NCEA Level 1 Numeracy - Statistics

Analyse data using a stem and leaf plot

Content

This teaching and learning sequence is about using stem and leaf plots to make comparisons and draw conclusions from two sets of data. The sequence is suitable for learners in any context where two sets of data have been collected in response to an investigative question and also where tutors are gathering naturally occurring evidence for the achievement of the NCEA Level 1 Numeracy Unit Standard 26626.

Alignment

The content aligns with Step 4/5 of the *Reason Statistically* strand of the Learning Progressions, in particular the *Analysing Data for Interpretation* and *Interpreting Data to Predict and Conclude* Progressions.

Before beginning this teaching and learning sequence learners should have completed, or be familiar with, the content of the two previous teaching and learning sequences: *Calculate the median and range for a set of data and compare the median and range for two sets of data* and *Organise data using a stem and leaf plot*.

Intent

After completing the teaching and learning sequence learners will understand how to use a stem and leaf plot to make comparisons and draw conclusions from two sets of data in order to respond to an investigative question.

Sequence

There are four parts to this sequence. Learners will:

1. understand the question for investigation
2. create back-to-back stem and leaf plots for the two sets of data
3. find the median and range for the two sets of data
4. discuss other features of the two sets of data (range, distribution) and respond to the investigative question.

1. *Understand the question for investigation*

A class of learners went to Mt Maunganui. One group climbed to the top of the mountain and back and the other group walked around the base of the mountain. Below are the times each learner, took to the nearest minute.

> **Number of minutes taken for the group who walked around the base of Mt Maunganui**
>
> 40, 61, 48, 38, 32, 34, 50, 35, 49, 37, 38, 96, 38
>
> **Number of minutes taken for the group who walked to the top of the mountain and back**
>
> 71, 52, 37, 62, 52, 43, 54, 57, 74, 63, 57, 65, 91, 43, 82, 58

Which walk do you think is the longer walk?

2. *Create back-to-back stem and leaf plots for the two sets of data*

Step one: Ask learners to brainstorm what they might do in order to answer the question under investigation.

Listen for:

- put the data in order
- find the median – how the values group around the middle
- find the range – how the scores are spread out.

Step two: Ask learners how they might organise the data to help them find the answer, and listen for making a stem and leaf plot. You may need to prompt learners for this response. Outline that is possible to make back-to-back stem and leaf plots for the purpose of comparing two sets of data. Show learners the template below and ask them to complete it with the given data.

Climbing Mt Maunganui		Walking around Mt Maunganui
Leaf (ones)	Stem (tens)	Leaf (ones)
	3	
	4	
	5	
	6	
	7	
	8	
	9	

Answer

Climbing Mt Maunganui	Walking around Mt Maunganui	
Leaf (ones)	Stem (tens)	Leaf (ones)
7	3	2, 4, 5, 7, 8, 8, 8
3, 3	4	0, 8, 9
8, 7, 7, 4, 2, 2	5	0
5, 3, 2	6	1
4, 1	7	
2	8	
1	9	6

3. Find the median and range for each of the sets of data

Step one: Ask learners to work in pairs to find the median and range for each set of data.

Reminder

(See teaching and learning sequence *Calculate the median and range for a set of data and compare median and range for two sets of data.*

The median is the middle number. To find the place of the middle number put the values in order and count how many values there are. Add 1 to that number and divide by 2. This will give you the place of the median.

In the example above:

16 people climbed the mountain.

16 + 1 is 17. 17 ÷ 2 is 8½. The 8½th value is halfway between 52 and 52, so the median is 52.

The range for those who climbed the mountain is 91 – 37, which is 54.

13 people went around the mountain.

13 + 1 is 14. 14 ÷ 2 is 7. The 7th value is 38, so the median is 38.

The range for those who went round the mountain is 96 – 32, which is 64.

4. Discuss other features of the two sets of data and respond to the investigative question

Climbing Mt Maunganui		Walking around Mt Maunganui
Leaf (ones)	**Stem (tens)**	**Leaf (ones)**
7	3	2, 4, 5, 7, 8, 8, 8
3, 3	4	0, 8, 9
8, 7, 7, 4, 2, 2	5	0
5, 3, 2	6	1
4, 1	7	
2	8	
1	9	6
Median: 52 mins **Range**: 54 mins		**Median:** 38 mins

Step one: Ask learners, in pairs, to discuss anything they notice about the data.

Step two: Ask learners which walk they think is the longer, and why.

Listen for and, if necessary, ask questions to prompt for the responses below:

- The walk around the mountain is the shorter walk.
- The median value for walking round the mountain is shorter (38 mins) than the median value for climbing the mountain (52 mins).
- Most of the values for those walking around the mountain are clustered between 30 and 40 minutes, whereas those for climbing the mountain are clustered around 50 to 60 minutes.
- There is an extreme value (an outlier) of 96 minutes for someone walking around the mountain. This should possibly be ignored in the comparison, but even if this is ignored, climbing the mountain is a longer walk.

Step three: See the resource Exercises for analysing data using a stem and leaf plot for examples of data sets where learners can practise analysing data using stem and leaf plots.