Unit 5: Statistics and Probability

Content Area: **Mathematics**
Course(s): **Accelerated Math 7**
Time Period: **4th Marking Period**
Length: **7 Weeks**
Status: **Published**

Unit Overview

In this unit students will explore statistical variability. They will be able to display data multiple ways.
 Students will also be able to describe, analyze and summarize data in order to make statistically sound inferences and conclusions.

By the end of the year administer the Link IT! Gr 7 MathLinkIt! NJSLS BM Form C.

Transfer

Students will be able to independently use their learning to solve real world problems involving...

- statistics 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.
- random sampling to produce representative samples and support valid inferences.
- two data distributions compared using visual and numerical representations based upon measures of center and measures of variability to draw conclusions.
- the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.
- the probability of a chance event is approximated by collecting data on the chance process that produces it, observing its long-run relative frequency, and predicting the approximate relative frequency given the probability.
- a probability model, which may or may not be uniform, is used to find probabilities of events.
- various tools are used to find probabilities of compound events. (Including organized lists, tables, tree diagrams, and simulations.)

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- Experimental results tend to approach theoretical probabilities after a large number of trials.
- Probabilities can be used to make informed decisions
- Certain probability models may not be valid in all situations
- Measures of center allow for analysis of data/data sets.
- Data, both overall patterns and individual points, has meaning in context

Essential Questions

Students will keep considering...

- Chapter 16:
  - How does probability relate to real world application problems?
  - How can measures of center and variation be used to compare two sets of data?

- Chapter 17:
  - How are different events classified and what can I use to solve them?

- Chapter 18:
  - How can information from a problem be represented in a way to see a pattern or frequency?
  - What is a line of best fit and how is it used to support a claim about the data set?

Application of Knowledge and Skill

Students will know...

Students will know...

- how to develop understanding of statistical variability.
- how to summarize and describe distributions.
- how to display data in various ways
- how to interpret and summarize data as a numerical set in relation to its context.

Students will be skilled at...

Students will be skilled at...

- Understanding Likelihood
- Using Data to Estimate Probabilities
- Discerning Between Equally Likely and Non-Equally Likely Outcomes
- Theoretical Probability Models
- Tree Diagrams for Simple Events
- Calculating Probabilities of Simple Events with Equally Likely Outcomes
- Calculating Probabilities of Simple Events with Non-Equally Likely Outcomes
- Introduction to Compound Probability
- Solving Problems Involving Compound Probability
- Using Simulations to Estimate Probabilities of Simple Events
- Using Simulations to Estimate Probabilities of Compound Events
- Analyzing Data Sets Visually and Numerically: Review
- Visually Comparing Two Data Distributions
- Numerically Comparing Two Data Distributions
- Determining If Two Distributions Are Different
- Introduction to Sampling
- Working With Samples and Populations
- Creating Representative Samples
- Understanding Sampling Variability
- Using Sample Data to Make Estimates about Populations
- Using Sample Data to Estimate Population Proportions
- Comparing Populations
- Representing Data in Scatter Plots
- Linear Patterns in Scatter Plots
- More Patterns in Scatter Plots
- Fitting A Line to Data
- Writing Linear Equations to Fit Data
- Representing and Analyzing Categorical Data
- Identifying Associations in Categorical Data

Academic Vocabulary

biased sample	bivariate data	complementary events
compound events	convenience sample	dependent events
distribution	double box plot	double dot plot
experimental probability	fair	five-number summary
fundamental counting principle	independent events	line of best fit
mean absolute deviation	outcome	permutation
population	probability	qualitative data
quantitative data	random	relative frequency
sample	sample space	scatter plot
simple event	simple random sample	simulation
standard deviation	statistics	survey
symmetric	systematic random survey	theoretical probability
tree diagram	two-way table	unbiased sample
unfair	uniform probability model	univariate data
voluntary response sample		

Learning Goal 1

Develop a probability model and use it to find probabilities of events.

Compare probabilities from a model to observed frequency and reason about differences between the model and observed frequency.

Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Target #1.1 -- DOK: 2 Skill/Concept

SWBAT: Describe the probability of a simple event in terms of likelihood.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.7.SP.C.5	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.
MA.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.

Target #1.2 -- DOK: 2 Skill/Concept

SWBAT: Find and use experimental data to estimate probabilities.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.7.SP.C.5	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.
MA.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.

Target #1.3 -- DOK: 2 Skill/Concept

SWBAT: Determine equally likely and non-equally likely outcomes.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.7.SP.C.5	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.
MA.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.

Target #1.4 -- DOK: 2 Skill/Concept

SWBAT: Understand how experimental probability approaches theoretical probability (long-run relative

frequency) as more experiments occur.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.7.SP.C.5	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.
MA.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.
MA.7.SP.C.7a	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.

Target #1.5 -- DOK: 2 Skill/Concept

SWBAT: Use tree diagrams to represent simple events and calculate probability.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.7.SP.C.5	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.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

Target #1.6 -- DOK: 3 Strategic Thinking

SWBAT: Calculate the probability of simple events with equally likely outcomes and make predictions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.7.SP.C.5	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.

MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

Target #1.7 -- DOK: 2 Skill/Concept

SWBAT: Calculate the probability of simple events with non-equally likely outcomes and make predictions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.7.SP.C.5	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.
MA.7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

Target #1.8 -- DOK: 2 Skill/Concept

SWBAT: Find probabilities of compound events.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.C.8a	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.
MA.7.SP.C.8b	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.

Target #1.9 -- DOK: 3 Strategic Thinking

SWBAT: Find probabilities of compound events and make predictions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.C.8a	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.
MA.7.SP.C.8b	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.

Target #1.10 -- DOK: 3 Strategic Thinking

SWBAT: Use simulations to estimate the probability of simple events.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.C.7	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.

Target #1.11 -- DOK: 3 Strategic Thinking

SWBAT: Use simulations to estimate the probability of compound events.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

MA.7.SP.C.8c	Design and use a simulation to generate frequencies for compound events.

Learning Goal 2

Use random sampling to draw inferences about a population.

Target #2.1-- DOK: 2 Skill/Concept

SWBAT calculate the mean, median, mode, IQR and MAD of data sets.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.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.

Target #2.2 -- DOK: 3 Strategic Thinking

SWBAT: Visually compare 2 data distributions.

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.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.

Target #2.3 -- DOK: Strategic Thinking

SWBAT: Numerically compare two data sets

MA.K-12.2	Reason abstractly and quantitatively.	
MA.K-12.3	Construct viable arguments and critique the reasoning of others.	
MA.K-12.4	Model with mathematics.	
MA.K-12.5	Use appropriate tools strategically.	
MA.K-12.6	Attend to precision.	
MA.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.	

Target #2.4 -- DOK: 3 Strategic Thinking

SWBAT: Determine if two distributions are different.

MA.K-12.3	Construct viable arguments and critique the reasoning of others.	
MA.K-12.4	Model with mathematics.	
MA.K-12.5	Use appropriate tools strategically.	
MA.K-12.6	Attend to precision.	
MA.K-12.7	Look for and make use of structure.	
MA.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.	

Target #2.5 -- DOK: 2 Skill/Concept

SWBAT: Determine a population and identify the appropriate sample of that population.

MA.K-12.2	Reason abstractly and quantitatively.	
MA.K-12.3	Construct viable arguments and critique the reasoning of others.	
MA.K-12.5	Use appropriate tools strategically.	
MA.K-12.6	Attend to precision.	
MA.K-12.7	Look for and make use of structure.	
MA.7.SP.A	Use random sampling to draw inferences about a population.	
MA.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.	

Target #2.6 -- DOK: 3 Strategic Thinking

SWBAT: Discern between populations and samples, and identify each for a given contex.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.

Target #2.7 -- DOK: 3 Strategic Thinking

SWBAT: Understand randomization and how to create representative samples.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.7.SP.C	Investigate chance processes and develop, use, and evaluate probability models.
MA.7.SP.C.5	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.

Target #2.8 -- DOK: 3 Strategic Thinking

SWBAT: Understand sampling variability and how to create a representative sample.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.7.SP.C	Investigate chance processes and develop, use, and evaluate probability models.
MA.7.SP.C.5	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.

Target #2.9 -- DOK: Strategic Thinking

SWBAT: Use sample data to make estimates about populations.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.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.

Target #2.10 -- DOK: Strategic Thinking

SWBAT: Use sample data to estimate population proportions.

MA.K-12.1	Make sense of problems and persevere in solving them.

MA.7.RP.A	Analyze proportional relationships and use them to solve real-world and mathematical problems.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.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.

Target #2.11 -- DOK: 4 Extended Thinking

SWBAT: Compare two populations using infrences made from sample data.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.7.SP.A	Use random sampling to draw inferences about a population.
MA.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.
MA.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.
MA.7.SP.B	Draw informal comparative inferences about two populations.
MA.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.
MA.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.

Learning Goal 3

Construct and interpret scatter plots.

Draw lines of best fit to model data that suggest a linear association.

Target #3.1 -- DOK: 1 Recall

SWBAT:

Use a scatter plot to investigate the relationship between two sets of data.
Construct and make conjectures about scatter plots.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.7	Look for and make use of structure.
MA.8.SP.A	Investigate patterns of association in bivariate data.
MA.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.

Target #3.2 -- DOK: 2 Skill/Concept

SWBAT:

Draw lines of best fit and use them to make predictions about data.

Use data models to make predictions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.8.SP.A	Investigate patterns of association in bivariate data.
MA.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.
MA.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 (e.g. line of best fit) by judging the closeness of the

data points to the line.

| MA.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. |

Target #3.3 -- DOK: 2 Skill/Concept

SWBAT:

Solve problems by using a graph. Find the measures of center and variation.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.8.SP.A	Investigate patterns of association in bivariate data.
MA.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.
MA.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 (e.g. line of best fit) by judging the closeness of the data points to the line.
MA.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.

Target #3.5 -- DOK: 4 Extended Thinking

SWBAT: Analyze data distributions.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.8.SP.A	Investigate patterns of association in bivariate data.
MA.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.
MA.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 (e.g. line of best fit) by judging the closeness of the data points to the line.
MA.8.SP.A.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.

Formative Assessment and Performance Opportunities

- Clicker
- Exit/Admit Ticket
- Journal
- Status Check (Thumbs up/down...)
- Student Presentations
- Student-Teacher Conference
- Think-Pair-Share

Summative Assessment

- LinkIt!
- Portfolio
- Project
- Quiz
- Test

21st Century Life and Careers (IN PROGRESS)

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP9.1	Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP11.1	Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.8.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.8.C.CS1	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.
TECH.8.1.8.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.8.E.CS1	Plan strategies to guide inquiry.
TECH.8.1.8.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.1.8.F.CS3	Collect and analyze data to identify solutions and/or make informed decisions.

Accommodations & Modifications

- 504 accommodations
- academic games
- centers

- challenge problems
- IEP modifications
- manipulatives
- math menus
- peer tutoring groups
- performance based tasks
- project based activities
- small group instruction
- student interviews
- To challenge students, have them find misleading data displays and questions that could be bias.
- use of technology
- Use technology or software to draw data displays

Unit Resources

See also *Unit 5: Statistics & Probability* Folder in Curriculum Portal

- ALEKS
- cK12.org
- NJCTL - New Jersey Center for Teaching and Learning
- NJSLS