# **Stem-and-leaf plots**

WALT: Read and display stem and leaf plots

### Success Criteria: I can ....

- Represent numerical data
- Split numbers into two parts when there are two digits
- Understand that each number is split into a stem (first digit) and a leaf (the last digit)

### **Teacher Introduction**

| A stem-and-leaf plot is a useful way of presenting numerical data.<br>It allows trends to be spotted easily. Each number is split into a |           | Stem      | Leaf |
|--|-----------|-----------|------|
| stem (the first digit or digits) and a leaf (the last digit).  | 53 is     | 5         | 3    |
| stem (the first digit of digits) and a leaf (the fast digit).  | 78 is     | 7         | 8    |
|  | 125 is    | 12        | 5    |
| Let's start: Test score analysis   |           |           |      |
| In a class, students' results on two recent tests out of 50 are recorded   | d.        |           |      |
| Test 1 results   | Tes       |           |      |
| 43, 47, 50, 26, 38, 20, 25, 20, 50, 44,  | Stem   Le | af        |      |
| 33, 47, 47, 50, 37, 28, 28, 22, 21, 29   | 1 8       |           |      |
| • For each test, try to find how many students:  | 2 7       | 8         |      |
| - achieved a perfect score (i.e. 50)   |           | 2 4 5 5 7 | 79   |
| <ul> <li>failed the test (i.e. less than 25)</li> <li>achieved a mark in the 40s.</li> </ul>   | 4 0       | 12336     | 588  |
| • If there are 100 test results to analyse, would you prefer a list  |           | 0         |      |
| or a stem-and-leaf plot? Why?  |           |           |      |

#### **Key Ideas**

- A stem-and-leaf plot is a way to display numerical data.
- Each number is split into a stem (the first digit or digits) and a leaf (the last digit).
   For example:

Stem-andleaf plot A table that lists numbers in order, grouped in rows

- StemLeafThe number 7 is0The number 31 is3The number 152 is15
- Leaves are aligned vertically, getting bigger as you move away from the stem.

| <ol> <li>Copy and complete:<br/>In a stem-and-leaf plot the first digit(s) of a data value is called the</li> </ol>                               | and th                | e last digit |
|---|-----------------------|--------------|
| <ul> <li>2 The number 52 is entered into a stem-and-leaf plot.</li> <li>a Which digit is the stem?</li> <li>b Which digit is the leaf?</li> </ul> |                       |              |
| <ul> <li>3 What number is represented by the following combinations?</li> <li>a 3 9 b 2 7 c</li> </ul>  | 13 4                  |              |
| <ul><li>4 In this stem-and-leaf plot, the smallest number is 35.</li><li>What is the largest number?</li></ul>                                    | <u>Stem</u><br>3<br>4 | 5779         |

## **Interpreting Stem and Leaf Plots**

| a<br>b | rage daily temperatures are shown for some of<br>Write out the temperatures as a list.<br>How many countries' temperatures are represent<br>What are the maximum and minimum temp<br>What is the range of temperatures recorded<br>What is the median temperature recorded? | esented?<br>peratures?  | 1<br>2 | Leaf<br>3 6 6<br>0 0 1 2 5 5 6 8 9<br>0 2 |
|--------|---|---|--------|---|
| So     | ution   | Explanation   |        |   |
| а      | 13, 16, 16, 20, 20, 21, 22, 25, 25, 26, 28, 29, 30, 32  | Each number is convert<br>a leaf to a single numbe<br>For example, 1   3 is con         | er.    |   |
| b      | 14  | The easiest way is to co<br>leaves – each leaf corres                                   |        |   |
| C      | minimum = 13<br>maximum = 32  | The first stem and leaf i<br>The last stem and leaf i                                   |        |   |
| d      | range = 19  | Range = maximum – m   | inim   | am = 32 - 13 = 19                         |
| e      | median = 23.5   | The middle value is hal<br>numbers 2   2 and 2   5,<br>= $\frac{1}{2}$ (22 + 25) = 23.5 | •      |   |

## Solve the following problems

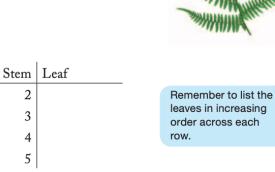
|   | a<br>I | a Writ<br>b How<br>c Ansv<br>i T<br>ii S<br>iii N | m-and-leaf plot show<br>e out the ages as a lis<br>many ages are show<br>ver true or false to ea<br>'he youngest person<br>omeone in the group<br>lobody listed is aged<br>'he oldest person is a | st.<br>m?<br>ach of the follo<br>is aged 10.<br>o is 17 years o<br>20. | owing.     | n a group.<br>- | Stem<br>0<br>1<br>2 | Leaf<br>8 9<br>0 1 3 5 7 8<br>1 4 |
|---|--------|---|---|--|------------|-----------------|---------------------|-----------------------------------|
| 6 |        |   | the stem-and-leaf pl<br>e Example 8 parts <b>d</b>  |  | te the rar | nge and the     |                     | ( Alter                           |
|   | a      | Stem  | Leaf  | b  | Stem       | Leaf            |                     | ALLE SAM                          |
|   |        | 0   | 9   |  | 1          | 1 4 8           | _                   |                                   |
|   |        | 1   | 3567789   |  | 2          | 124468          | 3                   | N. Settister                      |
|   |        | 2   | 019   |  | 3          | 03479           | 8                   |                                   |
|   |        |   |   |  | 4          | 2               | )                   | A ANTHONY                         |

- Stem
   Leaf

   3
   1
   1
   2
   3
   4
   4
   8
   9

   4
   0
   1
   1
   2
   3
   5
   7
   8

   5
   0
   0
   0
- Copy and complete the stem-and-leaf plot for this set of data.
  25, 27, 29, 30, 32, 39, 41, 42, 45, 51



### **Creating Stem and Leaf Plot**

Represent this set of data as a stem-and-leaf plot: 23, 10, 36, 25, 31, 34, 34, 27, 36, 37, 16, 33

| Solution  | Explanation   |
|---|---|
| Sorted list: 10, 16, 23, 25, 27, 31, 33, 34, 34, 36, 36, 37   | Sort the list in increasing order so that it can be put directly into a stem-and-leaf plot.   |
| Stem         Leaf           1         0         6           2         3         5         7           3         1         3         4         6         6         7 | Split each number into a stem and a leaf. Stems<br>are listed in increasing order. Leaves are written<br>vertically, listed in increasing order across each<br>row. |

8 Show each of the following sets of data as a stem-and-leaf plot.

- **a** 11, 12, 13, 14, 14, 15, 17, 20, 24, 28, 29, 31, 32, 33, 35
- **b** 20, 22, 39, 45, 47, 49, 49, 51, 52, 52, 53, 55, 56, 58, 58
- 9 Show each of the following as a stem-and-leaf plot.
  - **a** 21, 35, 24, 31, 16, 28, 48, 18, 49, 41, 50, 33, 29, 16, 32
  - **b** 32, 27, 38, 60, 29, 78, 87, 60, 37, 81, 38, 11, 73, 12, 14

**10** Show each of the following sets of data as a stem-and-leaf plot.

- **a** 80, 84, 85, 86, 90, 96, 101, 104, 105, 110, 113, 114, 114, 115, 119
- **b** 401, 420, 406, 415, 416, 406, 412, 402, 409, 418, 404, 405, 391, 411, 413, 413, 408, 395, 396, 417
- Remember, 101 is represented as 10 1.

The leaves for station 1 are read in reverse: 8 7 | 2 means 27 and 28. 'L'

### Problem solving

### 髌 Back-to-back stem-and-leaf plots 🗕

**13** Two radio stations poll their audience to determine their ages.

| Station 1 | Stem | Station 2                          |
|-----------|------|------------------------------------|
| 0         | 1    | 2 3 3 4 5 6 8 9                    |
| 8 7       | 2    | 2 3 3 4 5 6 8 9<br>0 0 1 2 4 5 8 8 |
| 975433    | 3    | 1 1 2                              |
| 7655441   | 4    | 8                                  |
| 9320      | 5    |                                    |

- **a** Find the age difference between the oldest and youngest listener polled for:
  - station 1 ii station 2
- **b** One radio station plays modern music that appeals to teenagers. The other plays classical music and broadcasts the news. Which radio station is most likely to be the one that plays classical music and news?
- c Advertisers want to know the age of the stations' audiences. This lets them target their advertisements more effectively (e.g. to 38 to 58 year olds).
  - Give a 20-year age range for the audience majority who listen to:
  - station 1 station 2

### Check your answers



| 1 a stem, leaf   |             | 10 a                            | Stem                         | Leaf                      |             |
|--|-------------|---------------------------------|------------------------------|---------------------------|-------------|
| <b>2 a</b> 5 <b>b</b> 2  |             | -                               |                              |                           | -           |
| <b>3 a</b> 39 <b>b</b> 27 <b>c</b> 134   |             |                                 | 8                            | 0456                      |             |
| 4 57   | h 40        |                                 | 9                            | 06                        |             |
| <b>5 a</b> 8, 9, 10, 11, 13, 15, 17, 18, 21, 24                                    | <b>b</b> 10 |                                 | 10                           | 145                       |             |
| c i false ii true iii true   | iv false    |                                 |                              |                           |             |
| <b>6 a</b> range = 20, median = 17   |             |                                 | 11                           | 034459                    |             |
| <ul> <li>b range = 31, median = 26</li> <li>c range = 19, median = 40.5</li> </ul> |             |                                 |                              |                           |             |
| <b>c</b> range = 19, median = 40.5<br><b>7</b> Stem   Leaf                         |             |                                 |                              |                           |             |
| $\frac{1}{2}$ $579$  |             | <b>b</b> Stem                   | Leaf                         |                           |             |
| 3 029  |             | 39                              | 156                          |                           |             |
| 4 125  |             | 40                              | 1245                         | 6689                      |             |
| 5 1  |             | 41                              | 1233                         | 5678                      |             |
| 5   1  |             | 42                              | 0                            |                           |             |
| <b>8 a</b> Stem   Leaf   |             | <b>11 a</b> 10                  | <b>b</b> 1                   | <b>c</b> 8                | <b>d</b> 58 |
| 1 1234457  |             | <b>12 a</b> 15                  | <b>b</b> 13                  |                           |             |
| 2 0489   |             | $c_{a \text{ is } 5 \text{ o}}$ | r 6. <i>b</i> is 0. <i>d</i> | is 8 or 9, <i>d</i> is 0. |             |
| 3 1235   |             | <b>13 a i</b> 49 ye             |                              |                           | tation 1    |
| <b>b</b> Stem   Leaf   |             | <b>c i</b> 33 to                |                              | ii 12 to 3                |             |
| $\frac{1}{2}$ 02   |             |                                 | ,                            |                           | - <i>j</i>  |
| 3 9  |             |                                 |                              |                           |             |
| 4 5799   |             |                                 |                              |                           |             |
| 5 12235688   |             |                                 |                              |                           |             |
|  |             |                                 |                              |                           |             |
| 9 a Stem Leaf  |             |                                 |                              |                           |             |
| 1 668  |             |                                 |                              |                           |             |
| 2 1489   |             |                                 |                              |                           |             |
| 3 1235   |             |                                 |                              |                           |             |
| 4 189  |             |                                 |                              |                           |             |
| 5 0  |             |                                 |                              |                           |             |