

Stem-and-leaf plots

Tuesday, 19 February 2019 6:16 pm

★ By the end of the lesson I would hope that you have the knowledge and understanding for the following points:

- Know what a stem-and-leaf plot is
- Know what a back-to-back stem-and-leaf plots it
- Know how to create a stem-and-leaf plot
- Know how to create a back-to-back stem-and-leaf plot
- Know how to read a stem-and-leaf plot
- Know how to describe the shape of the data from a stem-and-leaf plot
- Know how to find the mean, median, mode, range, IQR from a stem-and-leaf plot

RECAP:

This series of lessons has been about data and how we can manipulate it to help us better understand what it is trying to show us. We are heading to some of the more interesting sections of the Mathematics curriculum, but we're not quite there yet.

We have spent some time looking at measures of centre.

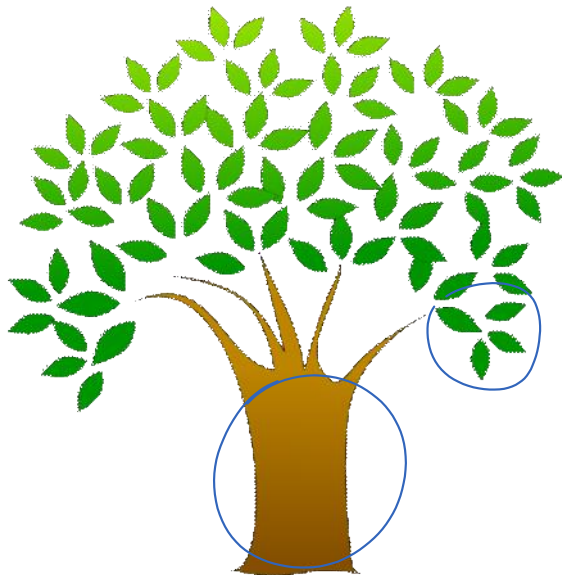
This is the last time we look at this type of way of describing information before moving onto measures of spread.

Let's recap, once more, why we would draw stem-and-leaf plots.

RECAP: Stem-and-leaf plots

Previously we looked at how to create a stem-and-leaf plot and what it is used for.

Remember: Histograms which group data give us the shape of the data, but not data itself. Stem-and-leaf diagrams are great as they give us the shape AND the data.



Stem-and-leaf plots are away to split data into their stems and leaves.

Example of how we create stems and leaves

23 can be split into:

stem → 2 | 3 ← leaf

236 can be split into:

2 | 36

236 can be split into:

stem → 23 | 6 ← leaf

$\begin{array}{c} (10)6 \\ (10)6 \end{array}$ 10 | 6
 10 | 6

10.6 can be split into:

stem → 10 | 6 ← leaf

The most important thing on a stem-and-leaf plot is to include a KEY so people know what the numbers mean. It's also good to include the units when you can.

Constructing a Stem-and-leaf plot

We need to look for the smallest number and the largest number.

This gives us the smallest stem and the largest stem.

We don't need to put the numbers into order as we will order them later.

Remember: We need to create an **unordered stem-and-leaf plot** to then create an **ordered stem-and-leaf plot**.

Example:

Extracted from the Cambridge Essentials Textbook series

Consider this set of data.

~~0.3~~ ~~2.5~~ ~~4.1~~ ~~3.7~~ ~~2.0~~ ~~3.3~~ ~~4.8~~ ~~3.3~~ ~~4.6~~ ~~0.1~~ ~~4.1~~ ~~7.5~~ ~~1.4~~ ~~2.4~~
~~5.7~~ ~~2.3~~ ~~3.4~~ ~~3.0~~ ~~2.3~~ ~~4.1~~ ~~6.3~~ ~~1.0~~ ~~5.8~~ ~~4.4~~ ~~0.1~~ ~~6.8~~ ~~5.2~~ ~~1.0~~

0.3 0 | 3

- Organise the data into an ordered stem-and-leaf plot.
- Find the median.
- Find the mode.
- Describe the data as symmetrical or skewed.

First step: Create an **unordered stem-and-leaf plot**

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

Key 2 | 5 = 2.5

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

Key 7 | 5 = 7.5

Second step: Order the stem-and-leaf plot

Third step: Find the median (by reading the number of data items and finding the middle one)

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

$$\frac{3 \cdot 30}{2} \mid \frac{3 \cdot 40}{2}$$

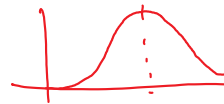
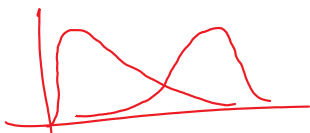
Med = 3.35

Key $715 = 7.5$

Fourth step: Find the mode (by reading which is the most common data item)

Mode = 4.1

Fifth step: Look at the distribution and decide on the shape
Remember: We can describe the shape as symmetrical or skewed.
Sometimes it's easiest to rotate your book by 90 degrees to see!



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

3 | 4 means 3.4

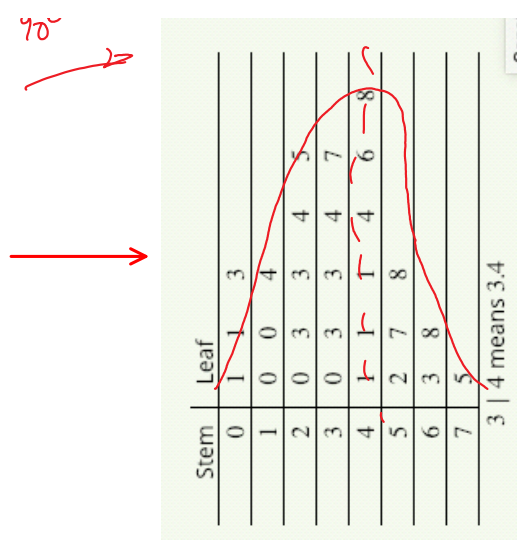
90° →

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

3 | 4 means 3.4

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

3 | 4 means 3.4



Constructing a back-to-back stem-and-leaf plot

There are lots of times, in Mathematics and Statistics, that we wish to compare data sets. We might wish to see whether boys or girls did better in pre- and post-tests. We might like to see which football team did better over the course of a season.

To be able to compare data, we can draw a back-to-back stem-and-leaf plot.

Example:
Extracted from the Cambridge Essentials Textbook series

A shop owner has two jeans shops. The daily sales in each shop over a 16-day period are monitored and recorded as follows.

Shop A

~~3~~ 12 12 13 14 14 15 15 21 22 24 24 24 26 27 28

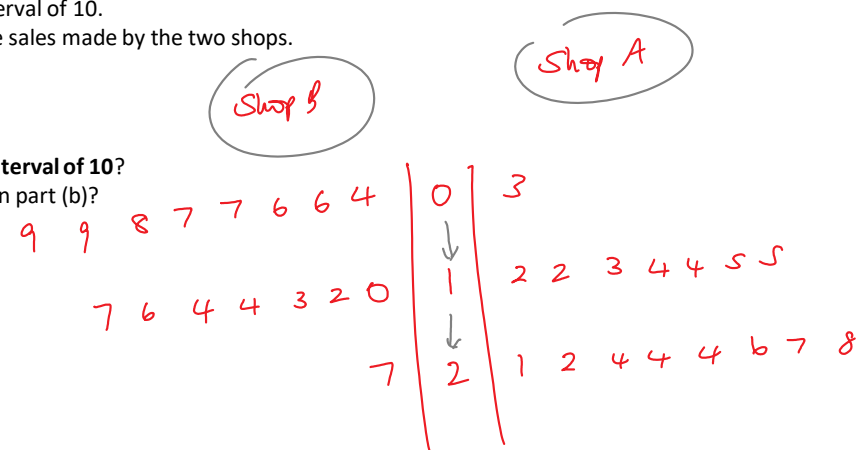
Shop B

4 6 6 7 7 8 9 9 | 10 12 13 14 14 16 17 27

- Draw a back-to-back stem-and-leaf plot with an interval of 10.
- Compare and comment on differences between the sales made by the two shops.

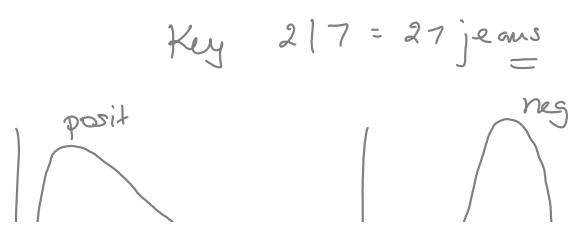
- Question: What did it mean, in part (a), when it said an interval of 10?
- Question: What does it mean by compare and comment in part (b)?

- Step 1: Decide on the stem values
- Step 2: Draw the stem and use it to plot Shop A values
- Step 3: Add Shop B's values.

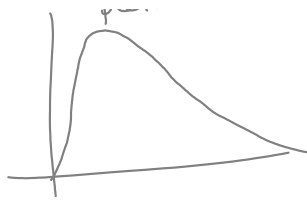


$$\text{Range A} = 28 - 3 = 25$$

$$\text{Range B} = 27 - 4$$



$$\begin{aligned} \text{Step } B &= 27 - 4 \\ &= 23 \end{aligned}$$



Order the back-to-back stem-and-leaf plot

Don't forget the key!

Now ... let's make a comment about what we see with the data.

When we make a comment we normally talk about some, or all of the following:

- Mean
- Median
- Mode
- Range
- Shape