6th Grade Advanced Math Statistics and Probability Unit Plan
20 Days

Unit 5 instructional time is focused on these priority standards:

MA.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.

MA.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, spread, and overall shape.

MA.6.SP.B.5 Summarize numerical data sets in relation to their context, such as by:
MA.6.SP.B.5a Reporting the number of observations.
MA.6.SP.B.5b Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MA.6.SP.B.5c Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
MA.6.SP.B.5d Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

These priority standards will be supported by:

MA.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.
MA.6.SP.B.4 Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

Moving towards these 7th Grade Priority Standards:

<u>7.SP.A.2</u> **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*.

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 seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book*.

7.SP.C.6 **Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.** *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times*.

Essential Questions:
How can I recognize when a question is statistical and when it is not?
What is the best way to organize a set of data?
How do I choose and create appropriate graphs to represent data?
What is the difference in a measure of center and a measure of variation?

"I can" statements:
(from McGraw Hill Common Core Flipbook)

I can explain what makes a statistical question.
I can develop a question that can be used to collect statistical information.
I can describe the nature of the attribute being investigated by a statistical question, including how it was measured and its units of measurement.
I can explain that there are three ways that the distribution of a set of data can be described: by its center, spread, and overall shape.
I can describe the center of a set of statistical data in terms of the mean, median, and mode.
I can describe the spread of a set of statistical data in terms of extremes, clusters, gaps, and outliers.
I can describe the overall shape of the set of data in terms of its symmetry or skewness.
I can define a measure of center as a single value that summarizes a data set.
I can find measures of center by calculating the mean, median, and mode of a set of numerical data.
I can define a measure of variation as the range of the data, relative to the measures of the center.
I can find measures of variation by calculating the interquartile range or the mean absolute deviation of a set of numerical data.
I can organize and display numerical data as a line plot or number plot.
I can organize and display numerical data in a histogram.
I can organize and display numerical data in a box plot.
I can identify a statistical question by interpreting the data in a box plot.
I can summarize numerical data sets in relation to their context.
I can determine the upper and lower extremes, median, and upper and lower quartiles of a set of data and use this information to display the data in a box plot.

I can identify the similarities and differences of representing the same data in a line plot, a histogram, or a box plot.
I can decide and explain which type of plot (dot plot, line plot, histogram, or box plot) is the best way to display my data depending on what I want to communicate about the data.
I can write a data collection summary that includes the number of observations, what is being investigated, how it is measured, and the units of measurement.
I can determine the measures of center and the measures of variability of the collected data.
I can justify the use of a particular measure of center or measure of variability based on the shape of the data.
I can use a measure of center and a measure of variation to draw inferences about the shape of the data distribution.
I can describe the overall patterns in the data and how they related to the context of the problem.
I can describe any deviations from the overall pattern and how they relate to the context of the problem.

RWE/Performance Task:

Possible task for 2015
Cyber-bullying Doesn't Add Up
https://grade6commoncoremath.wikispaces.hcpss.org/Unit+5+Statistics+and+Probability

7th Grade Task/Extension (2016?)
Candy Colors Activity – Design Roulette Wheel as assessment
From Howard County Public Schools
Task 1 - 3: Embedded in Candy Colors lessons
Task 4: Design an experiment to test how often each number and color are spun to see if they match with the expected outcomes.

Vocabulary:

Box and Whisker Plot - A diagram that summarizes data using the median, the upper and lowers quartiles, and the extreme values (minimum and maximum). Box and whisker plots are also known as box plots. It is constructed from the five-number summary of the data: Minimum, Q1 (lower quartile), Q2 (median), Q3 (upper quartile), Maximum.

Distribution – The arrangement of values that show the spread of the data.

Dot Plot – A statistical chart consisting of data points on a number line, typically using circles.

Frequency - the number of times an item, number, or event occurs in a set of data

Grouped Frequency Table - The organization of raw data in table form with classes and frequencies

Histogram - a way of displaying numeric data using horizontal or vertical bars so that the height or length of the bars indicates frequency

Inter-Quartile Range (IQR) - The difference between the first and third quartiles. (Note that the first quartile and third quartiles are sometimes called upper and lower quartiles.)

Maximum value - The largest value in a set of data

Mean Absolute Deviation - the average distance of each data value from the mean. The MAD is a gauge of “on average” how different the data values are form the mean value.

Mean - The “average” or “fair share” value for the data. The mean is also the balance point of the corresponding data distribution. $arithmetic\ mean = \bar{x} = x1 + x2 + x3 + \cdots\ xn\ n$ • Measures of Center- The mean and the median are both ways to measure the center for a set of data. • Measures of Spread- The range and the Mean Absolute Deviation are both common ways to measure the spread for a set of data. • Median- The value for which half the numbers are larger and half are smaller. If there are two middle numbers, the median is the arithmetic mean of the two middle numbers. Note: The median is a good choice to represent the center of a distribution when the distribution is skewed or outliers are present.

Minimum value - The smallest value in a set of data.

Mode - The number that occurs the most often in a list. There can be more than one mode, or no mode.

Numerical Data - Consists of numbers only. Numerical data can be any rational numbers.

Outlier - An outlier is an observation that is numerically distant from the rest of the data.

Range - A measure of spread for a set of data. To find the range, subtract the smallest value from the largest value in a set of data.

Skewed Data –When a set of data is not symmetrical it can skewed, meaning it tends to have a long tail on the left or right side.

Statistical Questions - A statistical question is one for which you don't expect to get a single answer. Instead, you expect to get a variety of different answers, and you are interested in the distribution and tendency of those answers. For example, "How tall are you?" is not a statistical question, however "How tall are the students in your school?" is a statistical question.

Variability – Describes how spread out or closely clustered a set of data is. Variability includes range and mean absolute deviation.

Lesson Outline

Topics	***Day(s)***	***Learning Target***	***Vocabulary***	***Learning Task***
Day 1:	1	• I can explain what makes a good statistical question. • I can develop a question that can be used to collect statistical information.	statistical question	Engage NY Module 6 Lesson 1 - Posing Statistical Questions
Day 2:	1	• I can explain that there are three ways that the distribution of a set of data can be described: by its center, spread, and overall shape.		Engage NY Module 6: Lesson 2: Displaying a Data Distribution
Day 3:	1	• I can organize and display numerical data as a line plot or number plot. • I can organize and display numerical data in a histogram.		Engage NY Module 6: Lessons 3-5
Day 4:	1	• I can define a measure of center as a single value that summarizes a data set. • I can describe the center of a set of statistical data in terms of the mean, median, and mode.		Engage NY Module 6: Lesson 6-7
Day 5-6:	2	• I can organize and display numerical data in a box plot. • I can determine the upper and lower extremes, median, and upper and lower quartiles of a set of data and use this information to display the data in a box plot.		Georgia Lessons on Box Plots (Make a human box plot)
Day 7:	1	• I can determine the measures of center and the measures of variability of the collected data. • I can justify the use of a particular measure of center or measure of variability based on the shape of the data.		Where's Waldo lesson from Georgia; Puppy Weights from Illustrative Math for Homework.

Day 8:	1	• I can find measures of variation by calculating the interquartile range or the mean absolute deviation of a set of numerical data. I can define a measure of variation as the range of the data, relative to the measures of the center.		Everyday Math Lesson about M.A.D. - Using Temperature & Salary
Day 9:	1	• I can find measures of variation by calculating the interquartile range or the mean absolute deviation of a set of numerical data.		North Carolina Activity - Shakespeare v. Rowling - MEAN ABSOLUTE DEVIATION
Day 10:	1	• I can summarize numerical data sets in relation to their context. • I can write a data collection summary that includes the number of observations, what is being investigated, how it is measured, and the units of measurement. • I can use a measure of center and a measure of variation to draw inferences about the shape of the data distribution.		Order it UP! Georgia Culminating Task (Day 1)
Day 11:	1	• I can identify the similarities and differences of representing the same data in a line plot, a histogram, or a box plot. • I can decide and explain which type of plot (dot plot, line plot, histogram, or box plot) is the best way to display my data depending on what I want to communicate about the data. •		Order it UP! Georgia Culminating Task (Day 2)
Day 12:	1	• I can describe the overall patterns in the data and how they related to the context of the problem. • I can describe any deviations from the overall pattern and how they relate to the context of the problem.		Real World Experience Tasks 1 & 2

Day 13:	1	• I can describe the overall patterns in the data and how they related to the context of the problem. • I can describe any deviations from the overall pattern and how they relate to the context of the problem.		Real World Experience Task 3 Gallery Walk
Day 14	1	**Summative Assessment**		

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- I can generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
- I can use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
- I can approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.