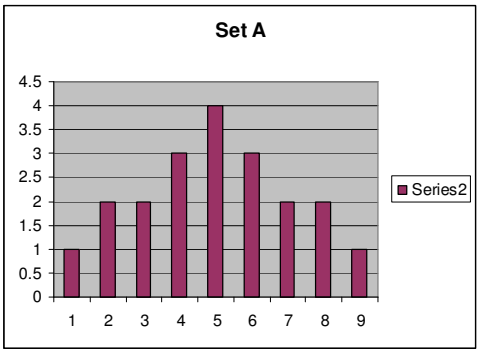
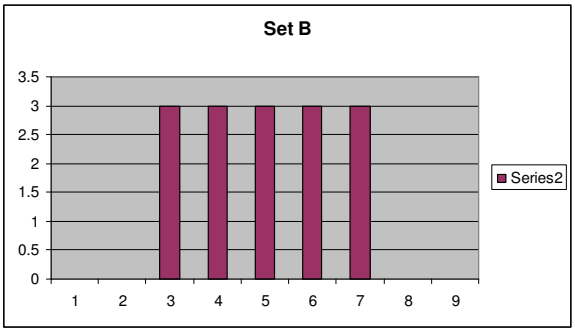
Ex 1: Consider the following two data sets with identical mean and median values. Why is this information misleading?
Set A) 0, 2, 2, 4, 4, 6, 6, 6, 8, 8, 8, 8, 10, 10, 10, 12, 12, 14, 14, 16

mean= 8
med= 8



Set B) 4, 4, 4, 6, 6, 6, 8, 8, 8, 10, 10, 10, 12, 12, 12,

mean= 8
med= 8



Sol'n: This information is misleading because one graph is bell-shaped and the other is uniform, but the calculations make them appear to be similar when really A and B are spread out quite differently.
What is something that can be done to further compare these graphs?

Look at the ***range*** in the data sets.

Range—the difference between the highest and lowest numbers.

A) Range = 16-0
= 16

B) Range= 12-4
=8

$\therefore$ Set B is more consistent since it has a smaller range.

Ex 2: Twins, Toby and Moby, both work at a local pizza shop. Their manager has decided to give a raise to her best employee. She looks at their data.

Number of Pizzas Made per Shift

Toby	54	152	180	12	72	126	104	132
Moby	132	104	102	120	86	12	180	96

Who is more deserving?

Sol'n: She starts by finding the mean number of pizzas made by each and their range.

Toby: $mean = \frac{832}{8}$
$= 140$
range = 180-12
=168

Moby: $mean = \frac{832}{8}$
$= 140$
range = 180-12
=168

These statistics leave both employees equal.
The manager notices that Moby's data looks more consistent, but she needs proof to support her claim.

She decides to calculate the ***standard deviation*** for each.

Standard Deviation (σ)—best choice for measuring the spread of data

Steps for calculating σ:

1. Find the difference between each value and the mean.
2. Square each difference.
3. Add up all of your answers from Step 2.
4. Divide this sum by the number of numbers (i.e. find the average of the differences squared).
5. Find the square root your answer.

Mathematically: $\sigma = \sqrt{\dfrac{\sum_{i=1}^{n} \left(x_i - \bar{x}\right)^2}{n}}$

where σ = standard deviation
$\bar{x}$ = mean
n = number of entries

Standard deviation for Toby (by hand):

Number of Pizzas x	$x - \bar{x}$	$\left(x - \bar{x}\right)^2$
54	54-140=-86	7396
152	12	144
180	40	1600
12	-128	16384
72	-68	4624
126	-14	196
104	-36	1296
132	-8	64
	Total=	31704

$$\sigma = \sqrt{\frac{31704}{8}}$$
$$\sigma = \sqrt{3963}$$
$$\sigma = 62.95$$

In order for this standard deviation to be significant, you must compare it to another data set.

Standard deviation for Moby (with the graphing calculator):
Steps:

1. Enter the data into L_1 by pressing **STAT 1:EDIT**
2. Press **STAT** and scroll over to **CALC**
3. Press **1** for 1-Var Stats
4. Type $\mathbf{L_1}$ by pressing $\mathbf{2^{nd}}$ **1 ENTER**

The standard deviation is given by σx.
$\therefore$ the standard deviation for Moby is 64.54
$\therefore$ Toby's σ is smaller.
$\therefore$ Toby's data is closer to the mean than Moby's.
$\therefore$ Toby is more consistent and deserves the raise.

3: Find the range and standard deviation of the following set of numbers:

3, 10, 8, 20, 4, 4, 3, 8, 8, 8, 12

Sol'n: Range= Highest Value- Lowest Value
= 20-3
=17
Standard Deviation (on graphing calculator) = 4.73

HW. What can you infer, justify and conclude about the Joaquin's and Taran's tests scores?

Joaquin's Tests: 76, 45, 83, 68, 64
Taran's Tests: 67, 70, 70, 62, 62