WAKE COUNTY PUBLIC SCHOOL SYSTEM

Middle School Programs
Building Healthy Core Learning
Common Core Math I, Unit 7

Math I UNIT 7 OVERVIEW: Systems of Equation & Inequalities

Unit Outcomes At the end of this unit, your student should be able to:	**Key Vocabulary** Terms to deepen the student's understanding
✓ Write the equation of a circle with center at the origin given the radius of the circle. ✓ Identify points on a circle given an equation of the circle. ✓ Use coordinates to prove simple geometric theorems algebraically *(e.g. prove that a quadrilateral created by connecting four points is a parallelogram using the slope criteria and/or distance on the coordinate plane).* ✓ Prove the slope criteria for parallel and perpendicular lines. ✓ Use the slope criteria to solve geometric problems (*e.g., determine if two lines are parallel, perpendicular, or neither; find the equation of a line parallel or perpendicular to a given line that passes through a given point; find the coordinates of a fourth vertex of a quadrilateral given three vertices and its shape).* ✓ Find the midpoint of a segment. ✓ Write equations in standard form into slope intercept form. ✓ Understand that when two lines intersect the point is common to both equations. *(It is the point where the two situations are the same).* ✓ Solve a system of equations by graphing, substitution, and elimination *(combination).* ✓ Apply understanding of solving systems of equations to application problems. ✓ Graph and interpret linear inequalities. ✓ Graph and solve systems of linear inequalities.	✓ Infinitely many solutions ✓ Intersecting lines ✓ Midpoint ✓ No Solution ✓ Parallel lines ✓ Perpendicular lines ✓ Solution of a system of linear equations ✓ Substitution ✓ Substitution method ✓ System of Linear Equations
Key Standards Addressed Connections to Common Core/NC Essential Standards	**Where This Unit Fits** Connections to prior and future learning
8.EE.8 Analyze and solve pairs of simultaneous linear equations. a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. c. Solve real-world and mathematical problems leading to two linear equations in two variables. **N-Q.1** Use units 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. **N-Q.3** Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **A-CED.2** Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ***Note:*** *At this level, focus on linear, exponential and quadratic. Limit to situations that involve evaluating exponential functions for integer inputs.*	**Coming into this unit, students should have a strong foundation in:** ✓ Solving one variable equations ✓ Graphing linear functions ✓ Solving one variable inequalities ✓ Operations with integers ✓ Identifying key features of a function from a graph **This unit builds to the following future skills and concepts:** ✓ Graphing and analyzing more complex functions *(including inverse, step, exponential, absolute value, trigonometric and logarithmic functions)* ✓ Evaluating piecewise functions

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A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. **A-REI.5** Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions. **A-REI.6** Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. **A-REI.11** Explain why the *x*-coordinates of the points where the graphs of the equations *y = f(x)* and *y = g(x)* intersect are the solutions of the equation *f(x) = g(x);* find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where *f(x)* and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. *Note: At this level, focus on linear and exponential functions.* **A-REI.12** Graph the solutions to a linear inequality in two variables as a half-plane *(excluding the boundary in the case of a strict inequality),* and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **G-GPE.4** Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, 123'>;) lies on the circle centered at the origin and containing the point (0, 2). **G-GPE.5** Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point). **G-GPE.6** Find the point on a directed line segment between two given points that partitions the segment in a given ratio**.** *Note: At this level, focus on finding the midpoint of a segment.* **G-CO.1** Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc. *Note: At this level, distance around a circular arc is not addressed.*	
Additional Resources Materials to support understanding and enrichment	**"Learning Checks"** Questions Parents Can Use to Assess Understanding
✓ Teaching Videos made by Wake County teachers ✓ WCPSS YouTube Channel – Math Playlist ✓ Systems of equations overview (video) ✓ Solving systems of equations (practice) ✓ Systems of inequalities overview (video) ✓ Solving systems of inequalities (practice) ✓ Standard form overview (video) ✓ Standard form (practice)	✓ What are the advantages and disadvantages of the different types of methods for solving systems of equations? ✓ How are systems of linear equations and systems of inequalities alike? Different? ✓ What type of real-life situations can be modeled using a system of equation and/or inequalities?