

1 Mean, Median, Mode, and Range

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FOM 11

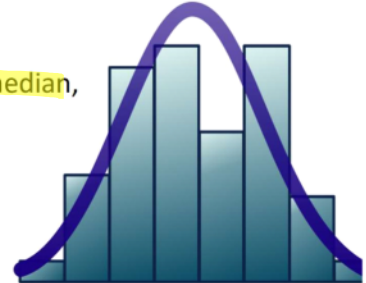
Ch6: Statistics Page 1

Day 1: Exploring Data (5.1)

Big Ideas: There are 3 measures of **central tendency** (**mean**, **median**, and **mode**), which tell us about the **shape** of the data.

Vocabulary: Statistics, median, mean, mode, outlier, range

Match each vocabulary with its definition.



- Statistics: the field of mathematics that deals with the collecting and analyzing of data
- Mean: "average". Calculated by adding up a set of values and dividing by the number of values
- Median: centre or "middle". Order the values from least to greatest.
 - If you have an odd number of values, take the middle value.
 - If you have an even number of values, take the average of the 2 middle values.
- Mode: the most frequent value (occurs the most).
Note: There can be more than one mode!
- Range: difference between the largest and smallest values.
 $\text{max} - \text{min}$
- Outlier: a value that is much smaller or much larger than most of the other values, typically representing a data error.

Example 1a: For the set of values: ~~1~~, 6, ~~7~~, 10, 9, 3, 6, ~~1~~, 6, determine the mean, median, mode, range.

Mean = $\frac{\text{add up the #'s}}{\text{number of #'s}} = \frac{1+6+3+10+9+3+6+1+6}{9} = \frac{45}{9} = \boxed{5}$ $n = \# \text{ of numbers}$

Median: ~~1~~, 1, 3, 3, 6, 6, 9, 10 Trick: to find median: go to $\frac{n+1}{2}$ th spot
mode: 6 range: $10 - 1 = 9$ If odd n

Example 1b: For the set of values: 1, 6, 3, 8, determine the mean, median, mode, and range.

Mean = $\frac{1+6+3+8}{4} = \frac{18}{4} = \boxed{4.5}$ range = $8 - 1 = 7$

Median: 1, 3, 6, 8 take average of 2 middle #'s

mode: none! $\frac{3+6}{2} = \frac{9}{2} = \boxed{4.5}$

Example 2: Paulo needs a new battery for his car. He is trying to decide between two different brands. Both brands are the same price. He obtains data for the lifespan, in years, of 10 batteries of each brand, as shown below.



| Measured Lifespans of 30 Car Batteries (years) | | | | | | | | | |
|--|-----|-----|-----|-----|---------|-----|-----|-----|-----|
| Brand X | | | | | Brand Y | | | | |
| 6.3 | 7.5 | 5.0 | 5.7 | 8.2 | 5.7 | 6.8 | 5.6 | 4.9 | 6.1 |
| 3.3 | 3.1 | 4.3 | 5.9 | 6.6 | 4.9 | 5.7 | 6.2 | 7.0 | 5.8 |

- a. Describe how the data in each set is distributed. Describe any similarities or differences between two sets of data.

Brand X
 Mean = $\frac{6.3 + \dots + 6.6}{10} = \frac{55.9}{10} = 5.59$

Median: 3.1, 3.3, 4.3, 5.0, 5.7, 5.9, 6.3, 6.6, 7.5, 8.2

avg: $\frac{5.7 + 5.9}{2} = 5.8$

mode: none!

Brand Y
 mean: $\frac{58.7}{10} = 5.87$

Median: 5.75

mode: 2 modes! 4.9 & 5.7

- b. Explain why the **mean and median** don't fully describe the difference between these two brands of batteries. Why can additional information be learned from the **range of the data**?

range = $8.2 - 3.1 = 5.1$

range: $7.0 - 4.9 = 2.1$

- c. Is the **mode** useful in this situation?

smaller range
 means Brand Y is more consistent!
 ⇒ Brand Y is better!

Assignment: "What happened to the cat who swallowed a ball of yarn?" Joke Worksheet