				Student/Class Goal	
Working Through Statistics				Students will understand and interpret data sets in real life situations.	

Outcome (*lesson objective*) Students will be able to calculate measure of central tendency (mean, median, mode) and variability (range, inter-quartile range, variance, standard deviation).	**Time Frame** 2 hours
Standard *Use Math to Solve Problems and Communicate*	**NRS EFL 3- 6**

Number Sense	**Benchmarks**	**Geometry & Measurement**	**Benchmarks**	**Processes**	**Benchmarks**
Words to numbers connection		Geometric figures		Word problems	4.25, 5.25, 6.26
Calculation	4.2, 5.1, 6.1	Coordinate system		Problem solving strategies	
Order of operations		Perimeter/area/volume formulas		Solutions analysis	
Compare/order numbers		Graphing two-dimensional figures		Calculator	3.22, 4.28, 5.28, 6.29
Estimation		Measurement relationships		Mathematical terminology/symbols	3.23, 4.29, 5.29, 6.30
Exponents/radical expressions	3.5, 4.6, 5.5, 6.5	Pythagorean theorem		Logical progression	
Algebra & Patterns	**Benchmarks**	Measurement applications		Contextual situations	4.31, 5.31, 6.32
Patterns/sequences		Measurement conversions		Mathematical material	
Equations/expressions	4.16, 5.16, 6.16	Rounding		Logical terms	
Linear/nonlinear representations		**Data Analysis & Probability**	**Benchmarks**	Accuracy/precision	
Graphing		Data interpretation	3.16, 4.20, 5.20, 6.21	Real-life applications	3.27, 4.34, 5.35, 6.36
Linear equations		Data displays construction	3.17, 4.21, 5.21, 6.22	Independence/range/fluency	3.28, 4.35, 5.36, 6.37
Quadratic equations		Central tendency	3.18, 4.22, 5.22, 6.23		
		Probabilities			
		Contextual probability			

Materials
Skateboard Production Handout
Hockey Game Attendance Handout
Big Test Standardized Test Scores Handout
Handouts Answer Key
Blank data chart for three measures of central tendency and calculators

Learner Prior Knowledge
Addition, subtraction, multiplication, and division of positive whole numbers, decimals, and fractions. Familiarity with the use of formulas, charts/graphs.

Instructional Activities
Step 1 - The teacher will introduce the topic by describing real life situations where statistics and data analysis are utilized.
- Stock Analysts use statistics to report on investments options to assist clients in making informed decisions on how to invest their money.
- Coaches utilize statistics when they gather data about players to determine strategic plays, player and team rankings, draft picks, and contract salaries.
- Business Owners use statistics when creating a business plan and when making critical decisions about their businesses.
- Clothing Buyers depend on statistics to determine consumer trends and make profitable decisions about future trends.
- Educators employ statistics to determine the success of their students and to relay that information to the public through displays and reports.

Step 2 - Teacher will distribute the *Skateboard Production* handout to each student and explain the definition of mode – the number most often repeated in a number set. The teacher will discuss with the students what the mode is for each worker listed on the chart. The teacher will explain the definition and use of mean – the sum of all the values of the data divided by the number of elements in the data set. The teacher will explain the definition of median – the middle number of a data set when data are arranged in numerical order. If there is no middle number, the median is the average of the two middle numbers. The teacher will explain the definition of range – the difference between the greatest and the least values in a set of data.

Step 3 - Have the students use the data in the production chart to determine the mode, median, mean, and range for each of the three workers.

Step 4- Teacher will distribute *Hockey Game Attendance* handout to each student and explain the definition of quartiles – **boundaries** that break the data into fourths.
- Second quartile – better known as the median
- First quartile – median of the lower half of the data
- Third quartile – median of the upper half of the data

Step 5 - Students will determine the quartiles for the game attendance data. (Sort the data from least to greatest. Then locate the median (2nd quartile). Find the median of the upper half of the data (3rd quartile). Find the median of the lower half of the data (1st quartile).

Step 6 - The teacher will distribute a data set for the *Big Test Standardized Test Scores* and explain the definition of variance – the mean of the squared difference between each number in the set and the mean of all numbers in the set.
V=variance   M=mean A_1, A_2, A_N=the data

$$V = \frac{(A_1 - M)^2 + (A_2 - M)^2 + ... (A_N - M)^2}{N}$$

Students will determine the variance of the standardized test scores. The teacher will explain the definition of standard deviation – the square root of the variance for the data set. Students will determine the standard deviation of the standardized test scores data.

Step 7 - Students will practice these skills using problems from *Number Power Algebra* and *Cord Algebra I.* Practice problem: Research the houses that were sold in your neighborhood in the last two years. Compile the mean, median, and mode house prices and come up with a reasonable price for which you might sell your house.

Assessment/Evidence (*based on outcome*)
SAMS, teacher-made assessment

Teacher Reflection/Lesson Evaluation
Not yet completed.

Next Steps

Technology Integration

Purposeful/Transparent
When students hear mathematical terms used in the classroom, they often don't understand how math can be used in their lives. The teacher makes those connections for students.

Contextual
The application of statistics is explained by doing activities that apply to production, sports, testing and real estate.

Building Expertise
Students apply their number sense skills, charts/graphs and formulas.

Skateboard Production Data
for Mean, Median, Mode, and Range

Worker	M	T	W	Th	F	M	T	W	Th	F
Bob	3	4	5	4	5	5	1	2	2	3
Kevin	2	3	2	7	1	6	1	2	5	3
Mike	3	2	2	7	6	5	4	2	3	2

Answer chart:

Worker:	Mean:	Median:	Mode:	Range:
Bob				
Kevin				
Mike				

Hockey Game Attendance
for Quartiles

Date:	Attendance:
November 5	246
November 6	311
November 7	305
November 12	140
November 14	265
November 15	211
November 20	195
November 21	279
November 24	242
November 30	246
December 1	272
December 2	250
December 3	209
December 9	242
December 10	296

First Quartile:	Second Quartile:	Third Quartile:

Standardized test scores for the Big Test
15   25   35   45   55

Variance:	Standard Deviation:

Answers for mean, median, mode, and range:
Bob's mean: (3+4+5+4+5+5+1+2+2+3)/10 = 34/10 = 3.4
Bob's median: (3+4)/2 = 7/2 = 3.5
Bob's mode: 5
Bob's range: 5-1 = 4

Kevin's mean: (2+3+2+7+1+6+1+2+5+3)/10 = 32/10 = 3.2
Kevin's median: (2+3)/2 = 5/2 = 2.5
Kevin's mode: 2
Kevin's range: 7-1 = 6

Mike's mean: (3+2+2+7+6+5+4+2+3+2)/10 = 36/10 = 3.6
Mike's median: (3+3)/2 = 6/2 = 3
Mike's mode: 2
Mike's range: 7-2 = 5

Answers for quartiles:

140	195	209	211	242	242	246	246	250	265	272	279	296	305	311
			Q_1				Q_2				Q_3			

Answers for variance and standard deviation:
Mean = (15+25+35+45+55)/5 = 175/5 = 35

$$\text{Variance} = \frac{(15-35)^2 + (25-35)^2 + (35-35)^2 + (45-35)^2 + (55-35)^2}{5}$$

$$= \frac{(-20)^2 + (10)^2 + (0)^2 + (10)^2 + (20)^2}{5}$$

$$= \frac{400+100+0+100+400}{5}$$

$$= \frac{1000}{5}$$

$$= 200$$

Standard deviation = $\sqrt{200} \cong 14.14$