

SECTION 12

A stem–leaf chart (also called a stemplot) is a list of numbers arranged in groups which have the same first digits.

These first digits are written in a column called the stem, starting with the lowest number and ending with the highest. The last digit of each number is written in the same row as its stem. The stem and all these last digits are separated by a vertical line.

All the last digits for a particular stem number are arranged in order of size from the stem outwards, and form the leaf.

Example 12a

The list below gives the ages of the members of a running club.

25 53 18 24 30 42 39 28 73 23
36 21 36 51 45 20 31 19 47

Draw a stem–leaf chart to show this.

Solution:

Step 1: We could arrange the ages into tens, twenties, thirties, etc. like this:

18 19
25 24 28 23 21 20
30 39 36 36 31
42 45 47
53 51
73

Step 2: To turn this into a stem–leaf chart we write the first digit of all the numbers in a column, draw a vertical line to separate this stem from all its leaves, then write the last digit of each number opposite the row in which its first digit appears, like this:

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

Note that we should include a 6 in the stem even though there is no one aged in the 60s.

It would be very wrong, however, to write $6 \mid 0$ as this would represent a person aged 60 years old.

Step 3: Finally, we write all the numbers in each leaf in order of size, starting from the stem outwards, like this, and also include a key so that a reader will know exactly what we mean:

```

1 | 8 9
2 | 0 1 3 4 5 8
3 | 0 1 6 6 9
4 | 2 5 7
5 | 1 3
6 |
7 | 3

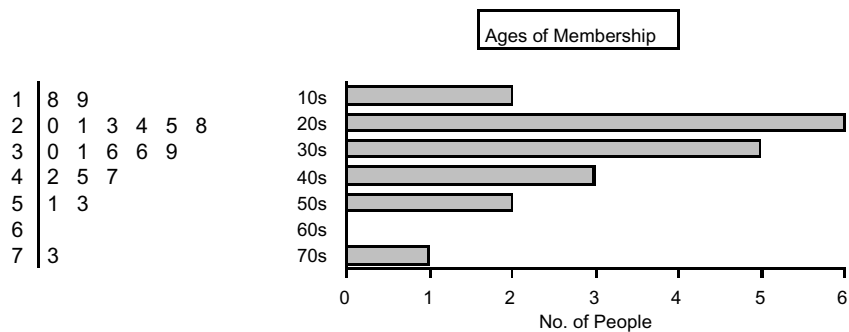
```

Key:

4 | 2 means a person
aged 42 years

In practice you would miss out Step 1 and go straight on to Step 2.

Notice that the chart is almost like a horizontal bar chart:



The numbers in the stem need not be single digits, we can have double digits or more.

Similarly we don't need whole numbers only, the stem could easily be a units figure, with the leaves being the first decimal place. Having a key is most important.

We can compare two sets of data by having a back-to-back stem-leaf chart as follows:

Example 12b

The weights (in pounds) for a group of women were recorded before and after going on a diet and the results were as follows:

BEFORE: 141 103 112 146 115 123 120 157 160 135
 134 118 139 152 123 137 131 125 134 142

AFTER: 131 115 144 146 141 144 139 123 135 149
 120 103 118 119 121 130 153 138 162 157

Draw a back-to-back stem-leaf chart to show this.

Solution:

We place the stem in the middle with the leaves going outwards in both directions, left and right.

It doesn't matter whether we put the 'Before' weights on the left and the 'After' weights on the right or vice versa; do whatever seems logical:

<u>BEFORE</u>					<u>AFTER</u>						
				3	10	3					
			8	5	2	11	5	9	8		
		5	3	0	3	12	3	0	1		
4	1	7	9	4	5	13	1	9	5	8	0
			2	6	1	14	4	6	1	4	9
				2	7	15	3	7			
				0	16	2					

We now arrange the numbers in the stem in order of size outwards from the stem:

<u>BEFORE</u>					<u>AFTER</u>						
				3	10	3					
			8	5	2	11	5	8	9		
		5	3	3	0	12	0	1	3		
9	7	5	4	4	1	13	0	1	5	8	9
			6	2	1	14	1	4	4	6	9
				7	2	15	3	7			
				0	16	2					

where 3 | 10 means 103 pounds

where 11 | 5 means 115 pounds

It doesn't look as if the diet worked very well, does it?

Stem-leaf charts are a very good way of grouping numbers together before analysing them, and the theory and practice of stem leaf charts is now very sophisticated and has evolved much further than we have seen here.

Dot plots are less sophisticated but can often be just as good a way of trying to see 'the picture' which is often hidden by the numbers.

Example 12c

Here is the data from Example 12a:

25	53	18	24	30	42	39	28	73	23
36	21	36	51	45	20	31	19	47	

To draw a dot plot we see first that the lowest number is 18 and the highest is 73, so rounding these respectively down and up means that a line from 10 to 80 would suffice:

10 20 30 40 50 60 70 80

Then place a dot corresponding to each age at an appropriate place on the scale. If you have to put more than one dot on the same number, place them one above the other. It's as simple as that!

**? 12**

Draw a stem–leaf chart for each of the following two sets of data. If you feel the need, draw a dot plot as well.

- These are the times, in minutes, taken by 30 operatives to complete a routine task in a factory:

7.8	8.3	5.4	7.1	6.6	10.4	8.4	9.2	8.3	7.9
8.5	5.0	6.2	7.8	6.2	8.5	8.6	9.0	9.8	8.1
5.9	9.2	10.2	8.7	7.9	9.4	5.9	9.4	9.2	7.2

- This table shows the daily output of a machine in a factory during the month of May.

424	394	411	430	430	449	431	429	441	443
437	415	425	432	393	432	422	413	424	397
416	431	419	429	447	433	426	435	438	439
418									