

## Unit E - Probability and Statistics

### Overview

Students use organized lists and trees to write sample spaces about events and determine probabilities associated with the events including simple probabilities and conditional probabilities involving ‘and’ and ‘or’. As students use tables to find probabilities they may begin to find shortcuts for finding probabilities. Students also develop and use simulations to model compound events. Given a sample of a population students will make predictions about the entire population. Building on their work describing the center of spread of data in grade 6, students will now compare the center and spread of two sets of data. Throughout the unit students are made aware that presentation of data can affect interpretation of information.

**21<sup>st</sup> Century Capacities:** Analyzing, Presentation

### Stage 1 - Desired Results

#### ESTABLISHED GOALS/ STANDARDS

- MP 1** Make sense sense of problems and persevere in solving them
- MP2** Reason abstractly and quantitatively
- MP3** Construct viable arguments and critique the reasoning of others
- MP4** Model with Mathematics
- MP5** Use appropriate tools strategically

**Use random sampling to draw inferences about a population.**

- CC.7.SP.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.
- CC.7.SP.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.
- CC.7.SP.3** Informally assess the degree of visual overlap of two numerical data

#### *Transfer:*

- Students will be able to independently use their learning in new situations to...*
1. Draw conclusions about graphs and/or data (Analyzing)
  2. Justify reasoning using clear and appropriate mathematical language. (Presentation)

#### *Meaning:*

- UNDERSTANDINGS:** *Students will understand that:*
1. Mathematicians select and use appropriate statistical methods and tools to analyze data, show trends, and describe or make predictions.
  2. Mathematicians are able to make assumptions and approximations to simplify a complicated situation.
  3. Mathematicians create or use models to examine, describe, solve and/or make predictions.

- ESSENTIAL QUESTIONS:** *Students will explore & address these recurring questions:*
- A. Does this solution make sense?
  - B. How can statistics help me describe what I see?
  - C. How can chance inform choice?
  - D. How can presentation change interpretation?

## Grade 7 Math Curriculum

<p>distributions with similar variability's, measuring the difference between the centers by expressing it as a multiple of a measure of variability.</p> <p><b>CC.7.SP.4</b> Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.</p> <p><b>CC.7.SP.5</b> Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.</p> <p><b>CC.7.SP.6</b> 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.</p> <p><b>CC.7.SP.7</b> Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.</p> <p><b>CC.7.SP.7a</b> Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.</p> <p><b>CC.7.SP.7b</b> Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.</p> <p><b>CC.7.SP.8</b> Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.</p> <p><b>CC.7.SP.8a</b> Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.</p> <p><b>CC.7.SP.8b</b> Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event</p> <p><b>CC.7.SP.8c</b> Design and use a simulation to generate frequencies for compound events. For example, use random digits as a simulation tool to approximate the answer to the question: if 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?</p>	<b>Acquisition:</b>	
<p><i>Students will know...</i></p> <ol style="list-style-type: none"> <li>1. Probabilities are expressed as numbers between 0 (unlikely) and 1(likely)</li> <li>2. Random sampling characteristics</li> <li>3. Vocabulary: mean, median, mode, range, box and whiskers, outliers, interquartile range, central tendency, variability, random, probability, theoretical, experimental, tree diagram, frequency table, compound event</li> </ol>	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> <li>1. Finding the mean, median, mode and range of a set of data</li> <li>2. Determining if a set of data has outliers</li> <li>3. Finding the interquartile range of a set of data</li> <li>4. Creating and reading a box and whisker plot</li> <li>5. Comparing and contrasting two sets of data in terms of central tendency and spread</li> <li>6. Finding experimental probabilities by collecting data</li> <li>7. Using theoretical probability to predict</li> <li>8. Use samples to predict</li> <li>9. Displaying compound events with diagrams or organized lists and then finding probabilities</li> </ol>	