

NJDOE MODEL CURRICULUM PROJECT

CONTENT AREA: Pre-Algebra

GRADE: 7

UNIT #: 3

UNIT NAME: Ratios and Proportions

Anticipated ending: Week of February 15

STUDENT LEARNING OBJECTIVES		CORRESPONDING CCSS	
1	Solve multi-step ratio and percent problems using proportional relationships (<i>simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error</i>).	7RP.3	Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i>
2	Distinguish between valid and invalid samples from a population by determining if the sample is representative of the subgroups within the population (<i>e.g. if the class had 50% girls and the sample had 25% girls, then the number of girls was not representative of the whole population</i>).	7RP.3	Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i>
		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.
3	Use random sampling to produce a representative sample, develop valid inferences about a population with an unknown characteristic of interest, and compare the variation in estimates using multiple samples of the same and different size.	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.
		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. <i>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.</i>
4	Visually and numerically compare the means and variations of two distinct populations (such as the mean height of different sports teams) to draw informal comparative inferences about measures of center and variability using graphical representations and statistical calculations.	7.SP.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. <i>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.</i>
		7.SP.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. <i>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.</i>

STUDENT LEARNING OBJECTIVES		CORRESPONDING CCSS	
5	Interpret and express the likelihood of a chance event as a number between 0 and 1, relating that the probability of an unlikely event happening is near 0, a likely event is near 1, and 1/2 is neither likely nor unlikely.	7.SP.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.
6	Conduct experimental probability events that are both uniform (<i>rolling a number cube multiple times</i>) and non-uniform (<i>tossing a paper cup to see if it lands up or down</i>) to collect and analyze data to make predictions for the approximate relative frequency of chance events.	7RP.3	Use proportional relationships to solve multistep ratio and percent problems. <i>Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.</i>
		7.SP.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. <i>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.</i>
7	Develop uniform and non-uniform theoretical probability models by listing the probabilities of all possible outcomes in an event, for instance, the probability of the number cube landing on each number being 1/6. Then, conduct an experiment of the event using frequencies to determine the probabilities of each outcome and use the results to explain possible sources of discrepancies in theoretical and experimental probabilities.	7.SP7	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. <i>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.</i> b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. <i>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</i>
8	Design a simulation of a compound probability event and determine the sample space using organized lists, tables, and tree diagrams, calculate the fractional probabilities for each outcome in the sample space, and conduct the simulation using the data collected to determine the frequencies of the outcomes in the sample space.	7.SP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks). **Bold type indicates grade level fluency requirements.** (Identified by PARCC Model Content Frameworks).

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.

SLO 1 Use problems that have several givens or must be decomposed before solving.

2. Reason abstractly and quantitatively.

SLO 2 Present an argument and provide supporting justification

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

SLO 5 Determine probability experimentally.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

All of the content presented at this grade level has connections to the standards for mathematical practices.

Bold type identifies possible starting points for connections to the SLOs in this unit.

Greater Brunswick Charter School Curriculum

Grade level: 7		Subject: Math			Unit #: 4		
Day	Topic	SLO	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
1	Probability		To determine readiness for unit study	<i>How much do I already know about probability?</i>		<ul style="list-style-type: none"> • Independent Practice • RTI • i-Ready 	GlencoeMath p.708-710
2	Probability of Simple Events	5, 7	To find the probability of an event occurring.	<i>How do I figure out the likelihood that something will happen?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 9.1 p.711-717
3	Relative frequency	6, 7	To determine the relative frequency of an event		<i>Just another name for probability.</i>	<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.719-720
4	Types of probability	7	To compute the difference between theoretical and experimental probability	<i>What is the difference between what should happen and what does happen?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 9.2 p.721-727
5	Fair vs. Unfair	7	To determine if a game is fair or not.	<i>How can I calculate whether a game is fair or not instead of just going by what I feel?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.729-732
6	Compound events	8	To compute the probability of two or more events occurring in sequence.	<i>How can I figure out if two things are going to happen?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 9.3 p.733-739
7	Simulations	8	To use simulations to model what should occur.	<i>How can I create a good simulation to make a good prediction?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 9.4 p.741-747
8	Simulations of compound events	8	To use simulations to model what should occur.	<i>How can I create a good simulation to make a good prediction?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.749-752

Grade level: 7

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9	Events, simulations, and probability	5, 6, 7, 8	To determine mastery of the content	<i>How much do I know so far, on my own?</i>		<ul style="list-style-type: none"> Independent Practice RTI for strugglers i-Ready 	GlencoeMath p.756 p.753-755 for achievers
10	Events, simulations, and probability	5, 6, 7, 8				<ul style="list-style-type: none"> Review Assessment 	
11	Fundamental counting principal	5, 8	To use the fundamental counting principal to determine probability.	<i>How can I count to find the likely outcome?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	GlencoeMath 9.5 p.797-763
12	Permutations	8	To calculate the number of permutations in a set of events or possibilities	<i>How many way can things happen if I know how many options I have?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	GlencoeMath 9.6 p.765-771
13	Independent and dependent events	8	To identify independent and dependent events	<i>How can I tell the difference between independent and dependent events?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	GlencoeMath p.772-774
14	Independent and dependent events	8	To calculate the probability of independent and dependent events.	<i>How do the probabilities differ between independent and dependent events?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	GlencoeMath 9.7 p.775-781
15	Events and permutations	5, 8	To determine level of mastery			<ul style="list-style-type: none"> Independent Practice RTI for strugglers i-Ready 	GlencoeMath p.785-786
16	Events, permutations, probability	5, 6, 7, 8				<ul style="list-style-type: none"> Review Assessment 	
17	Statistics		To determine readiness for study of statistics	<i>What do I already know in statistics?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	GlencoeMath p.

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18	Predictions	2, 3	To calculate the probability of an outcome to make a prediction	<i>How can I use what I know to predict the future?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 10.1 p.793-799
19	Samples	2, 3	To determine if a sample is valid.	<i>How can I recognize the difference between biased and unbiased samples?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 10.2 p.801-807
20	Multiple samples	2, 3	To collect multiple samples to make a prediction.	<i>How do taking multiple samples make my probability calculation more valid?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.809-812
21	Misleading graphs	2	To identify misleading graphs or misleading statistics	<i>How can I tell if something isn't right?</i>	<i>Ask the students how many remember hockey stars from the 1980s Edmonton Oilers.</i>	<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 10.3 p.813-819
22	Samples and predictions	2, 3	To determine mastery of content	<i>How much have I learned so far?</i>		<ul style="list-style-type: none"> • Independent Practice • RTI for strugglers • i-Ready 	GlencoeMath p.824 p.821-823 for achievers
23	Samples and predictions	2, 3				<ul style="list-style-type: none"> • Review • Assessment 	
24	Measures of central tendency	4	To compute measure of central tendency and display data effectively	<i>When should I use each measure to good effect?</i>	<i>The text does not teach or reteach these measures nor good display strategies. This will be up to you to provide.</i>	<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.825-826
25	Displaying data for visual comparison	4	To use box and whisker plots and dot plots to display sets of data	<i>How do boxes, whiskers, and dots help me see data?</i>		<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 10-4 p.827-835
26	Appropriate display of data	3	To select the appropriate display type for data	<i>How do I know which type of display to use for the data I have?</i>	<i>This is actually a very important skill for future life. Ex: people use line plots for discreet data points or pie charts to show counts over time.</i>	<ul style="list-style-type: none"> • Lesson/Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 10.5 p.839-845

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27	Measures of central tendency and displays	3, 4	To determine mastery of content	<i>How much do I know?</i>		<ul style="list-style-type: none"> Independent Practice RTI for strugglers i-Ready 	GlencoeMath p.849-852
28	Statistics	2, 3, 4, 5, 6, 7, 8				<ul style="list-style-type: none"> Review Assessment 	
29	Simple interest	1	To complete single and multi-step simple interest problems.	<i>What do I remember about percents?</i>	<i>Be sure to require students to set up an equation to find the solution to each problem.</i>	<ul style="list-style-type: none"> Review lesson Independent Practice RTI for strugglers i-Ready 	Simple interest problems Simple interest problems
30	Tax, discount	1	To compute the sales tax or discount on purchases	<i>What do I remember about tax and discounts?</i>		<ul style="list-style-type: none"> Review lesson Independent Practice RTI for strugglers i-Ready 	Sales tax and discount problems
31	Percent of increase or decrease	1	To compute the percent of increase or decrease between two numbers	<i>What do I remember about computing the percent of decrease or increase?</i>		<ul style="list-style-type: none"> Lesson/Guided Practice Independent Practice RTI i-Ready 	<ul style="list-style-type: none"> % up/down worksheet Multiple worksheets for which you can select the level of difficulty
32	Ratio and percent problems.	1				<ul style="list-style-type: none"> Review Assessment 	
Word Wall Candidates							
Complementary events		Outcome		Sample		Fundamental counting principle	
Simple events		Probability		Sample space		Uniform probability model	
Compound events		Experimental probability		Theoretical Probability		Tree diagram	
Dependent events		Survey		Fair		Biased sample	
Independent events		Simulation		Unfair		Unbiased sample	
Quartile		Interquartile range		Population		Statistics	
Range						Double box plot	
						Double dot plot	
						Systematic random sample	
						Convenience sample	
						Voluntary response sample	
						Simple random sample	

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Authentic Application

Your Goal: To predict the opinion of a student based on sampling from a sample of reliable size.

Your Role: Investigator and researcher

Your Audience: Your classmates

The Situation: Take a sampling of student opinion on a topic of value and interest to you.
Determine the probability of opinion, based on the sampling, by gender and grade level
Your work should result in at least four predictions on those two subsets.

Your Product: The likelihood that a student of specific grade level and gender will have a specific opinion on your topic.

Success Criteria:

CATEGORY	3	2	1
Research	The sampling unbiased and large enough in each subset to provide a reliable prediction	The sampling is biased or too small to be adequate.	The sampling is biased and too small to be adequate.
Calculations	All calculations are correct	The calculations are largely correct, but contain small errors.	No calculations are correct
Presentation	The visual presentation of the data and prediction are clear and persuasive.	The visual presentation is lacking or the prediction is in error.	The visual presentation is lacking and the prediction is in error.