Middle School Stats Is Where It's At!

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**This document includes links to all resources shared.

The Standards: TN State Standards

6th Grade

6th grade students begin to formally develop their ability to think statistically. They understand that a set of data (collected to answer a question) will have a distribution, which can be described by its center, spread, and shape. Students calculate the median, mean, and mode and relate these to the overall shape of the distribution. They recognize that the median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally, and also in the sense that it is a balance point. They understand that the mode refers to the most frequently occurring number found in a set of numbers and is found by collecting and organizing the data in order to count the frequency of each result. Students display, summarize and describe numerical data sets, considering the context in which the data were collected. Students use number lines, dot plots, box plots, and pie charts to display numerical data.

A. Develop understanding of statistical variability.	6.SP.A.1 Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages. 6.SP.A.2 Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center (mean, median, mode), spread (range), and overall shape. 6.SP.A.3 Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.
B. Summarize and describe distributions.	6.SP.B.4 Display a single set of numerical data using dot plots (line plots), box plots, pie charts and stem plots.
	6.SP.B.5 Summarize numerical data sets in relation to their context.a. Report the number of observations. b. Describe the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Give quantitative measures of center (median and/or mean) and variability (range) as well as describing any overall pattern with reference to the context in which the data were gathered. d. Relate the choice of measures of center to the shape of the data distribution and the context in which the data were gathered.

7th Grade

Students continue their work from 6th grade in order to build a strong foundation for statistics and probability needed for high school. Students understand that statistics can be used to gain information about a population through sampling. They work with drawing inferences about a population based on a sample and use measures of center and of variability to draw informal comparative inferences about two populations. Students investigate the chance processes and develop, use, and evaluate probability models. Students summarize numerical data sets with respect to their context using quantitative measures and describe any overall patterns or deviations from the overall pattern.

A. Use random sampling to draw inferences about a population.	7.SP.A.1 Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. 7.SP.A.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.
B. Draw informal comparative inferences about two populations.	7.SP.B.3 Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team; on a dot plot or box plot, the separation between the two distributions of heights is noticeable. 7.SP.B.4 Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. For example, decide whether the words in a chapter of a 7th grade science book are generally longer than the words in a chapter of a 4th grade science book.

D. Summarize and describe numerical data sets.	7.SP.D.8 Summarize numerical data sets in relation to their context. a. Give quantitative measures of center (median and/or mean) and variability (range and/or interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered. b. Know and relate the choice of measures of center (median and/or mean)and variability (range and/or interquartile range) to the shape of the data distribution and the context in which the data were gathered.

8th grade

Students extend their knowledge from 7th grade by working with scatter plots for bivariate data and understand linear associations and the use of linear models to solve problems interpreting the slope and intercept. Students continue work with probability by finding probability of compound events and represent the data using organized lists, tables, and tree diagrams.

A. Investigate patterns of association in bivariate data.	8.SP.A.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association. 8.SP.A.2 Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line and informally assess the model fit by judging the closeness of the data points to the line. 8.SP.A.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

Clarifying Standards

- TN State Instructional Focus Documents 6th Grade 7th Grade 8th Grade
    - Nothing about Statistics, but good resource for other standards
- North Carolina Standards Unpacked 6th Grade 7th Grade 8th Grade
    - Just make sure you keep in mind a few things need to be adjusted for our state standards
- Common Core Mathematics Companion
    - Just make sure you keep in mind a few things need to be adjusted for our state standards
- Resources from your District

Task Based Lessons

- Cover multiple standards/sub-parts
- Incorporate Mathematical Practices

6th Grade & 7th Grade

Open Middle Problems: Mean, Median, Mode & Range

- 6.SP.A.2 & 3- TSW construct a data set given combinations of mean, median, mode and range.
- 7.SP.D.8.a- TSW construct a data set given combinations of mean, median, mode and range.

Mean: Which is Possible?

- 6.SP.A.3 & 5- Given only a mean in a context, TSW determine which conclusions are true or false about the unknown data set.
- 7.SP.D.8.a & b- Given only a mean in a context, TSW determine which conclusions are true or false about the unknown data set.
- 7.SP.B.4- TSW make inferences about a population given a context and the mean of the data set.

Titans vs Clarksville High School: Comparing Weights of Starting Lineup Players
6th Grade Worksheet 7th Grade Version
Box plot Paper Folding Activity

- 6.SP.A.1- TSW explain why the weights of the players on the starting line up of each team is a statistical question.
- 6.SP.A.2- TSW describe the weights of the players on the starting line up of each team using measures of center (mean, median, mode), spread (range), and shape.
- 6.SP.A.3- TSW explain the measures of center (summarizes the weights of a team with a single number) and spread (the variation in the weights of a team) in context of the problem. TSW evaluate the meaning of the different measures of center in context of the problem.

- 6.SP.B.4- TSW create a line plot, histogram, and/or box plot to represent the weights of the players on the starting line up of each team.
- 6.SP.B.5- a) TSW report the number of observations is each data set. b) TSW describe the attribute being investigated in the context of the problem. c) TSW describe the data set using measures of center & spread as well as the shape of the data and any outliers. d) TSW determine the most appropriate measure of center to represent the weights of each team.
- 7.SP.B.3- TSW compare the weights of the players on the starting line up of each team by comparing line plots and box plots of the data. TSW determine the difference between the mean weight of the teams.
- 7.SP.B.4- TSW select the most appropriate measure of center to represent the weights of the players on the starting line up of each team. TSW compare the average weight of the two teams. TSW compare the teams using the range/IQR of the weights.
- 7.SP.D.8- a) TSW calculate the mean, median, mode, range & IQR of the players weights for each team. TSW describe the data set using measures of center & spread as well as the shape of the data and any outliers. b) TSW relate their choice of measure of center & variability to the shape of the data. TSW explain the measure of center and variability in terms of the context.

7th Grade

Estimating the Mean State Area from Illustrative Mathematics

Link to map

- 7.SP.A.1- TSW compare line plots constructed from data gathered through random and non-random samples. TSW compare results from smaller random samples vs larger random samples. TSW compare the actual mean state area to the means collected through samples. TSW use a random number generator to collect a random sample.TSW draw a conclusion about the validity of random and biased samples.
- 7.SP.A.2- TCW construct a dot plot of the means of student samples. TSW compare the dot plots of the the class data gathered from biased sampling & random sampling. TSW compare the dot plots of the the class data gathered from a sample size of 5 and a sample size of 10.
- 7.SP.B.3- TSW compare the overlap and centers/peaks of the data distributions.
- 7.SP.D.8- TSW calculate mean.

8th Grade

Monopoly Madness from http://mathin8th.weebly.com

- 8.SP.A.1- TSW construct two scatter plots to investigate the relationship between distance from GO and property cost/cost with hotel rent. TSW identify outliers, clusters, positive vs negative association, linear vs nonlinear association.
- 8.SP.A.2- TSW informally fit a straight line for the scatter plot. TSW describe the fit by informally judging the closeness of the data points to the line.
- 8.SP.A.3- TSW write an equation to represent their line of best fit. TSW use the equation to make predictions about the distance of a property of a certain cost and the cost of a property of a given distance. TSW explain their equation in terms of the approximate increase in cost when the distance from GO increase by one space.