.2 Stem-and-Leaf Plots

Focus on...
- stem-and-leaf plots

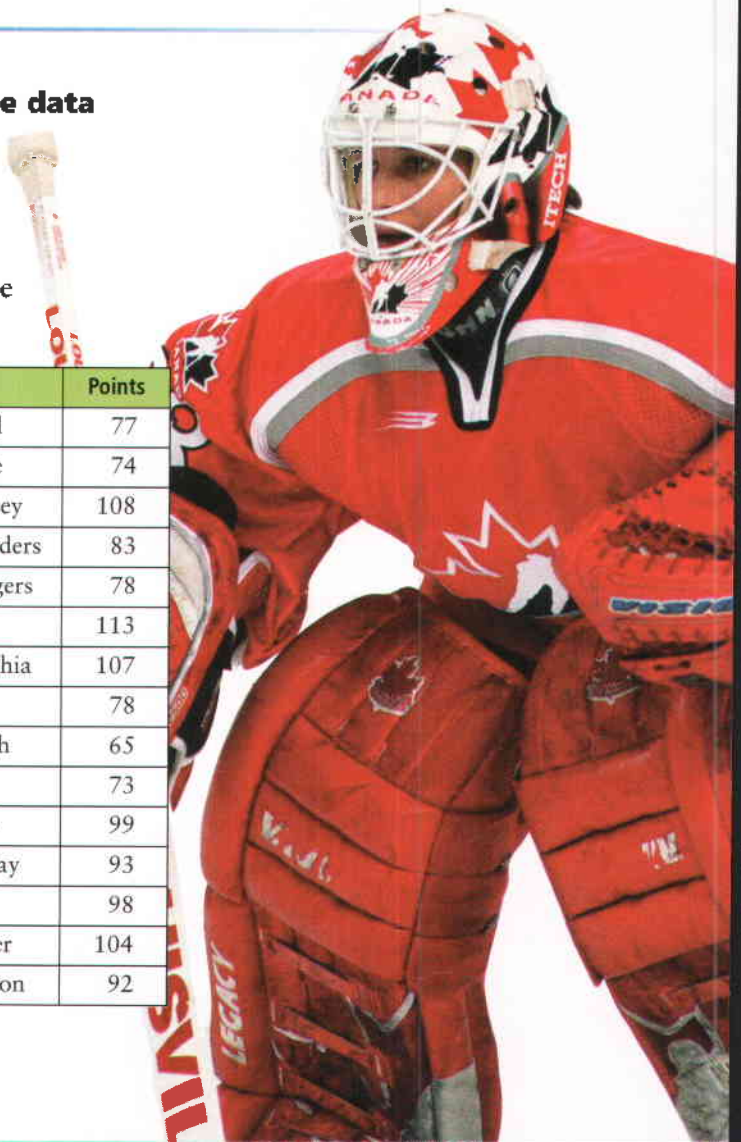
Canadian heroes like Manon Rheaume and Hayley Wickenheiser are partly responsible for the increasing interest in Canadian women's hockey. As the game becomes more popular, the amount of data increases. How can you organize the data you collect about *your* sports heroes?

Discover the Math

How can you reorganize data into numeric groups?

The table shows the final regular season standings in the National Hockey League (NHL) for a recent year.

Team	Points	Team	Points
Anaheim	95	Montréal	77
Atlanta	74	Nashville	74
Boston	87	New Jersey	108
Buffalo	72	NY Islanders	83
Calgary	75	NY Rangers	78
Carolina	61	Ottawa	113
Chicago	79	Philadelphia	107
Colorado	105	Phoenix	78
Columbus	69	Pittsburgh	65
Dallas	111	San Jose	73
Detroit	110	St. Louis	99
Edmonton	92	Tampa Bay	93
Florida	70	Toronto	98
Los Angeles	78	Vancouver	104
Minnesota	95	Washington	92



1. Explain how the data values in the table are organized.

2. **a)** Which team had the greatest point total?
   b) Which team had the least point total?
   c) Which team had the fifth greatest point total?
   d) Describe how you found your answers.

3. **a)** How many teams had points in the 60s? List the scores.
   b) How many teams had points in the 70s? List the scores.
   c) How many teams had points in the 80s? List the scores.
   d) How many teams had points in the 90s? List the scores.

4. **Reflect** In what ways might you organize data to help you find numerical information?

Example 1: Read and Interpret a Stem-and-Leaf Plot

A **stem-and-leaf plot** arranges data into groups of increasing order. The following stem-and-leaf plot shows the NHL data from the Discover.

Stem (tens)	Leaf (ones)
6	1 5 9
7	0 2 3 4 4 5 7 8 8 8 9
8	3 7
9	2 2 3 5 5 8 9
10	4 5 7 8
11	0 1 3

For this data set, the stems represent the tens digit. The leaves represent the ones digit.

stem-and-leaf plot
- a way of organizing numerical data by representing part of each number as a stem and the other part of the number as a leaf

a) How many teams scored in the 60s? What were their point totals?
b) What stem contains the most data?
c) What was the most common point total?

Solution

a)

Stem (tens)	Leaf (ones)
6	1 5 9

Stem: 6 — Leaves: 1 5 9

b) Stem 7 has the most data. It has 11 leaves.

c) There are three 8s in stem 7.

7 | 0 2 3 4 4 5 7 8 8 8 9

These represent 78s. So, 78 is the most common total.

Example 2: Create a Stem-and-Leaf Plot

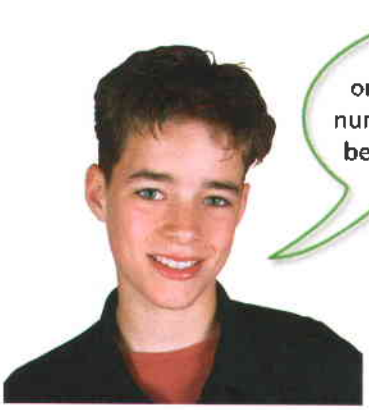
Here are scores for a figure skating competition.

6.2	7.1	5.7	9.3	7.7	6.4	4.7	5.2	7.0	8.5
7.5	5.3	8.2	9.6	7.1	7.3	5.9	6.7	8.8	6.3
5.5	6.8	7.9	7.1	4.6	6.0	8.1	8.4	7.6	6.2

a) Create a stem-and-leaf plot to show the data.
b) How many skaters scored in the 5s?
c) How many skaters scored in the 8s or higher?
d) In what numeric group did more skaters score than any other?
e) What does the shape of the stem-and-leaf plot tell you about the overall scores?

Solution

a)



I will use the ones digit for the stem. The numbers after the decimal will be the leaves. First, I'll group all the 4s together.

Stem (ones)	Leaf (tenths)
4	6 7
5	5 3 7 9 2
6	2 8 4 0 7 3 2
7	5 1 9 1 7 1 3 0 6
8	2 1 4 8 5
9	3 6

My leaves are not in order. I'll rewrite to show them in order.

Stem (ones)	Leaf (tenths)
4	6 7
5	2 3 5 7 9
6	0 2 2 3 4 7 8
7	0 1 1 1 3 5 6 7 9
8	1 2 4 5 8
9	3 6

b) Five skaters scored in the 5s.

Scoring in the 5s means a score from 5.0 to 5.9. I should look at stem 5.

c) Seven skaters scored in the 8s or higher.

Look at stem 8 and stem 9. Count the total number of leaves in these two stems.

d) Stem 7 has the most leaves. Nine skaters scored in the 7s.

e) The shape of the plot shows a large number of scores clustered near the middle. There are fewer scores at the high and low ends. This suggests that most skaters scored in the 5 to 8 range.

Stem (ones)	Leaf (tenths)
4	6 7
5	2 3 5 7 9
6	0 2 2 3 4 7 8
7	0 1 1 1 3 5 6 7 9
8	1 2 4 5 8
9	3 6

Key Ideas

- A stem-and-leaf plot is used to organize and order large sets of numeric data.
- To create a stem-and-leaf plot, organize the data into groups (stems). Then, order the data within each stem and write the leaves.

Communicate the Ideas

1. The stem-and-leaf plot shows people's ages.
a) Describe how the stem and leaf of a value are related.
b) What ages are shown?

Stem (tens)	Leaf (ones)
1	1 2 5
2	3 6
3	0 4

2. What's wrong? The prices for 6 pairs of running shoes, rounded to the nearest dollar, are \$69, \$74, \$79, \$79, \$85, and \$89. Describe the error. Explain how to fix it.

Stem (tens)	Leaf (ones)
6	9
7	4 9
8	5 9

Check Your Understanding

Practise

For help with questions 3 to 5, refer to Example 1.

3. a) How many stems are in the plot?
b) Which stems have two leaves?
c) Which stem has the most data?
d) List the scores shown.

Stem (tens)	Leaf (ones)
1	4 7
2	0 3 3 8
3	1 5
4	2

4. The stem-and-leaf plot shows the average monthly rainfall, in millimetres, for a particular city.
a) What amounts of rainfall are represented in stem 7?
b) How many rainfall measurements are recorded in the stem-and-leaf plot?

Stem (tens)	Leaf (ones)
2	8
3	2
4	8
5	4
6	0
7	2 5
8	5 6 8
9	3

5. The stem-and-leaf plot shows the ages of people at a family picnic.

Stem (tens)	Leaf (ones)
0	7 9
1	1 3 3 7
2	
3	6 7 8
4	1 2 2
5	8 9
6	2 3

a) How many children are under 10? How old are they?

b) How many teenagers are there? How old are they?

c) Four grandparents are present. How old do you think they are? Explain.

For help with questions 6 to 9, refer to Example 2.

6. Complete the stem-and-leaf plot by organizing the leaves in increasing order.

Stem (tens)	Leaf (ones)
1	1 6 2
2	7 0 3
3	8 5 1
4	3 2 7 3
5	6 9

7. Organize the following data using a stem-and-leaf plot.

10 21 32 47 12 22 34 47
14 25 36 18

a) What will the stem values represent?

b) What will the leaf values represent?

c) Create the stem-and-leaf plot.

d) Write one question about your stem-and-leaf plot. Answer your question.

8. a) Organize the following scores using a stem-and-leaf plot.

22 36 18 24 41 55 15 27 22 38
44 32 36 22 13 45 50 20 37 40

b) Write one question about your stem-and-leaf plot. Answer your question.

9. Victor rounded his grocery bills to the nearest dollar. During the past two months, he spent \$67, \$81, \$73, \$64, \$66, \$73, \$82, and \$59.

a) Organize the data using a stem-and-leaf plot.

b) What is Victor's most common grocery bill amount?

c) How much has Victor spent on groceries over the past two months?

Apply

10. A group of students wrote a test. Their scores, out of 50, are shown.

Stem (tens)	Leaf (ones)
1	8 9
2	2 4 5 8 8 9
3	0 1 2 2 3 6 8 8 8 9
4	2 3 5 5 8
5	0

a) How many students scored in the 40s? What were their scores?

b) In which stem did more students score than any other?

c) Did any student write a perfect test? Explain.

d) How many students scored below 50%? What were their scores?

11. The numbers of wins for the teams in a minor baseball league are 45, 61, 57, 90, 88, 80, 95, 49, 53, 80, 85, 92, 103, 85, 77, 73, 85, 68, 74, and 82.

a) Organize the data using a stem-and-leaf plot.

b) How many teams won more than 90 games?

c) What was the most common number of wins?

12. **a)** Collect age data from 15 to 20 family members, friends, and acquaintances.
b) Create a stem-and-leaf plot to show the data.

13. The masses, in grams, of samples of a particular chemical are 1.2, 1.3, 0.8, 1.0, 0.8, 1.4, 0.7, and 1.0.
a) Create a stem-and-leaf plot for the data.
b) Explain what the stems and leaves represent.
c) What is the difference between the greatest mass and the least mass?

Try This!

14. The times for 50-m sprinters are shown in a stem-and-leaf plot.

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

a) Organize the plot.
b) What do the stems and leaves represent? Justify your answer.
c) Explain five things that the data set tells you.

Extend

15. Weekly payroll data values for a small company are given. The stem shows the hundreds digit and the tens digit.

Stem	Leaf
28	0 5
29	0 0 0 4 8
30	5 5
31	8
32	
33	
34	8

a) How many employees work for the company? Justify your response.
b) What is the most common weekly wage?
c) What is the highest weekly wage?
d) What is the company's total weekly payroll expense? Explain how you found this.
e) The boss wishes to hire a very experienced and talented worker. What is the highest weekly wage the boss can offer the worker without exceeding the payroll budget of $3640? If the new worker accepts, will that person be the highest paid employee? Explain.

Literacy Connections

Prepare to Write

Use a fishbone organizer to help you plan paragraph answers. The examples shown describe bar graphs and pictographs. Use the point-form information to write two paragraphs.