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Learning Goal: We are learning to understand the different types of data and how to calculate basic statistical summaries.

Statistics is a vast and growing field of mathematics and every day we are exposed to many stats and probabilities. What is the chance that it will rain tomorrow? What is the average in my classes? Am I a normal height for my age? Companies are using statistics and data every minute to make decisions. Netflix uses what you watch to curate what is on your main screen and helps them to decide to make more similar content. Garbage collection needs to be done in an optimal way to save on gas and trips to and from the dump. Sports teams are hiring statisticians as coaches to help makes player decisions. The list is unending. In this unit, we will explore some of the basics ways to summarize and analyze data.

First, we need to understand different types of data. The first two types are called **qualitative** and **quantitative**.

Qualitative	Quantitative
- descriptive ↳ uses your senses - helps us understand why - not fact, opinion - gathered through observation	- countable ⎫ - measurable ⎬ numbers - fact - how many, how much, how often

Example: Given the following picture, describe what you see using both qualitative and quantitative data.
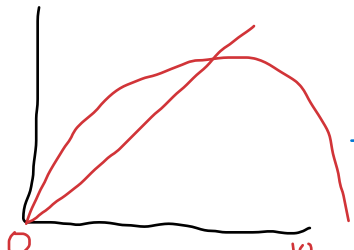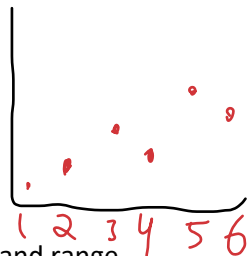
Qualitative	Quantitative
- book case / shelf - brown - made out of wood - holds book - rectangular - smooth - if real wood, it would smell. (words)	· 80 cm tall - 29 cm deep - One unit - 3 shelves - 25cm tall shelves - cost $100 (numbers)

(Diagram of a bookcase with measurements: 25cm, 25cm, 25cm shelf heights; 80cm total height; 40cm width; 29cm depth)

Quantitative data has two types of data, **continuous** and **discrete**.

Continuous	Discrete
— any value — measured — decimals, fraction, whole #'s — Temperature, height, length of a movie - solid lines, the "Youch" all values	- specific values - counted number - 1, 2, 3 ... - # of students - # of episodes - # of siblings 1 2 3 4 5 6

Lastly, we will look at how we can calculate some statistical summaries: mean, median, mode and range.

The **mean** is the ___average___. This is an easy, yet tedious calculation:

— add up all the numbers, then divide by the number of data values.

The **median** is the ___middle___. Calculating the median depends on whether you have an even or odd list of numbers.

First, the list must be in order from smallest to largest

If odd: 1, 2, 3, 4, 5
         ↑
       middle

If even: 1, 2, 3, 4, 5, 6

$\frac{3+4}{2} \div \frac{7}{2} = 3.5$ ↑ middle

The **mode** is the number that shows up the ___most___. If there is no mode, state "no mode". If there is more than one, they state all the numbers that apply.

The **range** is a measure of spread, meaning how wide or narrow is the spread of the data is. The range is calculated by:

largest number minus the smallest number.

Two examples: Calculate the mean, median, mode, and range for each data set.

Hours Slept

7.5	6	7.25	6.5	7.25	6
6	6	5.75	7	7.5	

11 data points, ∴ odd

$$\frac{11}{2} = 5.5$$
6th #

mean: $\frac{72.75}{11} = 6.6$ hours

Median: 5.75, 6, 6, 6, 6, 6.5, 7, 7.25, 7.25, 7.5, 7.5

= 6.5 hours.

Mode: 6 hours

Range: $7.5 - 5.75 = 1.75$ hours.

Minutes to Run 5km

27.3	17.9	34.3	31.8	36.9	29
34.1	33.4	29	22.3		

10 data points, ∴ even

mean: $\frac{296}{10} = 29.6$ minutes

Median: 17.9, 22.3, 27.3, 29, 29, 31.8, 33.4, 34.1, 34.3, 36.9

$$\frac{29 + 31.8}{2} = \frac{60.8}{2} = 30.4 \text{ minutes}$$

Mode: 29 minutes

Range: $36.9 - 17.9 = 19$ minutes

Success Criteria:
- I can identify the difference between qualitative vs quantitative data and discrete vs continuous
- I can calculate the mean, median, mode, and range from a given data set