Cliffside Park Public Schools

COURSE OF STUDY UNIT PLANNING GUIDE FOR:

Grade 7 Unit 3

Grade Level:
7th

Cliffside Park School District
Cliffside Park, NJ 07010
www.cliffsidepark.edu

Cliffside Park Public Schools

Course Overview:

In Grade 7, instructional time should focus on four critical areas: (1) developing understanding of and applying proportional relationships; (2) developing understanding of operations with rational numbers and working with expressions and linear equations; (3) solving problems involving scale drawings and informal geometric constructions, and working with two- and three-dimensional shapes to solve problems involving area, surface area, and volume; and (4) drawing inferences about populations based on samples.

("Grade 7 » Introduction." *Grade 7 » Introduction* | *Common Core State Standards Initiative*. Common Core State Standards Initiative, 2017. Web. 13 July 2017.)

Overview of Units:

1. Operations on Rational Numbers and Expressions
2. Equations, Ratios, Proportions and Percent Problems
3. Drawing inferences about population and probability models
4. Problem Solving with Geometry

Mathematics: Grade 7

Unit 3 Grade 7 Mathematics
Unit Name: Drawing inferences about population and probability models (Topic 6, Topic 7) **Primary Resource:** enVisionmath 2.0 Common Core 2017 **Topic Name:** **Topic 6:** Use Sampling to Draw Inferences About Populations **Topic Duration:** Approximately 2 weeks **Unit Durations:** Approximately 11 weeks
TOPIC 6 **Enduring Understandings:** ● Representatives samples must reflect the entire population. ● The best way to determine a representative sample is to make sure the sample is randomly chosen. ● Data from random samples can be used to make valid inferences about a population by looking for patterns or trends in the distribution of the data, using measures of center and variation in the data, or by writing a proportion given the number of items in the entire population. ● Data displays, such as box plots can be used to make informal comparative inferences about two populations. ● One can compare the shapes of the data displays pr the measures of center and variability. ● You can use dot plots to compare population based on measures of center and variability. ● You can use statistical measures, such as mean and MAD, to make inferences and predictions about populations. ● Many real-world problem situations can be represented with a mathematical model, but that model may not represent a real-world situation exactly.
TOPIC 6 **Essential Questions:**

How can sampling be used to draw inferences about one or more population?

How can you determine a representative sample of a population?

How can inferences be drawn about a population from data gathered from a sample?

How can data displays be used to compare populations?

How can data plots and statistical measures be used to compare populations?

Focus of Standards:

Student Outcomes: *What students will know.*	**Skills** *What students will be able to do.*	**Assessments**	**Resources**
• Test and verify the appropriateness of their math models. • Explain why the results from their mathematical models may not align exactly to the problem situation.	• Distinguish between a population and sample. • Establish whether a sample is representative of a population. • Generate random samples. • Make qualitative inferences from a sample data set. • Make estimates about a population based on a sample data set, and asses whether the inferences are valid. • Use box plots to compare and make inferences about populations. • Use the median and IQR of datasets to informally	***Formative:*** • Diagnostic assessment • Topic Readiness Assessment ***Summative:*** • Topic Assessment • Topic Quiz ***Benchmark Tests:*** • Benchmark test given every 6-8 weeks. ***Alternative:*** • Topic Performance Task • Oral questioning	**Texts:** *enVision 2.0 Common Core* **Digital:** • Student/Teacher eText • Videos • MathXL • IXL • 3-Act Mathematical Modeling • Virtual Nerd App • BouncePages App • Math Tools **Classroom Math Materials** • Student Journal

	compare and make inferences about two populations. • Use the mode, range, mean, and mean absolute deviation (MAD) to compare populations. • Use mathematical modeling to represent a problem situation and to propose a solution.	• Journaling • Problems worked out partially • Using manipulatives to gauge understanding and develop reasoning skills • Using questioning strategies in TE. • Creating scaffolding questions on test • Online tests • Questions tied to Real-World scenarios • Projects	• Online text • Bounceapp • Digital toolkit • Math Practices and Problem Solving Handbook

VOCABULARY	
Tier 2 **none**	**Tier 3** Random sample, representative sample, valid inference
NJSLS Math Standards	**NJSLS Math Practices**
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	**MP.1** Make sense of problems and persevere in solving them **MP.2** Reason abstractly and quantitatively.

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.* **7.RP.A.2c** Represent proportional relationships by equations. For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$. **7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* **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, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.* **7.SP.B.4** Use measures of center and measures of variability for	**MP.3** Construct viable arguments and critique the reasoning of others. **MP.4** Model with mathematics. **MP.5** Use appropriate tools strategically. **MP.6** Attend to precision. **MP.7** Look for and make use of structure. **MP.8** Look for and express regularity in repeated reasoning.

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.*	

Additional Resources:

www.ixl.com
Khan Academy Grade 7
Illustrative Mathematics Grade 7

Unit Name: Drawing inferences about population and probability models.

Primary Resource: enVisionmath 2.0

Topic Name: **Topic 7:** Probability
Topic Duration: Approximately 4 weeks

Unit Durations: Approximately 11 weeks

TOPIC 7
Enduring Understandings:

- Probability is the likelihood an event will occur. Probability can be described using a ratio such as 1 out of 2. The closer the ratio is to 0 the less likely it is to occur. The closer the value is to 1 is more likely the event will occur.
- Theoretical probability of an event is the number of favorable outcomes divided by the number of possible outcomes, when all outcomes are equally likely.
- Theoretical probability is calculated based on an equation. Experimental probability consists of the results of an actual experiment. These probabilities are often very close, but are usually not identical.
- A probability model can be used to evaluate a chance process and its outcomes to develop theoretical or experimental probability. The model has a sample space, a list of events, and the probability of each event.

- Many real-world problem situations can be represented with a mathematical model, but that model may not represent a real-world situation exactly.
- The possible outcomes of a compound event (a combination of two or more events) can be represented using a tree diagram, a table, or an organized list.
- A model, such as a table, organized list, or tree diagram, can represent the sample space of a compound event. The sample space can then be used to determine the probability of a favorable outcome.
- The experimental probability of an outcome can be found by first assigning outcomes to devices such as spinners, coins, and number cubes. These can then be used to model the experimental probability of an event.

TOPIC 7
Essential Questions:

How can you investigate chance processes and develop, use, and evaluate probability models?

What is probability?

How can the probability if an event help make predictions?

How is experimental probability similar and different from theoretical probability?

How can a model be used to find the probability of an event?

How can all the possible outcomes, or sample space, of a compound event be represented?

How can a model help find the probability of a compound event?

How can you use simulations to find the probability of an event?

Focus of Standards:

Student Outcomes: *What students will know.*	**Skills** *What students will be able to do.*	**Assessments**	**Resources**

• Relate probability to mathematical fairness. • Compare theoretical and experimental probability. • Explain differences between theoretical and experimental probability. • Explain why the results from their mathematical models may not align exactly to the problem situation. • Model a real-world situation involving a compound event and predict its outcome using a simulation.	• Use probability to describe the likelihood that an event will occur. • Understand theoretical probability to predict an outcome. • Use theoretical probability to predict an outcome. • Use experimental probability to make predictions. • Develop a probability model. • Use a probability model to evaluate a situation. • Use a probability model to make an estimate. • Use mathematical modeling to represent a problem situation and to propose a solution. • Test and verify the appropriateness of their math models. • Use a tree diagram, a table, or an organized list to represent the sample space for a compound event. • Organize information about a compound event on a table, a tree diagram, or an organized list.	***Formative:*** • Diagnostic assessment • Topic Readiness Assessment ***Summative:*** • Topic Assessment • Topic Quiz ***Benchmark Tests:*** • Benchmark test given every 6-8 weeks. . ***Alternative:*** • Topic Performance Task • Oral questioning • Journaling • Problems worked out partially • Using manipulatives to gauge understanding and	**Texts:** *enVision 2.0 Common Core* **Digital:** • Student/Teacher eText • Videos • MathXL • IXL • 3-Act Mathematical Modeling • Virtual Nerd App • BouncePages App • Math Tools **Classroom Math Materials** • Student Journal • Online text • Bounceapp • Digital toolkit • Math Practices and Problem Solving Handbook

	• Find the probability of a compound event. • Use different tools to simulate a compound event.	develop reasoning skills • Using questioning strategies in TE. • Creating scaffolding questions on test • Online tests • Questions tied to Real-World scenarios • Projects	

VOCABULARY	
Tier 2 Outcomes, event, simulation	**Tier 3** Probability, theoretical probability, experimental probability, relative frequency, sample space, probability model, compound event
NJSLS Math Standards	**NJSLS Math Practices**
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. **7.EE.B.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of	**MP.1** Make sense of problems and persevere in solving them **MP.2** Reason abstractly and quantitatively. **MP.3** Construct viable arguments and critique the reasoning of others. **MP.4** Model with mathematics. **MP.5** Use appropriate tools strategically. **MP.6** Attend to precision.

answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.* **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*. **7.RP.A.2c** **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.* **7.SP.C.7b** Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. *Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* **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. a. 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*	**MP.7** Look for and make use of structure. **MP.8** Look for and express regularity in repeated reasoning.

probability that a girl will be selected. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?* **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.* **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. **7.SP.C.8c** 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?*	

Interdisciplinary Connections

NJSLS for ELA and Science are introduced, developed, and practiced in the context of learning math content and engaging in mathematical practices.

ELA

ELA-Literacy.RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks
ELA-Literacy.RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.
ELA-Literacy.RST.6-8.3 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

ELA-Literacy.SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

Science

MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
MS-LS2-1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

NJSLS: 21st Century Life and Careers

Key Subjects and 21st Century: Themes Mastery of key subjects and 21st century themes is essential to student success. Key subjects include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics. In addition, schools must promote an understanding of academic content at much higher levels by weaving 21st century interdisciplinary themes into key subjects:

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy

9.1.8.E.8 Compare the value of goods and services from different sellers when purchasing large quantities and small quantities.
9.2.8.B.5 Analyze labor market trends using state and federal labor market information and other resources available online.
9.1.8.B.7 Construct a budget to save for long-term, short-term, and charitable goals

9.1.8.C.2 Compare and contrast credit cards and debit cards and the advantages and disadvantages of using each. **9.1.8.C.5** Calculate the cost of borrowing various amounts of money using different types of credit (e.g., credit cards, installment loans, and mortgages) and compare the interest rates associated with each.
Career Ready Practices: Today's students need to develop thinking skills, content knowledge, and social and emotional competencies to navigate complex life and work environments. **CRP2.** Apply appropriate academic and technical skills. **CRP4.** Communicate clearly and effectively and with reason. **CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them. **CRP11.** Use technology to enhance productivity
NJSLS Technology Standards **8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results **8.1.8.C.1** Collaborate to develop and publish work that provides perspectives in a global problem for discussions with learners from other countries **8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify and make an informed decision.
Additional Resources: www.ixl.com Khan Academy Grade 7 Illustrative Mathematics Grade 7

Integrated Differentiation/Accommodations/Modifications for Math 7 Unit 3 ***(Alternate Modes of Instruction and Support)***		
Modifications to Support Gifted and Talented Students	**Modifications to Support English Language Learners**	**Modifications to Support Our Learners**

		(Students with IEPs/504s and At-Risk Learners)
Integrate Higher Order Thinking Skills (HOTS) through questioning and extension projects specific to rational numbers, additive inverse, and properties of rational numbers. Provide menu of challenge activities for when the child finishes the lesson early (integrate technology when possible). College/Career Readiness skill enhancement - G & T students can research professions related to the Rational Numbers. Have the student teach the lesson - peer tutoring (research-based strategy) Accelerate pace for students who are advanced in concepts. Use inquiry-based, discovery learning approaches that emphasize open-ended problems with solving problems with Rational Numbers. Allow students to design their own ways to find the answers to complex questions.	**Concept/Idea Map** - teacher models note-taking on the modeling associated with statistical and probability concepts.. **Contextualize language** for the following key vocabulary terms: **Markup, markdown, percent markup, percent markdown, interest rate, simple interest, principle, random sample, representative sample, valid inference, outcomes, event, simulation, probability, theoretical probability, experimental probability, relative frequency, sample space, probability model, and compound event.** **Visuals and illustrations** Using a number line to add and subtract integers. Using graphic organizers to arrange work and keep it neat. **Word/picture bank** available for students' reference; as well as Spanish translation through Google or their textbooks.	Review student individual educational plan and/or 504 plan for instructional, assessment, and environmental supports. Allow student to use calculator to simplify algebraic expressions with rational numbers. Teach students how to check the accuracy of the solution that was derived from use of a calculator. Provide manipulatives to aid in operations with rational numbers. (integer tiles and fraction tiles). Teach students how to check the accuracy of the solution that was derived from use of the calculator or other method. Provide number lines to help students with adding or subtracting integers. Use integer tiles to perform operations with rational numbers. Utilize graphic organizer or partially completed template for students to simplify expressions.. Provide study guides that are partially completed by teacher, allowing the student to fill in missing information during instruction in order to aid in obtaining information pertaining to modeling linear functions and solving linear systems.

	Wait Time Two - extend basic "Wait Time" - after the 1st student responds to a question, the teacher waits an additional 5 - 7 seconds before calling on another student to ask a question about scatter plots, correlations and lines of best fit; **Native Language Supports:** Working with peer, online assistive technology, translation device, bilingual dictionary. Teach the text backward - **frontload** the concepts and vocabulary needed for learning the material and activating prior knowledge about absolute values, properties of mathematics and integers. Use a **word square** to teach target academic vocabulary for the unit.	Utilize visual aids such as charts or graphs connected to rational numbers. By utilizing individual student assessment results, the teacher will provide small group or remedial instruction to review essential questions/big ideas of rational numbers, properties of numbers, operations with rational numbers, and operations with fractions. Provide wait time to allow students to process orally presented information and questions relating to the topics in the unit. Access to word/picture banks to develop an understanding and use content-specific vocabulary, such as those listed under **Contextualize language.** Allow for Student Choice: Students should be permitted to demonstrate understanding of content through illustrations, computer projects, oral response, creative presentations or demonstration, etc. Support comprehension of unknown vocabulary, by providing examples of Note-taking, highlighting, underlining, etc. Students should be allowed given copies of grade level material or text so they can highlight or underline pertinent information. Text to speech/Oral reading Provide students with flexible seating options while working independently, depending on need or preference.

		Math-specific vocabulary and literary terms should be pre-taught before teaching relevant concepts. Allow extra time to complete in class written assignments. Provide students with a sample problem or list of steps or procedures for multi-step solutions to problems. Allow student to reference these procedures when solving independently. Reduce the number of assigned problems within the unit. Provide models or templates to teach the structure of how to solve problems systematically. If necessary, provide additional set of materials or online access so that students can utilize resources at school and home. Provide study guide for students to review before unit quizzes and tests. Modify tests to address big ideas/essential questions of Unit 3. Provide instructional adaptations and interventions in the general education classroom. ● Differentiated Intervention (enVision 2.0) ○ Reteach ○ Additional Vocabulary Support ○ Build Mathematical Literacy

		○ Math tools and Games ● MATHXL ● IXL Intensive individual intervention: ● RtI in enVision 2.0

Sources

New Jersey Student Learning Standards (2016) http://www.state.nj.us/education/cccs/2016/math/standards.pdf
New Jersey Student Learning Standards: Technology (2014) - http://www.state.nj.us/education/cccs/2014/tech/8.pdf
New Jersey Student Learning Standards: ELA (2014) - https://www.state.nj.us/education/cccs/2016/ela/g03.pdf
New Jersey Science and Engineering Practices - https://www.state.nj.us/education/cccs/2016/science/
NJ Career Ready Practices (2014) - https://www.state.nj.us/education/cccs/2014/career/CareerReadyPractices.pdf
Pearson enVision 2.0 (2016) https://www.pearsonrealize.com/index.html#/