

Algebra 1B

Date:

7.3 Measures of Central Tendency

**Central Tendency:** Measure of what is the center:  
Mean, Median, and Mode

**Mean ( $\bar{x}$ )** - The sum of the values in a data set divided by the total number of values in the set.

$$\bar{x} = \frac{\sum x}{n}$$

$\sum x$  = Sum of the values  
 $n$  = number of values

$\bar{x}$

**Median** - The middle value (or the mean of the two middle values) when the data is arranged in ascending order.

least  $\rightarrow$  Greatest

**Mode** - The value that appears most often in a set of data. Data can have no mode, one mode, or more than one mode.

Example 1:

Below are the number of baskets made in a basketball game.

Find the mean, median, and mode.

5, 4, 3, 4, 8, 4, 7

Mean: 
$$\frac{5+4+3+4+8+4+7}{7} = 5$$
 Baskets

Median: 3, 4, 4, 4, 5, 7, 8

Median is 4 Baskets

Mode: 4 Baskets

Example 2:

Below are the test scores from a recent exam.

Find the measures of central tendency (3 m's)

94, 67, 95, 97, 74, 73, 86, 91, 89, 91, 84, 68

mean: about 84

median: 87.5

Mode: 91

NORMAL FLOAT AUTO RE

L1	L2	L3
95		
97		
74		
73		
86		
91		
89		
91		
84		
68		

NORMAL FLOAT AUTO REAL DEGRE

EDIT **CALC** TESTS

- 1: 1-Var Stats
- 2: 2-Var Stats
- 3: Med-Med
- 4: LinReg(ax+b)
- 5: QuadReg
- 6: CubicReg
- 7: QuartReg
- 8: LinReg(a+bx)

**1-Var Stats**

$\bar{x}=84.08333333$  mean  
 $\Sigma x=1009$   
 $\Sigma x^2=86123$   
 $Sx=10.79948091$   
 $\sigma x=10.33971577$   
 $n=12$  — # of data values  
 $\min X=67$   
 $\downarrow Q_1=73.5$   
 $\min X=67$   
 $Q_1=73.5$   
 $\text{Med}=87.5$  median  
 $Q_3=92.5$   
 $\max X=97$

Measures of central tendency can be misleading. For example, two very different types of data can have the exact same mean. So, there are other types of data measures.

**Measure of Spread:** How widely the data values vary

-Range: The difference between the greatest and least values of the data

Find the range of the two sets of data from the previous problems.

Problem 1: 5, 4, 3, 4, 8, 4, 7

Biggest - smallest

$$8 - 3$$

$$\text{range} = 5$$

Problem 2: 94, 67, 95, 97, 74, 73, 86, 91, 89, 91, 84, 68

Biggest - smallest

$$97 - 67$$

$$\text{range} = 30$$

## Statistics on the Graphing Calculator

*The graphing calculator is a powerful tool when it comes to measuring statistics.  
It can perform many of the calculating that we currently do by hand.*

**Exercise #1:** Shown below are the scores 16 students received on a math quiz.

74, 98, 60, 72, 80, 91, 52, 73, 72, 66, 92, 68, 75, 66, 84, 82

**Step #1:** Go to **STAT, EDIT**, Enter the values into **L1**

L1	L2	L3	1
75			
80			
82			
84			
81			
82			
87			
L1(16) = 98			

**Step #2:** Go to **STAT**, arrow over to **CALC**, and choose **1: 1-Var Statistics**

EDIT	TESTS
1: 1-Var Stats	
2: 2-Var Stats	
3: Med-Med	
4: LinReg(ax+b)	
5: QuadReg	
6: CubicReg	
7: QuartReg	

Step #3: Hit **ENTER** twice. You are given a screen that gives information pertaining to your data set.

$\bar{x}$  = mean = 75.3125  
 $\Sigma x$  = Sum of values = 1205  
 $n$  = # of data values = 16  
 $\min X$  = minimum (LE) = 52  
 $Q_1$  = 1<sup>st</sup> (lower) Quartile = 67  
 $\text{Med}$  = median = 73.5  
 $Q_3$  = 3<sup>rd</sup> (Upper) Quartile = 83  
 $\text{Max} X$  = Maximum (UE) = 98

```

1-Var Stats
x̄=75.3125
Σx=1205
Σx²=92967
Sx=12.15301746
σx=11.76710856
↓n=16
  
```

```

1-Var Stats
↑Sx=12.15301746
σx=11.76710856
n=16
minX=52
Q1=67
Med=73.5
Q3=83
_maxX=98
  
```

\* The calculator will NOT give you the mode and range. You must find these by hand!

Practice:

1. On his first 5 biology tests, Bob received the following scores: 72, 86, 92, 63, and 77. What test score must Bob earn on his sixth test so that his average (mean score) for all six tests will be 80?

let  $x =$  the 6<sup>th</sup> score

$$\frac{72 + 86 + 92 + 63 + 77 + x}{6} = 80$$

390

~~$$\frac{390 + x}{6} = 80$$~~

Proportion  
Cross multiply

$$\begin{array}{r} 390 + x = 480 \\ - 390 \quad - 390 \\ \hline x = 90 \end{array}$$

He needs a 90 on the 6<sup>th</sup> test

2. Alex earned scores of 60, 74, 82, 87, 87 and 94 on his first six algebra tests. What is the relationship between the measures of central tendency of these scores?

- (1) median < mode < mean
- (2) mean < mode < median
- (3) mode < median < mean
- mean < median < mode

least  $\rightarrow$  greatest

$$\text{mean} = 80.\bar{6}$$

$$\text{median} = 84.5$$

$$\text{mode} = 87$$



3. The prices of seven race cars sold last week are listed in the table.

- a) What is the mean value of these race cars, in dollars?

\$ 315,000

Price per Race Car	Number of Race Cars
\$126,000	1
\$140,000	2
\$180,000	1
\$400,000	2
\$819,000	1

- b) What is the median value of these race cars, in dollars?

\$180,000

- c) State which of these measures of central tendency best represents the value of the seven race cars. Justify your answer.

\$180,000 (median) b/c

\$819,000 is an outlier and skewed the mean