MTH1W – Unit 9: Statistics

Name: Mr. Hagen

Lesson #9.1: Intro to Statistics

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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.

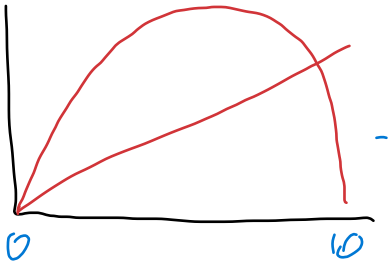
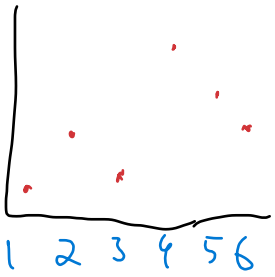
First, we need to understand different types of data. The first two types are called **qualitative** and **quantitative**.

Qualitative → quality	**Quantitative** - quantity
words: - the colour, - the shape, - smell, - taste, - opinion-based, - uses your senses. } descriptive	- countable, - measurable } > numbers, - fact, - how much?, - how often?, - how many?

Example: Given the following picture, describe what you see using both qualitative and quantitative data.

qualitative	quantitative
- brown	- 40cm wide
- made from wood	- 80cm tall
- rectangular	- 25cm shelves
- shelf	- 3 shelves
- smooth	- cost $100.
- holds books.	
- could have a smell	

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

Continuous	Discrete
- any value - measured - decimals, fraction, whole #'s - Temperature, height, length of movie  - solid line, they touch all values	- specific values - counted numbers - 1, 2, 3, ... - # of students - # of episodes # of siblings 

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 points.

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

First, sort the numbers from lowest to highest

If odd: ~~1, 2,~~ 3, ~~4, 5~~

↳ $\frac{n+1}{2} = \frac{5+1}{2} = 3^{rd}$ middle

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

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

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 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 numbers. ∴ odd

Mean: $\frac{72.75}{11} = 6.6$ hours.

$\frac{11+1}{2} = \frac{12}{2} = 6^{th}$ #

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 numbers ∴ even

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

$\frac{10+1}{2} = \frac{11}{2} = 5.5^{th}$

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

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