Algebra 2 Tier 3 Unit Plan
Unit 2: Systems of Linear Equations and Inequalities

ORANGE PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

OFFICE OF MATHEMATICS

Algebra 2 Unit 2

Contents

Algebra 2 Unit 2
Curriculum Map

A STORY OF UNITS										
	SEP	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**
Alg1 Tier 3	GETTING STARTED	INTRODUCTION TO FUNCTIONS AND EQUATIONS	RAGE OF CHANGE		LINEAR FUNCTION		STATISTICAL MODELING		LINEAR EQUATIONS AND INEQUALITIES	
	Use variables to represent unknowns and to generalize relationships	Use multiple representation to represent functions including linear and non-linear functions	Understand rate of change, and use linear function to model two quantities if there is constant rate of change between these two quantities		Aanlyze rate of change to tetrmine whetr using a linear model to represent data is appropriate		Analyze bivariate categorical data, create two-way frequency tables and compute maginal, joint, and conditional relative frequencies		Solve linear equation/inequalitii es by using table, graph, and algebriacally	

Unit Overview

Unit 2: Systems of Linear Equations and Inequalities

Essential Questions

- ➢ What is a system of linear equations and inequalities?
- ➢ How can we solve for a system of equations and inequalities?
- ➢ What is represented by the solution to a system of equations and inequalities?
- ➢ What multiple methods can be used to solve and represent a system of equations and inequalities?
- ➢ How can our mindset affect our success as students and learners?

Enduring Understandings

- ➢ This unit builds student understanding of systems of equations and inequalities and their solutions, and informal, tabular, graphical, and symbolic methods of solving these systems. The development parallels much of the sequence of the approach to solving and graphing equations and inequalities in the previous unit.

Common Core State Standards

Topic 16

Algebra – Creating Equations
1) A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
2) A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on parts of linear equations in two variables.
3) 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.

Topic 17
4) A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
5) A.REI.3: Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
6) A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on parts of linear equations in two variables.

Topic 18
7) A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
8) 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.
9) A.REI.6: Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on parts of linear equations in two variables.

21st Century Career Ready Practice

CRP1. Act as a responsible and contributing citizen and employee.
CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP4. Communicate clearly and effectively and with reason.
CRP5. Consider the environmental, social and economic impacts of decisions.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.
CRP12. Work productively in teams while using cultural global competence.

Calendar

November 2018						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

December 2018

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

Scope and Sequence

Overview		
Lesson	Topic	Suggesting Pacing and Dates
1	16.1 – Introducing Systems of Equations	1 day
2	16.2 – Solving Systems of Linear Equations Using Number Sense	1 day
3	16.3 – Modeling with Systems of Linear Equations	1 day
4	16.4 – Solving Systems of Equations with Tables	1 day
5	16.5 – Solving Other Systems of Equations with Tables	1 day
6	16.6 – Using Graphs to Solve Systems of Equations	1 day
7	16.7 - Using Graphs to Solve Systems of Equations Continued	1 day
8	16.8 – Systems of Inequalities	1 day
9	16.9 – Modeling with Systems of Inequalities	1 day
10	17.1 – Checking for Understanding	1 day
11	17.2 – Problem Solving and Mindset	1 day
12	17.3 – Fluency with Multi-step Equations	1 day
13	18.1 – The Substitution Method	1 day
14	18.2 – More on the Substitution Method	1 day
15	18.3 – Applying the Substitution Method	1 day
16	18.4 – The Linear Combination Method	1 day
17	18.5 – The Linear Combination Method Continued	1 day
18	18.6 – Connecting the Algebra and Geometry of Systems of Equations	1 day
19	18.7 – Choosing a Linear System Solution Method	1 day
20	18.8 – End of Unit Assessment	1 day

Lesson Analysis

Lesson 1: 16.1 – Introducing Systems of Equations

Objective
- Using knowledge of linear equations SWBAT work in _____ to create and analyze systems of equations and their solutions with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 2: Reason abstractly and quantitatively
- MP 7: Look for and make use of structure

Vocabulary: System of equations

Common Misconceptions:
- Not using different variables to represent different unknown parts of a problem situation

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • A solution represents the value of an unknown variable that makes and equation "true" ***New*** • A system of equations is a method to solving multiple equations with two variables • The solution to a system of equations is a value of both variables that make both equations true	***Review*** • Finding a solution to a linear equation ***New*** • Write a system of equations to model a problem situation • Check your solution to a system of equations to make sure if makes sense with the context of the given problem	Agile Minds 16.1, Student activity book,	1 day	Staying Sharp 16.1

Lesson 2: 16.2 – Solving Systems of Linear Equations using Number Sense

Objective
- Using knowledge of linear equations SWBAT work in _____ to write systems of equations to represent a problem situation with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 5: Use appropriate tools strategically
- MP 7: Look for and make use of structure

Vocabulary: systems of equations, informal methods

Common Misconceptions:
- Incorrect or vague definitions of variables being used
- Only satisfying one equation with the solutions and not both
- Difficulties finding implicit information that may be needed to write a complete system of equations

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • The solution to a system of equations is a value of both variables that make both equations true ***New*** • Problem solving and reasoning can help solve a system of equations using only informal methods	***Review*** • Using number sense to solve a basic system of equations • Check solutions to basic systems of equations ***New*** • Identify unknown variables of a situation • Write a system of equations to represent a problem situation • Solve a system of equations using number sense and other informal methods such as trial and error	Agile Minds 16.2, student activity book	1 day	Staying Sharp 16.2

Lesson 3: 16.3 – Modeling with Systems of Linear Equations

Objective

Using informal methods such as guess and check and logical thinking SWBAT work in _____ to solve systems of equations with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices

- MP 1: Make sense of problems and persevere in solving them
- MP 2: Reason abstractly and quantitatively
- MP 4: Model with Mathematics
- MP 7: Look for and make use of structure

Vocabulary: system of equations, unknown variables

Common Misconceptions:

- Difficulties in representing unknown quantities with variables
- Using the same variable to represent different unknown quantities
- Difficulty translating and explaining what variables represent

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • A linear equation is made up of operations and variables that represent unknown pieces of information *New* • A system of equations can be used to represent a problem with multiple variables • A system of equations is made up of linear equations that can be written using the same methods as writing single equations	*Review* • Identifying variables to represent situations • Writing linear equations *New* • Develop a process to model situations with systems of equations • Write a system of equations with two variables • Translate descriptions of given situations verbally and mathematically	Agile Minds 16.3, Student activity book, Chart paper and markers	1 day	Staying Sharp 16.3

Lesson 4: 16.4 – Solving Systems of Equations with Tables

Objective
- Using tables SWBAT work in _____ to solve linear systems of equations with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: input, output, delta-table function, three-column table

Common Misconceptions:
- Not putting both equations into the equation editor on the graphing calculator
- Looking at the wrong columns of the table function when trying to find a match (misunderstanding a 3 column table)
- Switching up x and y values on a given table

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • An x/y table is one way to represent a linear function • A table has input (x) values and output (y) values ***New*** • A solution to a system of equations can be found in a table by finding matching values of y for the same x-value • A graphing calculator can be used to create and use tables to solve linear equations	***Review*** • Entering a linear equation into the graphing calculator and analyzing the table function • Analyzing a linear equation from a given table ***New*** • Solving a system of linear equations using two tables • Locating a function's table on a graphing calculator • Solving a system of linear equations using the 3-column table on the graphing calculator	Agile Minds 16.4, Student activity book,	1 day	Staying Sharp 16.4

Lesson 5: 16.5 - Solving other Systems of Equations with Tables

Objective
- Using tables along with a "generate and test" method SWBAT work in _____ to solve linear systems of equations with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: input, output, delta-table function, three-column table

Common Misconceptions:
- Not putting both equations into the equation editor on the graphing calculator
- Looking at the wrong columns of the table function when trying to find a match (misunderstanding a 3 column table)
- Switching up x and y values on a given table

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • An x/y table is one way to represent a linear function • A table has input (x) values and output (y) values ***New*** • A solution to a system of equations can be found in a table by finding matching values of y for the same x-value • A solution to a system of equations are values for both variables that satisfy both equations	***Review*** • Entering a linear system of equations into the graphing calculator and analyzing the table function • Analyzing a linear system of equations from a given table ***New*** • Solving a system of linear equations using two tables • Use the "generate and test" method to solve a system using tables for equations that are not easy to use a table with	Agile Minds 16.5, Student activity book,	1 day	Staying Sharp 16.5

Lesson 6: 16.6 - Using Graphs to Solve Systems of Equations

Objective
- Using graphs SWBAT work in _____ to solve linear systems of equations with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 5: Use appropriate tools strategically
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: intersection, slope, y-intercept, coordinate plane

Common Misconceptions:
- Graphing difficulties
- Not graphing both lines on the same coordinate plane
- Misunderstanding what the solution of a system of equations is when graphed

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Slope-intercept form of an equation gives you the slope and y-intercept of a linear function • A linear equation is a straight line when graphed on a coordinate plane ***New*** • The solution of a system of equations will be the point of intersection between the two lines when graphed on a single coordinate plane	***Review*** • Analyze solving a system of equations with tables • Graph linear equations ***New*** • Graph both equations of a system of equations on one coordinate plane • Use a graph to identify the solution to a system of equations	Agile Minds 16.6, student activity book	1 day	Staying Sharp 16.6

Algebra 2 Unit 2

Lesson 7: 16.7 - Using Graphs to Solve Systems of Equations Continued

Objective
- Using the graphing function on graphing calculators SWBAT work in _____ to solve systems of linear equations for at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 2: Reason abstractly and quantitatively
- MP 7: Look for and make use of structure

Vocabulary: intersection, slope, y-intercept, coordinate plane, equation editor

Common Misconceptions:
- Graphing difficulties
- Not graphing both lines on the same coordinate plane
- Not entering both equations into the equation editor in the graphing calculator
- Misunderstanding what the solution of a system of equations is when graphed

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Slope-intercept form of an equation gives you the slope and y-intercept of a linear function • A linear equation is a straight line when graphed on a coordinate plane ***New*** • The solution of a system of equations will be the point of intersection between the two lines when graphed on a single coordinate plane	***Review*** • Analyze solving a system of equations with tables • Graph linear equations • Entering a linear function into a graphing calculator and analyzing the graph ***New*** • Graph both equations of a system of equations on one coordinate plane • Use graphing calculators to graph systems of equations • Use the intersection function on a graphing calculator to identify the solution to a system of equations	Agile Minds 16.7, Student activity book, calculator intersection directions	1 day	Staying Sharp 16.7

15

Lesson 8: 16.8 - Systems of Inequalities

Objective
- Using coordinate planes SWBAT work in _____ to analyze and explore solutions to systems of inequalities with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: solution sets, coordinate plane, system of inequalities

Common Misconceptions:
- Identifying the same solution for inequalities as you would for an equation
- Difficulties visually seeing on the graph the solution set of a system of inequalities
- Mixing up inequality symbols (i.e. < means greater than and > means less than)

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Inequalities have solution sets rather than just one single solution *New* • A solution to a system of inequalities is the solution set that satisfies both inequalities • Systems of inequalities can also be graphed on the same coordinate plane to identify the solution set	*Review* • Graphing linear inequalities • Graphing compound inequalities *New* • Graph systems of inequalities involving three inequalities • Solving for the unknown variable after the equation has been rearranged	Agile Minds 16.8, student activity book, Computer lab	1 day	Staying Sharp 16.8

Lesson 9: 16.9 - Modeling with Systems of Inequalities

Objective
- Using knowledge of linear inequalities SWBAT work in _____ to solve systems of inequalities for at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 4: Model with mathematics
- MP 5: Use appropriate tools strategically
- MP 7: Look for and make use of structure

Vocabulary: linear inequalities

Common Misconceptions:
- Incorrectly identifying solution sets
- Misunderstanding the context of the problem and exactly what solution the problem is asking for
- Incorrectly identifying the unknown quantities with variables

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • A system of equations is needed when there is more than one variable in a given problem • A system of inequalities can be written when you have an inequality with more than one variable ***New*** • A problem scenario can be represented by a system of inequality just like it can be represented by a system of inequalities	***Review*** • Graphing systems of inequalities • Modeling problem scenarios with systems of equations ***New*** • Apply a system of inequalities to a problem situation • Model a problem by writing a system of inequalities	Agile Minds 16.9, Student activity book, Assessment reports	1 day	Staying Sharp 16.9

Lesson 10: 17.1 – Checking For Understanding

Objective
- Using algebraic properties SWBAT work in _____ to arrange steps to solving multi-step equations with justifications for at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: solution step, justification, algebraic properties

Common Misconceptions:
- Incorrectly using the algebraic properties
- Forgetting inverse operations
- Difficulties understanding what skill each property actually connects to which makes it difficult for students to name the property they are using even if they know the skill

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • A solution to a system has a solution set while a solution to an equation, most often, is only one number • An algebraic property is used in every step while solving mult-step equations ***New*** • Each algebraic property is used as a justification for each step made while solving equations	***Review*** • Explain the difference between a solution to a system and a solution to an equation • Solve multi-step equations ***New*** • Build efficiency solving multi-step equations • Justify each step of a multi-step equation using algebraic properties	Agile Minds 17.1, Student activity book, mid unit assessment, equation solution cards	1 day	Staying Sharp 17.1

Lesson 11: 17.2 – Problem Solving and Mindset

Objective
- Using growth mindset strategies SWBAT work in _____ to work out an algebraic problem with a positive mindset and reasoning with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 3: Construct viable arguments and critique the reasoning of others
- MP 7: Look for and make use of structure

Vocabulary: mindset, positive mindset, growth mindset , phases or problem solving

Common Misconceptions:
- Students who feel uncomfortable being open about weaknesses
- Difficulties with the reflective nature of this lesson
- Misunderstandings of the process of problem solving

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Using context clues is an important problem solving skill • Effective communication makes problem solving easier and more effective ***New*** • Mindset continually affects our success as problem solvers in every problem faced throughout each day	***Review*** • Being good "givers" and "getters" of information can make us stronger problem solvers ***New*** • Solve an algebraic problem while considering your mindset and the affect it has on your success • Think about and analyze how you handle challenges and control your mindset	Agile Minds 17.2, Student activity book, Chart paper and markers	1 day	Staying Sharp 17.2

Lesson 12: 17.3 – Fluency with Multi-step Equations

Objective
- Using multiple methods SWBAT work in _____ to analyze, solve, and create complex multi-step equations with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 4: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: solution step, justification, algebraic properties

Common Misconceptions:
- Incorrectly using the algebraic properties
- Forgetting inverse operations
- Difficulties understanding what skill each property actually connects to which makes it difficult for students to name the property they are using even if they know the skill

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • A solution to a system has a solution set while a solution to an equation, most often, is only one number • An algebraic property is used in every step while solving mult-step equations ***New*** • There are multiple ways to solve multi-step equations that when done correctly will result in the same answer • Each algebraic property is used as a justification for each step made while solving equations	***Review*** • Explain the difference between a solution to a system and a solution to an equation • Solve multi-step equations in two different ways ***New*** • Compare different methods to solving multi-step equations • Build efficiency solving multi-step equations • Justify each step of a multi-step equation using algebraic properties	Agile Minds 17.3, Student activity book, White boards	1 day	Staying Sharp 17.3

Lesson 13: 18.1 – The Substitution Method

Objective
- Using substitution method SWBAT work in _____ to solve systems of equations algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: Substitution method

Common Misconceptions:
- Difficulties substituting expressions into an equation (most often not properly using distributive property)
- Solving for one variable but forgetting to use it to solve for the second variable

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • You can use a variety of methods to solve equations by ***New*** • Systems of equations also have a variety of methods to choose from in order to solve • Substitution method solves for one variable and substitutes that expression into the other equation so that you are left with an equation that only has one variable	***Review*** • Solving systems of equations informal methods ***New*** • Explore substitution method and identify where else in algebra the idea of substitution is used • Identify the skills needed to use substitution method • Use substitution method to solve systems of equations	Agile Minds 18.1, Student activity book,	1 day	Staying Sharp 18.1

Lesson 14: 18.2 – More on the Substitution Method

Objective
- Using substitution method SWBAT work in _____ to solve systems of equations algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP4: Model with mathematics
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: substitution method

Common Misconceptions:
- Difficulties substituting expressions into an equation (most often not properly using distributive property)
- Solving for one variable but forgetting to use it to solve for the second variable
- Difficulties graphing

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Substitution method is an algebraic method to solving systems of equations that uses substitution to rewrite one of the variables to be able to solve an equation with only one variable ***New*** • Graphing systems of equations can help to build connections between geometric skills and knowledge to algebra • The visual representation of a system of equations can help students to use prior geometric knowledge to better understand what a solution to a system of equations represents	***Review*** • Identify multiple representations of a solution to a system of equations • Solving systems of equations with substitution method ***New*** • Use substitution method to continue improving efficiency on solving systems of equations • Identify connections between coordinate geometry and graphing systems of equations	Agile Minds 18.2, student activity book	1 day	Staying Sharp 18.2

Lesson 15: 18.3 - Applying the Substitution Method

Objective
- Using substitution method SWBAT work in _____ to solve systems of equations that model application problems algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: substitution method

Common Misconceptions:
- Misunderstanding when it is necessary to change direction of the inequality (either changing it with addition or subtraction or forgetting to change it for multiplication and division)
- Difficulties understanding that you can use algebraic properties just as you would when solving equations

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • System of equations can represent real world problems easily • Some of the informal techniques previously used to solve systems of equations were logic and principles of equality ***New*** • Substitution method can be used to also solve real world problems	***Review*** • Write systems of equations to represent real world problems • Identify variables in a real world problem ***New*** • Solve real world systems of equations • Identify what each variable represents in the real world problem context • Identify what the solution represents in terms of the real world problem context	Agile Minds 18.3, Student activity book, student	1 day	Staying Sharp 18.3

Lesson 16: 18.4 – The Linear Combination Method

Objective

- Using linear combination method SWBAT work in _____ to solve systems of equations algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices

- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: Linear combination method

Common Misconceptions:

- Forgetting to multiply the entire equation when changing one of the equations to be able to combine them
- Only combining one side of the equations and not both
- Mistakes with signs

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • You can use a variety of methods to solve equations by ***New*** • Systems of equations also have a variety of methods to choose from in order to solve • Linear combination method uses the idea of equality to combine both equations in a way that "eliminates" one of the variables	***Review*** • Solving systems of equations informal methods ***New*** • Explore Linear combination method • Identify the skills needed to use linear combination method • Use linear combination method to solve systems of equations	Agile Minds 18.4, Student activity book	1 day	Staying Sharp 18.4

Lesson 17: 18.5 – The Linear Combination Method Continued

Objective

- Using linear combination method SWBAT work in _____ to solve systems of equations algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 6: Attend to precision
- MP 7: Look for and make use of structure

Vocabulary: linear combination method, constant

Common Misconceptions:
- Difficulties seeing the constants that can be multiplied to each equation to create terms that will "eliminate" one of the variables
- Only combining one side of the equations and not both
- Mistakes with signs

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • You can use a variety of methods to solve equations by *New* • Systems of equations also have a variety of methods to choose from in order to solve • Linear combination method uses the idea of equality to combine both equations in a way that "eliminates" one of the variables • Sometimes you have to multiply both equations by a constant in order to create a set of terms that will "eliminate" one of the variables	*Review* • Solving systems of equations informal methods • Use linear combination method to solve systems of equations by multiplying one equation by a constant *New* • Explore Linear combination method • Identify the skills needed to use linear combination method • Use linear combination method to solve systems of equations where you have to multiply both equations by a constant	Agile Minds 18.5, Student activity book	1 day	Staying Sharp 18.5

Lesson 18: 18.6 – Connecting the Algebra and Geometry of Systems of Equations

Objective

- Using substitution and linear combination method SWBAT work in _____ to solve systems of equations with no solutions and infinite solutions algebraically with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 5: Use appropriate tools strategically
- MP 7: Look for and make use of structure

Vocabulary: parallel lines, collinear lines, unique solutions, solution to a system of equations

Common Misconceptions:
-

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Multiple methods of solving systems of equations can be used *New* • Whether you solve a system of equations graphically or algebraically the solution will be the same • The graphs of unique solutions are parallel lines (for no solution) and collinear lines (for infinite solutions) • Visually seeing the graphical representation of these solutions can enhance a deeper understanding of systems of equations	*Review* • Graph a system of equations on the same coordinate plane • Identify the solution to a graphed system of equations • Solve for a system of equations algebraically *New* • Compare the solutions found graphically to the solutions found algebraically when solving a system of equations • Identify the type of lines that are found when graphing the solutions to problems with either no solution or infinite solutions	Agile Minds 18.6, Student activity book, computer lab	1 day	Staying Sharp 18.6

Lesson 19: 18.7 – Choosing a Linear System Solution Method

Objective

- Using all methods learned in this unit SWBAT work in _____ to analyze systems of equations and identify which method is more efficient to solve with at least 80% efficiency on the staying sharp wrap up activity.

Focused Mathematical Practices
- MP 1: Make sense of problems and persevere in solving them
- MP 3: Construct viable arguments and critique the reasoning of others
- MP 5: Use appropriate tools strategically
- MP 7: Look for and make use of structure

Vocabulary: All vocab from topic

Common Misconceptions:
- Students may feel limited that there is only one right answer for the "best method" instead of understanding that the "best method" could be multiple answers and different for individual students
- Students may have difficulty understanding that part of the process of choosing the method to use involves knowing your own skills and which methods you feel more confident with

CCSS	Concepts What students will know	Skills What students will be able to do	Material/ Resource	Suggested Pacing	Assessment Check Point
	Review • Methods to solve a system of equations includes: graphically, tables, substitution method and linear combination method *New* • One problem does not have to be solved the same way every time, there are often times multiple ways to solve the same problem • Multiple methods to solve a type of problem creates opportunities to problem solve and determine which method would work best for a particular problem	*Review* • Solve a system of equations by any of the previously learned methods *New* • Analyze all methods learned to solve systems of equations • Identify when it would be easier to use certain methods over others • Select a method to solve a system of equations and explain why you made that choice	Agile Minds 18.7, Student activity book, graph paper	1 day	Staying Sharp 18.7

Ideal Math Block

The following outline is the department approved ideal math block for grades 9-12.

1) Do Now (7-10 min)
    a. Serves as review from last class' or of prerequisite material
    b. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

2) Starter/Launch (5 min)
    a. Designed to introduce the lesson
    b. Uses concrete or pictorial examples
    c. Attempts to bridge the gap between grade level deficits and rigorous, on grade level content
    d. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

3) Mini-Lesson (15-20 min)
    a. Design varies based on content
    b. May include an investigative approach, direct instruction approach, whole class discussion led approach, etc.
    c. Includes CFU's
    d. Anticipates misconceptions and addresses common mistakes

4) Class Activity (25-30 min)
    a. Design varies based on content
    b. May include partner work, group work/project, experiments, investigations, game based activities, etc.

5) Independent Practice (7-10 min)
    a. Provides students an opportunity to work/think independently

6) Closure (5-10 min)
    a. Connects lesson/activities to big ideas
    b. Allows students to reflect and summarize what they have learned
    c. May occur after the activity or independent practice depending on the content and objective

7) DOL (5 min)
    a. Exit slip

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Solve problem using multiple strategies
Example: The Fruit Emporium sells a dish of two flavors of yogurt with one serving of fruit toppings for $1.40. It also sells a dish of three flavors of yogurt with one serving of fruit toppings for $1.95.
a. **How much is one flavor of yogurt with one serving of fruit toppings?**
b. **How much does a customer pay for the one serving of fruit toppings?**

Strategies:

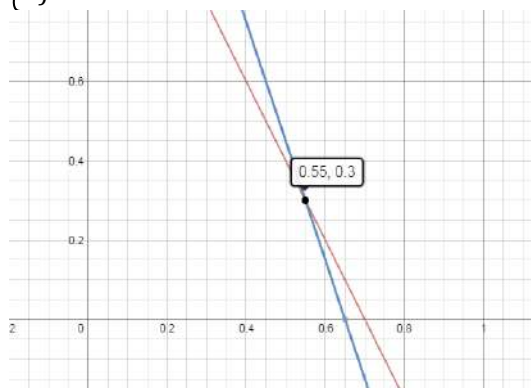- Use concrete diagram and number sense

- Use bar model
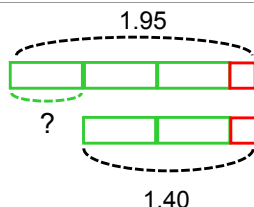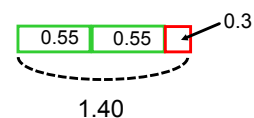
- Use Graph

Create system of equations

Let *f* represents number of flavors ,
   t represents the number of topping

$$\begin{cases} 2f + t = 1.40 \\ 3f + t = 1.95 \end{cases}$$

0.55, 0.3

Solve problem using multiple strategies

Example: The Fruit Emporium sells a dish of two flavors of yogurt with one serving of fruit toppings for $1.40. It also sells a dish of three flavors of yogurt with one serving of fruit toppings for $1.95.

   c. How much is one flavor of yogurt with one serving of fruit toppings?
   d. How much does a customer pay for the one serving of fruit toppings?

Create system of equations
Let *f* represents number of flavors ,
    t represents the number of topping

$$\begin{cases} 2f + t = 1.40 \\ 3f + t = 1.95 \end{cases}$$

substitution method	*elimination method*
t = 1.40 – 2f	2f + t = 1.40
	- (3f + t = 1.95)
3f + (1.40 – 2f) = 1.95	_____
f + 1.40 = 1.95	- f = - 0.55
- 1.40 -1.40	divided by -1 on both sides
_____	f = 0.55
f = 0.55	2 (0.55) + t = 1.40
t = 1.40 – 2f	1.10 + t = 1.40
t = 1.40 -2 (0.55)	- 1.10 -1.10
t = 0.30	_____
	t = 0.30

Which graph **best** represents the solution to this system of inequalitie

$$x + y \leq 6$$
$$x + 2y \leq 8$$

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