

Subject: 8th/CC Math I Grade Level: 8th Unit Title: Equations, functions, rate of change/slope	Timeframe Needed for Completion: 9 weeks Grading Period: 1st nine weeks
Big Idea/Theme: Determining functions <ul style="list-style-type: none"> • Understandings: • Reason quantitatively and use units to solve problems • Interpret the structure of expressions • Create equations that describe numbers or relationships • Understand solving equations as a process of reasoning and explain the reasoning • Solve equations and inequalities in one variable • Represent and solve equations and inequalities graphically • Define, evaluate and compare functions • Understand the concept of a function and use function notation • Use functions to model the relationship between quantities • Interpret functions that arise in applications in terms of a context • Analyze functions using different representations • Build a function that models a relationship between two quantities • Build new functions from existing functions • Construct and compare linear, quadratic and exponential models and solve problems • Interpret expressions for functions in terms of the situation they model • 	

Essential Questions:

1. How do you know when to stop when simplifying/solving an expression or equation?
2. How can it be possible to have no solution or all the real numbers as an answer to an equation?
3. What is the difference between an equation and an inequality?
4. How can you have an extraneous solution to an equation?
5. Why are there two inequalities when solving absolute value inequalities?
6. Why does it matter that you correctly identify the dependent and independent variables?
7. How do domain and range relate to a function?
8. How does a function relate to its inverse?
9. How do you determine a function from an equation, table or graph?
10. When is an equation a function?
11. How are arithmetic and geometric sequences similar? How are they different?

Curriculum Goals/Objectives (to be assessed at the end of the unit/quarter)**Common Core State Standards**

1. N.Q.1: Use units as a way to understand problems and to guide the solution of multi-step problems
2. N.Q.1: Choose and interpret units consistently in formulas
3. N.Q.1: Choose and interpret the scale and the origin in graphs and data displays
4. N.Q.2: Define appropriate quantities for the purpose of descriptive modeling
5. N.Q.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities
6. A.SSE.1: Interpret expressions that represent a quantity in terms of its context. 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 .*
7. A.CED.1: Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.
8. A.CED.4: 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 .*
9. A.REI.1: 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.
10. A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by

letters

11. 8.F.1 Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.
12. 8.F.2 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables or by verbal descriptions). *For example, given a linear function represented by an algebraic expression, determine which function has the greater rate of change.*
13. 8.F.3 Interpret the equation $y=mx+b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A=s^2$ giving the area of a square as a function of its side length is not linear because its graph compares the points $(1,1)$, $(2,4)$, and $(3,9)$ which are not on a straight line.*
14. 8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and the initial value of the function from a description of a relationship or from two (x,y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
15. 8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g. where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
16. F.IF.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, the $f(x)$ denotes the output of f corresponding to the input x . The graph of f is

the graph of the function $y = f(x)$.

17. F.IF.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
18. F.IF.3 Recognize that sequences are functions, sometimes described recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.
19. F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include intercepts; intervals where the function is increasing, decreasing, positive or negative; relative maximums and minimums; symmetries; end behavior and periodicity.*
20. F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example if the function $h(n)$ gives the number of person hours it takes to assemble n engines in a factory, then the positive integers would be the domain for the function.*
21. F.IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
22. F.BF.2 Write arithmetic and geometric sequences both recursively and with explicit formula, use them to model situations, and translate between the two forms.
23. F.LE.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table.)
24. S.ID.7 Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.

<p>Essential Skills/Vocabulary:</p> <p>Vocabulary: Solution set Extraneous solution Independent variable Dependent variable Constraints Domain Range Terms Factors Coefficients Justifying Rate of change Slope y-intercept Initial value Function notation Arithmetic sequence Geometric sequence Common difference Common ratio</p> <p>Essential skills:</p> <ol style="list-style-type: none"> 1. Use appropriate units to solve problems 2. Choose units appropriate to the context of the problem 3. Understand , read and interpret the scale and origin 4. Understand how to adjust viewing window to view a complete graph 5. Defining appropriate quantities to describe the model being used 6. Understand the tool used determines the level of accuracy 	<p>Assessment Tasks:</p> <p>Quick writes Teacher made tests and quizzes Find the error Foldables Cornell notes Groupwork Projects Graphic organizers Venn Diagrams Anticipation/prediction guides</p>
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7. Interpreting parts of an expression, such as terms, factors, coefficients
8. Interpreting constants and coefficients of an expression in context
9. Creating equations and inequalities in one variable, using them to solve problems
10. Creating equations in linear, quadratic and exponential functions, as appropriate
11. Rewriting an equation to solve for a specific variable
12. Explain steps in solving an equation and justify each step
13. Understand a function assigns exactly one output to each input
14. Determining the rate of change of functions
15. Identifying linear and nonlinear functions
16. Determine rate of change and initial value from a table, graph or equation
17. Sketching a graph given a real world situation
18. Describe the domain and range of a function
19. Understand the difference between arithmetic and geometric sequences
20. Interpret key features of graphs and tables; including intercepts, intervals where function is increasing, decreasing, positive, negative, maximums, minimums
21. Graphing a function given an equation and determining the domain, range and any restrictions that exist
22. Writing arithmetic and geometric sequences.

Guiding Questions:

1. When finding the area of a figure, what would be an appropriate measure?
2. When finding the volume of a figure, what would be an appropriate measure?

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| <ol style="list-style-type: none">3. How do you determine an appropriate scale when making a graph?4. What quantities would you use to describe the “best”?5. What quantities could you use to describe being “good” at something?6. What is the accuracy of the measuring tool used?7. Write an equation given multi inputs to determine a specific output.8. Given the following formula, solve for a specified variable9. Solve the given equation using mathematical properties to justify each step10. How can you determine a rule is not a function?11. Given a function, determine if it is linear or non-linear12. Looking at the table, graph, equation determine the rate of change and the y-intercept13. Describe the given graph explaining what could have occurred in each segment14. Evaluate a specific data point of a function and explain its meaning in the context of the equation15. Where does the function show a positive rate of change and what does it mean in this problem?16. Where does the function show a negative rate of change and what does it mean in this problem?17. What are the intercepts, and what do they mean in this problem?18. Sketch a graph of the described relationship and explain what a given point represents in the problem19. What are the differences between arithmetic and geometric sequences? | |
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Materials Suggestions:

NCDPI Resources:

<http://www.ncpublicschools.org/curriculum/mathematics/middlegrades/grade08/>
<http://mathlearnnc.sharpschool.com/cms/One.aspx?portalId=4507283&pageId=5149151>

National Library of Manipulatives

<http://nlvm.usu.edu/en/nav/vlibrary.html>

NCTM Illuminations

<http://illuminations.nctm.org/>

Lesson Plan sites and Activities:

<http://www.lessonplanspage.com/Math.htm>
<http://www.ilovemath.org>

Math Graphic Organizers

<http://www.enchantedlearning.com/graphicorganizers/math/>

Problem Solving/Problem Websites

<http://library.thinkquest.org/25459/learning/problem/>
<http://www.geom.uiuc.edu/~lori/mathed/problems/problast.html>
<http://www.rhlschool.com/math.htm>
<http://nces.ed.gov/nationsreportcard/itmrlsx/search.aspx>

Currituck County Schools – Common Core Resources

<http://www.currituck.k12.nc.us/Page/3021>

AVID Library/Mathematics Write Path I and II

