

Welcome MYP 9 Mathematics!

	Assignment Effort Grade (Circle One)	Comments (What was interesting or challenging?)
Monday Date: <u>4/09</u> Topic: <u>10A: Types of data</u>	0 1 2	
Tuesday Date: <u>4/10</u> Topic: <u>Pre- assessment</u>	0 1 2	
Wednesday Date: <u>4/11</u> Topic: <u>10B: Discrete data, stem plots</u>	0 1 2	
Thursday Date: <u>4/12</u> Topic: <u>10C: Continuous Data, Hisograms</u>	0 1 2	
Friday Date: _____ Topic: _____	0 1 2	

Warm-up:

What can we say about Bo's (Ms. Berg's nephew) naps?



1.5 - 2 hrs
most naps

Length of Naps:

120 min	80 min
150 min	120 min
125 min	90 min
100 min	125 min
67 min	120 min
120 min	120 min
122 min	20 min

150 min
Max

Class Plan

1. Warm-up

2. Which Measure is best?

D

MEASURING THE CENTRE OF A DATA SET

3. Practice

D

MEASURING THE CENTRE OF A DATA SET

What is a Measure of Central Tendency?

In this course we consider two statistics that are commonly used to measure the **centre** of a data set. These are the **mean** and the **median**.

A single value that attempts to describe a set of data by identifying the central position within that set of data.

Represents the "typical" value in the set

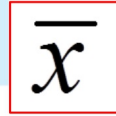
<https://statistics.laerd.com/statistical-guides/measures-central-tendency-mean-mode-median.php>

D**MEASURING THE CENTRE OF A DATA SET****THE MEAN (Average)**

The **mean** \bar{x} of a data set is the statistical name for its *arithmetic average*. It can be found by dividing the sum of the data values by the number of data values.

$$\text{mean} = \frac{\text{the sum of the data values}}{\text{the number of data values}}$$

\bar{x} is read 'x bar'.

**THE MEDIAN (Middle)**

The **median** is the *middle value* of an ordered data set.

For an **odd number** of data, the median is one of the data.

For an **even number** of data, the median is the average of the two middle values. The median might not be one of the original data.

If there are n data values, find the value of $\frac{n+1}{2}$.

The median is the $\left(\frac{n+1}{2}\right)$ th data value.

THE MODE: Most frequent value

INVESTIGATION

THE EFFECT OF OUTLIERS

Data Set: 4,5,6,6,6,7,7,8,9,10

Do: Investigation in your notebook

1. Calculate mean, median, mode
2. Add extreme value/ outlier of 100.
Then, calculate mean, median, mode
3. Comment on the effect that the outlier has on the mean, median, and mode.
4. Which measure of central tendency was most affected by the outlier?

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Data Set: 4,5,6,6,6,7,7,8,9,10

1. Calculate mean, median, mode

$$\bar{X} = \frac{X_1 + X_2 + \dots + X_n}{n} = \frac{4+5+6+6+6+7+7+8+9+10}{10} = \frac{68}{10}$$

$$\boxed{\bar{X} = 6.8}$$

$$\text{Median} = \frac{6+7}{2} = \frac{13}{2} = \boxed{6.5}$$

$$\text{mode} = 6$$

Data Set: 4,5,6,6,6,7,7,8,9,10

2. Add extreme value/ outlier of 100.

Then, calculate mean, median, mode

$$\bar{x} = \frac{4+5+6+6+6+7+7+8+9+10+\overset{\text{outlier}}{\textcircled{100}}}{11} = \frac{168}{11} \approx 15.3$$

$$\bar{x} \approx 15.3$$

$$\text{Median} = 7$$

$$\text{mode} = 6$$

INVESTIGATION

THE EFFECT OF OUTLIERS

Data Set: 4,5,6,6,6,7,7,8,9,10

3. Comment on the effect that the outlier has on the mean, median, and mode.

4. Which measure of central tendency was most affected by the outlier?

3. Comment on the effect that the outlier has on the mean, median, and mode.

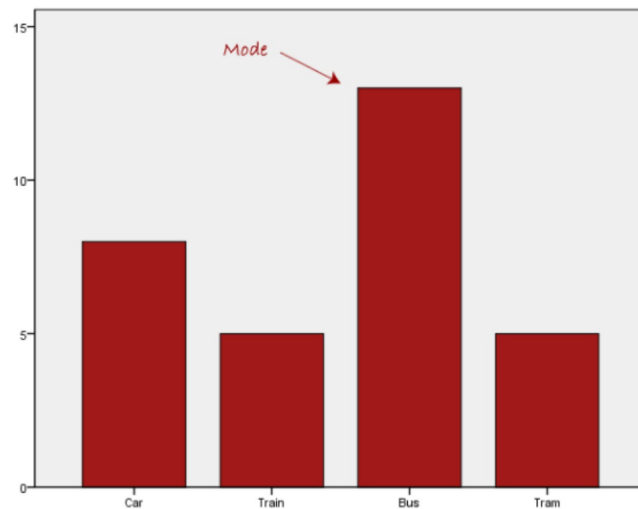
The mean was skewed by an outlier, the median and mode were not changed as drastically.

4. Which measure of central tendency was most affected by the outlier?

The mean is skewed by an outlier, then median is the best measure of the center.

When is the MODE the best measure of the center?

Normally, the mode is used for categorical data where we wish to know which is the most common category, as illustrated below:



Example: Maintaining an Average

Southwest made it to the playoffs. Charles Brown rushed for 78 yards, 95 yards and 64 yards in the first three games. Show work algebraically

If Charles wants to average (mean) 80 yards, how many does he need in the final game?



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4 games, $\bar{x} = 80$ yds

$$\frac{x + 78 + 95 + 64}{4} = 80$$

$$\frac{x + 237}{4} = 80$$

$$x + 237 = 320$$

$$x = 83 \text{ yards}$$



Example 8

Solve the following problems:

- a The mean of six scores is 78.5. What is the sum of the scores?
- b Find x if 10, 7, 3, 6, and x have a mean of 8.

471

$$a) \frac{X+X+X+X+X+X}{6} = 78.5$$

$$b) \frac{10+7+3+6+x}{5} = 8$$

$$26+x=40$$

$$x = 14$$

Example 8

Solve the following problems:

- a The mean of six scores is 78.5. What is the sum of the scores?
- b Find x if 10, 7, 3, 6, and x have a mean of 8.

a $\frac{\text{sum}}{6} = 78.5$

$$\therefore \text{sum} = 78.5 \times 6$$
$$= 471$$

\therefore the sum of the scores is 471.

b There are 5 scores.

$$\therefore \frac{10 + 7 + 3 + 6 + x}{5} = 8$$

$$\therefore \frac{26 + x}{5} = 8$$

$$\therefore 26 + x = 40$$

$$\therefore x = 14$$

Exercises...10D Measures of Center

EXERCISE 10D.1

1 Find the mean of the data set:

a 3, 9, 8, 6, 8, 4, 5, 5

b 17, 23, 14, 37, 25, 30, 22, 27, 31, 36

c 4.5, 6.7, 8.1, 2.4, 6.3, 5.3, 8.4, 4.7, 3.7, 5.8, 6.6, 4.2, 9.3

2 Calculate the median of the data set:

a 21, 23, 24, 25, 29, 31, 34, 37, 41

b 105, 106, 107, 107, 107, 109, 113, 120, 124, 132

11 Find x if:

a 2, 2, 6, 4, 7, and x have a mean of 5

b 9, x , 14, 18, x , x , 8, 10, and 4 have a mean of 11.

- 12** Over a semester, Jamie did 8 science tests. Each test was marked out of 30, and Jamie averaged 25. However, when checking his files, Jamie could only find 7 of the 8 tests. For these he scored 29, 26, 18, 20, 27, 24, and 29. Determine how many marks he scored for the eighth test.

- 13** Towards the end of the season, a netballer had played 14 matches and had an average of 16.5 goals per game. In the final two matches of the season the netballer threw 21 goals and 24 goals. Find the netballer's new average.

EXERCISE 10D.1

1 **a** 6 **b** 26.2 **c** ≈ 5.85

2 **a** 29 **b** 108 **c** 149.5

3 **a** mean = £363 770, median = £347 200

The mean is affected by extreme values whereas the median is not. So the mean has been ‘pushed up’ higher than the median by the higher values.

b **i** mean selling price **ii** median selling price

4 mean = 5.6 presents, median = 6 presents

5 mean ≈ 34.6 chocolate almonds,
median = 35 chocolate almonds

- 7 a** **A**: positively skewed; **B**: negatively skewed;
C: approximately symmetric
- b** **A**: mean ≈ 3.29 , median = 3;
B: mean = 5.6, median = 6;
C: mean = 4.45, median = 4.5
- c** **i** “For positively skewed data, the mean is *greater* than the median.”
ii “For negatively skewed data, the mean is *less* than the median.”
iii “For symmetric data, the mean and median are approximately *equal*.”
- 8** 105.6 **9** 1712 km **10** \$2 592 000
- 11 a** $x = 9$ **b** $x = 12$ **12** 27 marks out of 30
- 13** ≈ 17.3 goals per match **14** ≈ 17.7