

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	Calculate and interpret unit rates of various quantities involving ratios of fractions that contain like and different units using real world examples such as speed and unit price. <i>For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.</i>	7.RP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. <i>For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.</i>
2	Determine if a proportional relationship exists between two quantities e.g. by testing for equivalent ratios in a table or graph on the coordinate plane and observing whether the graph is a straight line through the origin.	7.RP.2a	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
3	Identify the constant of proportionality (unit rate) from tables, graphs, equations, diagrams, and verbal descriptions.	7.RP.2b	Recognize and represent proportional relationships between quantities. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
4	Write equations to model proportional relationships in real world problems. <i>For example, if a recipe that serves 6 people calls for 2 1/2 cups of sugar. How much sugar is needed if you are serving only 2 people?</i>	7.RP.2c	Recognize and represent proportional relationships between quantities. c. Represent proportional relationships by equations. <i>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 $t = pn$.</i>
5	Represent real world problems with proportions on a graph and describe how the graph can be used to explain the values of any point (x, y) on the graph including the points $(0, 0)$ and $(1, r)$, recognizing that r is the unit rate.	7.RP.2d	Recognize and represent proportional relationships between quantities. d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$ where r is the unit rate.
6	Solve multi-step ratio and percent problems using proportional relationships, including scale drawings of geometric figures, simple interest, tax, markups and markdowns, gratuities and commissions, and fees.	7.RP.3, 7.G.1	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> Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

STUDENT LEARNING OBJECTIVES		CORRESPONDING CCSS	
7	Use freehand, mechanical (i.e. ruler, protractor) and technological tools to draw geometric shapes with given conditions (e.g. scale factor), focusing on constructing triangles.	7.G.2	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

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 6 Use proportional relationships in real world context.
2. **Reason abstractly and quantitatively.**
SLO 7 Notice geometric conditions that determine a unique triangle.
3. Construct viable arguments and critique the reasoning of others.
4. **Model with mathematics.**
SLO 6 Represent proportional relationships symbolically.
5. **Use appropriate tools strategically.**
SLO 7 Use technology when available.
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 #: 3		
Day	Topic	SLO	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
1	Ratios and Rates	1	To determine what is known as foundation for the unit	<i>How will what I already know help me learn the new content in this unit?</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • i-Ready 		GlencoeMath p. 4-8
2	Unit Rate	1	To compute the unit rate	<i>How can I show two objects are proportional?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.1 p.9-16
3	Unit rates with complex fractions	1	To compute the unit rate with more difficult fractions.	<i>How do I make a complicated fraction much more normal so I can find the unit rate?</i>	<i>You may need a mini-lesson on handling complex fractions. Tips are in the margins in the text.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.2 p.17-24
4	Converting rates	1, 6	To convert problems using one rate to answers using another rate.	<i>How can fractions and cancelling help me convert rates easily?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.3 p.25-32
5	Non-proportional relationships	2, 3, 4	To determine if a relationship between sets of values are proportional or nonproportional.	<i>How can the constant of proportionality be my friend?</i>	<i>Each pair of numbers has a constant of proportionality. Equivalent ratios are simply two constants that are the same. An upcoming Inquiry lab has another chance at this.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.4 p.33-40
6	Real life problems with proportions	1, 2, 3, 4, 6	To apply skills using proportions	<i>How do my skills help me solve real problems</i>	<p><i>Look for problems of higher rigor, like here.</i></p> <p><i>Also, pause to work with students struggling after the first 5 days.</i></p>	<ul style="list-style-type: none"> • Differentiated RTI • Mini-lesson as needed • RTI • i-Ready 	GlencoeMath p.41-44 Another way of teaching proportions.

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Day	Topic	SLO	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
7	Assessment	1, 2, 3, 4			<i>Use the first half of the period to review skills, the second half to assess.</i>	<ul style="list-style-type: none"> • Review • Assessment 	
8	Graphing proportional relationships	2, 3, 5	To graph a relationship using a straight line	<i>How does a graph help me see a relationship?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.5 & Inquiry Lab p.45-54
9	Solving proportions	3, 4, 6	To solve proportions using cross products	<i>What is a shortcut to solve a proportion?</i>	<i>Teach the math reason cross products work. This will reinforce it occurs only across an = sign and give them an option when the cross product isn't as obvious.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.6 p.55-62
10	Rate of change	3	To identify the relationship between unit rate and rate of change	<i>How is the rate of change and the constant of change just like what I already know?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 63-64
11	Constant rate of change	3, 5	To identify the constant rate of change across a set of data comparisons	<i>How does the unit rate in one pair of data translate to the others in a series of pairs in a proportional relationship?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.7 p.65-72
12	Slope	3	To recognize the slope is the same as the constant of proportionality over a set of data.	<i>What does the constant of proportionality look like on a graph?</i>	<i>Assign students elements of the pages based on their skills, work with students who are struggling with skills.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.8 p.73-80
13	Direct Variation	2, 3	To identify direct variation as the constant of proportionality and the slope in a set of data.	<i>Why does the same concept have so many names?</i>	<i>Emphasize the sameness of the concepts with the names referring more to the application than the math.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 1.9 p.81-88

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15	Ratios and proportions	1, 2, 3, 4, 5	Review	<i>Do I know enough to use this in real life?</i>	<i>Work with strugglers, assign the career piece to those not struggling.</i>	<ul style="list-style-type: none"> • Differentiated RTI intervention • Review practice • Independent Practice • i-Ready 	GlencoeMath p89-94
16	Scale Drawings	6, 7	To determine proportional scale of an online map function	<i>How is a map's zoom feature like a scale factor for drawing?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p571-574
17	Scale Drawings	6, 7	To use scale factor to determine real world values	<i>How can I know the distance from looking at a map?</i>	<i>Focus on the fact that the distance on a map is the hypotenuse of a right triangle. This will align better with SLO #7</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 7.4 p.575-582
18	Scale drawings	6, 7	To use scale factor to determine real world values beyond triangles	<i>How can I know the distance from looking at a blueprint?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.583-584
19	Assessment				<i>Be sure to include scale drawing content in the assessment if you rely on a book test.</i>	<ul style="list-style-type: none"> • Review • Assessment 	
20	Percents introduction		To review info already known	<i>What do I already know that will help me learn new things in this unit?</i>	<i>Review test problems causing difficulty</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.96-98
21	Percent diagrams	6	To visualize a percentage by drawing a ratio out of 100	<i>What does 10%, 30%, 60%, etc. actually look like?</i>	<i>Don't skip on this. It's the basis for making approximations using percents for the rest of their lives.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath p.99-102

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					Whole Group	Small Group / Stations	
22	Percent of a number	6	To find a percent of a number	<i>How can I find the final price of something after the discount?</i>	<i>They've solved simple algebraic equations. Use: 'of' means 'x' 'is' means '=' to make algebraic equations to solve for the resulting number.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.1 p.103-110
23	Estimating percent of a number	6	To use landmark percents and prior visualization (from Day 18) to estimate percent of a number	<i>How can I get close to knowing the discount price while doing the math in my head?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.2 p.111-118
24	Find percents (Optional)	6	To find what percent one number is of another by using the Percent Proportion.	<i>How can I figure out how big the discount is?</i>	<i>Consider skipping Lesson 3. The "is over of" method here has consistently confused students for decades. But, it's your choice.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.3 p.119-128
25	Find percents	6	To find what percent one number is of another by using an algebraic equation.	<i>How can I figure out how big the discount is?</i>	<i>Consider using this as the only method with 'What %' playing the role of the variable in the equation to solve. This method works well for all percentage problems by just changing the location of the variable in the equation to solve.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 3.4 p.129-136
26	Reasonableness of an answer	6	To determine if an answer is reasonable.	<i>How can I use visualization and knowing 100% to check if an answer is reasonable?</i>		<ul style="list-style-type: none"> • Differentiated intervention • Review practice • Independent Practice • i-Ready 	GlencoeMath p.137-139
27	Assessment	6				<ul style="list-style-type: none"> • Review • Assessment 	

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Day	Topic	SLO	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
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28	Percent of change	6	To find the percent of change between two numbers. <i>\$2.95 is what % of \$1.30 becomes $2.95 = W\% \times 1.30$ Solve for W and get 227% Remember you need a percent Remember the increase doesn't include the first 100%. So the increase is 127% This relies on one concept instead of many methods.</i>	<i>How can I compare the change between different numbers?</i>	<i>Consider relying on the same equation method as used earlier. Rather than having students remember a variety of equations and fractions, consider using the same algebraic equation method for all problems.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.5 p.143-150
29	Applications of percent of change	6	To calculate sales tax and tips.	<i>How much more is this going to cost me?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.6 p.151-158 Khan Academy Western Reserve
30	Another application of percent of change	6	To calculate discount	<i>How much am I saving?</i>	<i>Consider mixing the problems of different types during classroom practice and homework. You may see how they are all the same algebraic equation with the variable in a different place and the students will too, eventually.</i>	<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.7 p.159-166
31	Another application of percent of change	6	To calculate interest.	<i>How much are my credit cards and loans going to cost me in a few years if I don't know this?</i>		<ul style="list-style-type: none"> • Lesson & Guided Practice • Independent Practice • RTI • i-Ready 	GlencoeMath 2.8 p.167-174 MathScore Math Only
32	Review	6			<i>Don't forget the unit assessment is likely to ask them to compute the sales tax after a discount or how much interest was paid on a 20% markup.</i>	<ul style="list-style-type: none"> • Differentiated intervention • Review practice • Independent Practice • i-Ready 	GlencoeMath p.177-182
33	Assessment	6				<ul style="list-style-type: none"> • Review • Assessment 	

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Day	Topic	SLO	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
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<u>Word Wall Candidates</u>							
	Constants:		Complex fraction	Coordinate plane	Percent		Tip
	Constant of proportionality		Proportion	Ordered pair	Percent equation		Gratuity
	Constant rate of change		Proportional	Origin	Percent of change		Markdown
	Constant of variation		Nonproportional	Quadrant	increase		Markup
			Direct variation	Slope	decrease		Discount
	Rate		Cross products	X-axis, Y-axis	Percent proportion		Sales Tax
	Rate of Change		Equivalent ratios	X-coordinate			Selling price
	Unit Rate		Dimensional analysis	Y-coordinate	Scale		Principal
	Unit Ratio				Scale factor		Simple interest

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Authentic Application

Your Goal: To predict the population in 2025 of three countries around the world

Your Role: You are an actuarial on a team of United Nations FAO volunteers determining the sustainability of life for countries in danger of not being able to feed their population.

Your Audience: The United Nations Security Council

The Situation: The world population has just reached 7.2 billion. Your job is to predict the population of three different countries. You will need to find the rate of population growth for each country, the current population and use your knowledge of percent of increase to predict the population growth for each country.

To find the rate of population growth for each country go to: https://en.wikipedia.org/wiki/List_of_countries_by_population_growth_rate . Use the most recent rates certified by your organization.

To find the current population for each country go to: http://en.wikipedia.org/wiki/List_of_countries_by_population. You cannot use countries that already use a UN Projection for their population.

Your Product: Produce an oral report with all of the data that you found and calculated. You must inform the Security Council about the population increase or decrease of each country and tell them which countries will be a larger percentage of the world’s population in 2025 than it is now.

Success Criteria:

CATEGORY	4	3	2	1
Research	Team found all the information they needed for the equations and the project board.	Team did research but did not do enough for either the equations or the project board.	Team did some research but numbers for the equation and information for project board was not accurate.	Team failed to research and completely altered the data.
Writing Linear Equations	Team accurately wrote two linear equations from the data they collected.	Team wrote the equations but was wrong on one aspect.	Team wrote the equations but they were wrong.	Team failed to write equations
Graphing Linear Equations	The Team accurately graphed two linear equations.	The Team graphed the equations but messed up on some aspect of graphing.	Team graphed one equation but not the other.	Team failed to graph either equation.
Project board	The project board was creative and had a numerous amount of information.	The project board lacked creativeness.	The project board lacked an element required to be in project board.	Team failed to create a project board.
Oral Presentation	Team presented their information in a clear and	Team presented their information in a fashion that	Team presented their information but not in a clear	Team failed to give an oral presentation

