

NJDOE MODEL CURRICULUM

CONTENT AREA: Mathematics | **Course: Algebra I** | **UNIT #: 1** | **UNIT NAME: Relationships Between Quantities and Reasoning with Equations**

STUDENT LEARNING OBJECTIVES		CORRESPONDING CCSS/NJCCCS	
1	Solve multi-step problems that can be represented algebraically with accurate and appropriately defined units, scales, and models (such as graphs, tables, and data displays).	<p>N.Q.1</p> <p>N.Q.2</p> <p>N.Q.3</p>	<ul style="list-style-type: none"> Use <i>units</i> as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. Define appropriate quantities for the purpose of descriptive modeling. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
2	Interpret terms, factors, coefficients, and expressions (including complex linear and exponential expressions) in terms of context.	A.SSE.1	<ul style="list-style-type: none"> Interpret expressions that represent a quantity in terms of its context. ★ <ol style="list-style-type: none"> Interpret parts of an expression, such as terms, factors, and coefficients. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.
3	Solve linear equations and inequalities in one variable (including literal equations). Justify each step in the process and solution.	<p>A.CED.4</p> <p>A.REI.3</p>	<ul style="list-style-type: none"> Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law $V = IR$ to highlight resistance R. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
4	Create linear equations and inequalities in one variable and use them to solve problems. Justify each step in the process and the solution.	<p>A.CED.1</p> <p>A.REI.1</p> <p>A.REI.3</p>	<ul style="list-style-type: none"> Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
5	Create linear equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	A.CED.2	<ul style="list-style-type: none"> Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
6	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	A.REI.1	<ul style="list-style-type: none"> Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

Major Content (Identified by PARCC Model Content Frameworks, “widely relevant content”).

Selected Opportunities for Connections to Mathematical Practices

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

2. Reason abstractly and quantitatively.

SLO 4 Create abstract algebraic models of real-world problems then transform them.

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

4. Model with mathematics. *

5. Use appropriate tools strategically.

6. Attend to precision.

SLO 6 Use precise language when giving descriptions.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

SLO 3 Write general formulas after working with specific examples.

*MP.1 and MP.4 are overarching practices relevant to Algebra 1. (PARCC Model Content Frameworks)

All of the content presented in this course has connections to the standards for mathematical practices.

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

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
1	<ul style="list-style-type: none"> Operations on whole numbers and using number lines From where algebra expressions come 		<ul style="list-style-type: none"> + , - , x , / whole numbers Write algebra from verbal expressions and vice versa 	<ul style="list-style-type: none"> Are operations with integers easy or hard for me? How do I translate between English and algebra 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 0-3 Lesson 1-1
2	<ul style="list-style-type: none"> Operations on fractions 		<ul style="list-style-type: none"> + , - , x , / fractions 	<ul style="list-style-type: none"> How will my learning of algebra suffer if I still can't do basic operations with fractions? 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 0-4, 0-5
3	<ul style="list-style-type: none"> Forms of rational numbers Order of operations 	2	<ul style="list-style-type: none"> Relate decimals, per cents, and fractions Find values from expressions 	<ul style="list-style-type: none"> How can I show that decimals, fractions and per cents are all the same number? Does the order of operations work in algebra the same as with numbers? 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 0-6 Lesson 1-2
4	<ul style="list-style-type: none"> Basic functions with 2D figures Mathematical properties 	2	<ul style="list-style-type: none"> Measure around the outside, and the inside of 2D figures Employ the commutative, associative, and identify properties to compute expressions 	<ul style="list-style-type: none"> How do I find the outside and inside measures of a 2D figure? How does the order of operations make the mathematics properties easier to use? 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 0-7 Lesson 0-8 Lesson 1-3
5	<ul style="list-style-type: none"> Basic functions with 3D figures 	5	<ul style="list-style-type: none"> Measure around the outside, and the inside of 2D figures 	<ul style="list-style-type: none"> How is measuring 2D and 3D figures the same and how do the differences impact the formulas I use? 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 0-9 Lesson 0-10

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
6	<ul style="list-style-type: none"> Expanding two arrays Distributive property 	4	<ul style="list-style-type: none"> Evaluate expressions using the distributive property 	<ul style="list-style-type: none"> <i>How is the distributive property like expanding each of two similar figures?</i> 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 1-4
7	Solving equations	4	<ul style="list-style-type: none"> Evaluate an equation 	<ul style="list-style-type: none"> <i>How does including an = change what I do when I evaluate expressions (A: none)</i> 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 1-5
8	<ul style="list-style-type: none"> Relations Cartesian plane 	1, 2, 4, 5	Plotting points of a relation between two variables on a plane	<ul style="list-style-type: none"> <i>How can I see all of the numbers that make both sides of an equation equal?</i> 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 1-6
9	<ul style="list-style-type: none"> Catch-up RTI 	1, 2, 4, 5					
10	All topics thus far	1, 2, 4, 5				<ul style="list-style-type: none"> Review Assessment 	
11	Writing equations	4, 5	Write algebraic equations from words and vice versa	<ul style="list-style-type: none"> <i>What is the difference between writing expressions from words and writing equations from words?</i> 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 2-1
12	Solving equations	1, 2, 3	Solve equations with one variable			<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 2-2
13	Solving equations	1, 2, 3, 6	Combine like terms to solve equations	<ul style="list-style-type: none"> <i>How is combining like terms before solving an equation like categorizing animals before making a zoo?</i> 		<ul style="list-style-type: none"> Warm-up, skill practice Lesson & Guided Practice Independent practice i-Ready 	Lesson 2-4

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
14						<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	
15	Evaluating formulas	1, 2, 3, 5, 6	Evaluate formulas	<i>What is the difference between finding values from formulas and finding values from an expression?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 2-8
16	Weighted averages	1	Solve problems involving weighted averages	<i>How can I combine parts of multiple factors into an equation to solve for one part?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 2-9
17	Review	1, 2, 3, 4, 5, 6				<ul style="list-style-type: none"> • RTI • Assessment 	
18	Linear graphs	1, 5	Identify linear equations, parts of an equation, and parts of the corresponding line	<i>What terms do I need to use to talk about graphs and equations intelligently?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 3-1
19	Identifying solutions for equations from a graph	1, 5	Graph linear equations in a plane			<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 3-2
20	Slope between two points	1, 5	Identify the slope of a line between two points	<i>How does knowing the slope of a graph help me draw it?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 3-3

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
21	Relating direct variation to slope	1, 5		<i>How can I determine the constant of variation from two points on a graph?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 3-4
22	Arithmetic sequence	1, 5	Finding ongoing values for an equation from the graph	<i>How can I determine the sequence of values in a direct variation relationship from the constant of variation/slope and the graph?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 3-5
23	<ul style="list-style-type: none"> • Y-intercepts • Slope-Intercept form 	5	<ul style="list-style-type: none"> • Manipulate an equation into slope-intercept form • Graph the line from the slope-intercept form of an equation. 	<i>How can I graph an equation without entering values into the equation?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 4-1
24	Equation from line	1, 5	Develop the equation of a line from the slope and one point on the line	<i>If I have a line, how can I figure out the equation?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 4-2
25	Review	1, 2, 5, 6				<ul style="list-style-type: none"> • RTI • Assessment 	
26	Inequalities in one variable	3, 4	<ul style="list-style-type: none"> • Use addition/subtraction to solve inequalities • Graph solutions to inequalities on a number line 	<ul style="list-style-type: none"> • <i>What is different between solving equations and inequalities using addition or subtraction?</i> • <i>What the point of using an open point?</i> 		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 5-1
27	Inequalities in one variable	3, 4	Use multiplication/division to solve inequalities	<i>What is different between solving equations and inequalities using multiplication or division?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 5-2

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
					Whole Group	Small Group / Stations	
28	Combining like terms with inequalities	1, 2, 3, 4	Combine like terms to solve inequalities	<i>What is different between solving equations and inequalities when combining like terms?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 5-3
29	<ul style="list-style-type: none"> • Slope-intercept form of inequalities in two variables • Graphing linear inequalities 	1, 2, 4, 6	<ul style="list-style-type: none"> • Manipulate two variable inequalities into slope-intercept form • Graph the solution in a plane 	<i>What is different in graphing a solution for a linear equation and inequality?</i> <i>How is an open point like a dotted line?</i> <i>How can I tell, easily, which side to shade?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 5-6
30	Graphing inequalities	1, 2, 5, 6	Become more secure graphing linear equations and inequalities			<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	5-6 Tech Lab
31	Functions	5	<ul style="list-style-type: none"> • Determine if a relation is a function • Recognize and use function notation 	<i>What is the most important characteristic of a function and why is it important?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 1-7
32	Per cent of change	1, 6	Write per cent of change types of problems as an algebraic equation	<i>Now that I know how to change words to equations, how does algebra make it possible for me to never mess up one of these problems again?</i>		<ul style="list-style-type: none"> • Warm-up, skill practice • Lesson & Guided Practice • Independent practice • i-Ready 	Lesson 2-6
32	Review	1, 2, 3, 4, 5, 6				<ul style="list-style-type: none"> • RTI • Assessment 	

Word Wall Candidates

Variable	Term	Coefficient	Relation	Equation
Solution	Root	Domain	Range	Independent Variable
Dependent Variable	Function	Intercept	Slope	Rise / Run
Direct Variation	Arithmetic Sequence	Point-Slope Form	Inequality	Intersection
Half-Plane				

Day	Topic	SLO CCSS	Learning Objectives	Essential Questions	Suggested Student Activities		Possible Resources
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<u>Authentic Application</u>							
	Your Goal:	The design wheelchair ramps for each entrance to the building					
	Your Role:	Each person in a group of four is to fill one of the roles of researcher, blueprint maker, supply manager, presenter. All members of the group must determine the slope required of the final product.					
	Your Audience:	You will present your ramp designs to the class and to the school director. The ramp is to be designed to meet the needs of physically handicapped students and visitors.					
	The Situation:	<p>Each entrance to the school must be made handicapped accessible and comply with state and federal requirements listed in the Americans with Disabilities Act. After choosing an entrance for your team, you are to design a ramp for that entrance that meets the requirements. The researcher must be certain of all applicable laws and ensure the finished products complies with those laws and determine the prevailing cost of labor for construction.</p> <p>The blueprint maker must be artistic to draw the finished design and plan to enable your audience to visualize the ramp in its final state and location. The supply manager must compute the amount of supplies needed to construct the ramp with the materials the team decides is best for their ramp. Remember, the materials used to make the ramp must withstand weather and winter elements for many years. The supply manager must also determine the cost of those materials and the cost of constructing the ramp.</p>					
	The Product:	Your finished product must include an understandable drawing of the ramp in its intended location and a clear cost out of all elements needed to ensure its construction.					
	Success Criteria:	The quality of the ramp's compliance with laws, the quality of the drawing, the quality and accuracy of cost listings, and the quality and clarity of your presentation will all factor into the grade for the team. Also, individual level of contribution to the team's final product will also be a factor.					