



**Lesson Plan:** Calculating Measures of Location and Range

**Level:** Stage 4

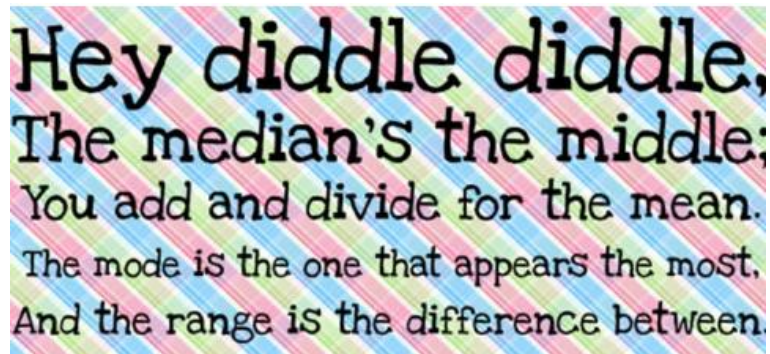
**Syllabus link:** MA4-20SP “analyses single sets of data using measures of location, and range”

### LESSON OUTLINE

This activity is designed to supplement a lesson in which students are taught how to calculate the mean, median, mode and range for a single set of data. Once students have been introduced to the concepts and provided with some example calculations, they can complete the worksheet to practice and consolidate their new skills using real life data from SWAQ stations.

### **Resources/Materials:**

- Worksheet (included)
- Laptop/device with internet access or classroom projector connected to a computer with internet access
- Calculators (optional)



### **Description of activity:**

Before beginning this activity, students should be familiar with the concepts of mean, median, mode and range. They should be aware of the definitions of each and how to calculate each one for a simple data set. It is recommended that you also spend some time doing worked examples with your class before giving them the worksheet.

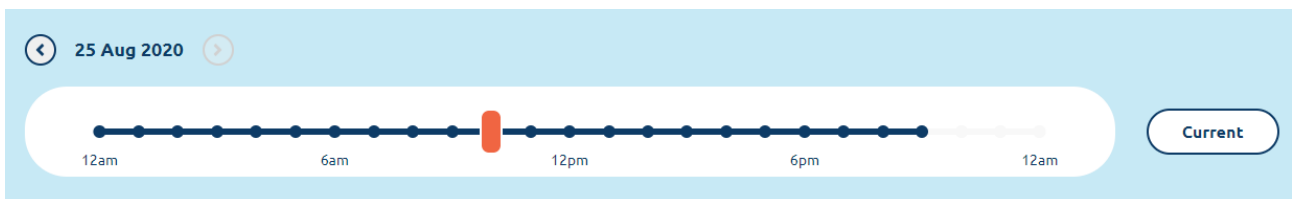
The worksheet is designed to give students an opportunity to practice mean, median, mode and range calculations using real life data from SWAQ stations. To access the data, you can either display the website using a classroom projector, or students may also access the data individually if they have their own devices. Instructions for where to find the data is included on the worksheet.

Students will be calculating the mean, median, mode and range for each of the weather/air quality measurements and recording their answers in table format. Enough space has been provided so that students can include their working out in the table, and this should be encouraged. We also recommend that you provide solutions for the first data set, temperature, before continuing with the remainder of the worksheet. This is so that you can ensure that students understand and are completing the calculations correctly.

### Things to note:

The combination of measurements from all available SWAQ stations forms the data set. When looking at the website, you will see these groups of measurements in columns. For example, the temperature data set is comprised of the temperature measurements from all of the SWAQ stations and is the first column of readings you will see to the right of the school names. Each weather/air quality measurement (temperature, humidity, precipitation etc) should be considered as a separate data set.

Due to the data being collected in real time, it is not possible for us to provide solutions to the worksheet as the numbers will be different depending on when this task is carried out. Unfortunately, there is no shortcut around this – you will need to calculate them yourselves in order to provide solutions to students. If you prefer to have solutions prepared before the class, it is possible to set the time of the data to anytime in the past week by moving the sliding orange tab above the measurements to select the time of day, and using the arrows next to the data in the top left to select the desired day (as shown below). If you choose to do this, make sure you remember to tell your students to select the same day and time. However, we believe that the activity is more impactful for students the more current the data, so we recommend trying to use as up-to-date data as possible. If you feel comfortable calculating the solutions during the lesson itself, then this could be the best option to allow students to use current data.



There may also be cases where the data is not available (for example in schools that do not have an air quality sensor), and this is displayed as N/A. Students should ignore these measurements and just use the values that are available as part of a smaller data set.

### **Key Questions to Ask**

What is the formula for calculating the mean?

When calculating the median, what do you need to remember to do before selecting the middle number? (order the data – this is a common mistake)

What happens if there is more than one number that occurs the most? (multiple modes)

What happens if there are no repeated numbers in the data set? (no mode)

What is another name we sometimes use when referring to the mean? (average)

What should you do if you are trying to calculate the median and there are two middle numbers? (take the average of the two middle numbers)

Extension: What makes the range different from the other measures? (It is a measure of spread, not a measure of location)



## Calculating Measures of Location and Range

### Instructions:

1. Go to [www.swaq.org.au](http://www.swaq.org.au) and click “explore the data”
2. Scroll down until you see the list of school names with their weather and air quality measurements displayed on the right.
3. Calculate the mean, median, mode and range for each weather measurement and record your answers with working out in the table provided.

### DEFINITIONS

**Mean:** Commonly referred to as the ‘average’ of the data. To calculate the mean, add up all the values and divide by the number of measurements.

**Median:** The middle value. To calculate, put the values in order from smallest to largest, and then select the middle value, or if there are two middle values, the average of the two middle values.

**Mode:** The most common value. It is possible to have more than one mode if there is more than one value which occurs the most.

**Range:** The spread of the data. To calculate the range, find the difference between the smallest and largest values.

### EXAMPLE

5   8   4   5   7   12   6   3   5   8

Mean:

$$\frac{5 + 8 + 4 + 5 + 7 + 12 + 6 + 3 + 5 + 8}{10} = 6.3$$

Median:

3   4   5   5   5   6   7   8   8   12

$$\frac{5 + 6}{2} = 5.5$$

Mode:

5

Range:

$$12 - 3 = 9$$

	Mean	Median	Mode	Range
Temperature (°C)				
Humidity (%)				
Precipitation (mm)				
Wind (km/h)				
Air Quality				