MATH MCS MYP UNIT PLANNER

Teacher(s)	**Schumacher**	**Subject group and discipline**	**Accelerated Algebra 1/Geometry A**		
Unit title	**Unit 2: Reasoning with Linear Equations and Inequalities**	**MYP year**	**Year 4**	**Unit duration (hrs)**	**15 hours (4 weeks)**

Inquiry: Establishing the purpose of the unit

Key concept	**Related concept(s)**	**Global context**
Form	Change, Generalization, Pattern, Representation	Scientific and Technical Innovation Systems, models, methods Products, processes, solutions

Statement of inquiry

The way relationships change causes generalizations and patterns.

Inquiry questions

Factual

- How do equations and expressions differ?
- How do you evaluate an expression?
- What is a solution?

Conceptual

- How can a formula be rearranged?
- Why is rearranging a formula helpful?
- How do you solve equations using algebraic properties of equality?

- What are the similarities and differences between the

Debatable

- What is the best way to solve a linear equation in one-variable equation?

MYP Objectives	**Assessments**
Objective A: Knowing and Understanding Objective B: Investigating Patterns	MYP Assessments: Rubric A Solving Equations; Rubric B Arithmetic Sequences Common Formative Assessment (CFA): Unit 2 Mid-unit Checkpoint Summative: Unit 2- Reasoning with Linear Equations and Inequalities

Approaches to learning (ATL)

- Understand and use mathematical notation
- Take effective notes in class
- Consider ideas from multiple perspectives
- Present information in a variety of formats and platforms

Action: Teaching and learning through inquiry

Content Standards

Unit 2 Georgia Standards of Excellence:

<u>Create equations that describe numbers or relationships</u>

MGSE9-12.A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear, ~~quadratic, simple rational, and exponential~~ functions ~~(integer inputs only).~~

MGSE9-12.A.CED.2 Create linear, ~~quadratic, and exponential~~ equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (The phrase "in two or more variables" refers to formulas like the compound interest formula, in which $A = P(1 + r/n)^{nt}$ has multiple variables.)

MGSE9-12.A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret data points as possible (i.e. a solution) or not possible (i.e. a non-solution) under the established constraints.

MGSE9-12.A.CED.4 Rearrange formulas to highlight a quantity of interest using the same reasoning as in solving equations. *Examples: Rearrange Ohm's law V = IR to highlight resistance R;* ~~*Rearrange area of a circle formula $A = \pi r^2$ to highlight the radius r.*~~

<u>Understand solving equations as a process of reasoning and explain the reasoning</u>

MGSE9-12.A.REI.1 Using algebraic properties and the properties of real numbers, justify the steps of a simple, one-solution equation. Students should justify their own steps, or if given two or more steps of an equation, explain the progression from one-step to the next using properties.

Solve equations and inequalities in one variable

MGSE9-12.A.REI.3 Solve linear equations and inequalities in one variable including equations with coefficients represented by letters. *For example, given ax + 3 = 7, solve for x.*

Solve systems of equations

MGSE9-12.A.REI.5 Show and explain why the elimination method works to solve a system of two-variable equations.

MGSE9-12.A.REI.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Represent and solve equations and inequalities graphically

MGSE9-12.A.REI.10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.

MGSE9-12.A.REI.11 Using graphs, tables, or successive approximations, show that the solution to the equation f(x) = g(x) is the x-value where the y-values of f(x) and g(x) are the same.

MGSE9-12.A.REI.12 Graph the solution set to a linear inequality in two variables.

Build a function that models a relationship between two quantities

MGSE9-12.F.BF.1 Write a function that describes a relationship between two quantities.

MGSE9-12.F.BF.1a Determine an explicit expression and the recursive process (steps for calculation) from context. *For example, if Jimmy starts out with $15 and earns $2 a day, the explicit expression "2x+15" can be described recursively (either in writing or verbally) as "to find out how much money Jimmy will have tomorrow, you add $2 to his total today."* $J_n = J_{n-1} + 2, J_0 = 15$

MGSE9-12.F.BF.2 Write arithmetic ~~and geometric~~ sequences recursively and explicitly, use them to model situations, and translate between the two forms. Connect arithmetic sequences to linear functions ~~and geometric sequences to exponential functions.~~

Understand the concept of a function and use function notation

MGSE9-12.F.IF.1 Understand that a function from one set (the input, called the domain) to another set (the output, called the range) assigns to each element of the domain exactly one element of the range, i.e. each input value maps to exactly one output value. If f is a function, x is the input (an element of the domain), and f(x) is the output (an element of the range). Graphically, the graph is y = f(x).

MGSE9-12.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.

MGSE9-12.F.IF.3 Recognize that sequences are functions, sometimes-defined recursively, whose domain is a subset of the integers. (Generally, the scope of high school math defines this subset as the set of natural numbers 1,2,3,4...) By graphing or calculating terms, students should be able to show how the recursive sequence a1 =7, an =an-1 +2; the sequence sn = 2(n-1) + 7; and the function f(x) = 2x + 5 (when x is a natural number) all define the same sequence.

Interpret functions that arise in applications in terms of the context

MGSE9-12.F.IF.4 Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; ~~and periodicity.~~

MGSE9-12.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 an appropriate domain for the function.*

MGSE9-12.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.

Analyze functions using different representations

MGSE9-12.F.IF.7 Graph functions expressed algebraically and show key features of the graph both by hand and by using technology.

MGSE9-12.F.IF.7a Graph linear ~~and quadratic~~ functions and show intercepts, maxima, and minima (as determined by the function or by context).

MGSE9-12.F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one function and an algebraic expression for another, say which has the larger maximum.*

Learning Activities and Experiences

Topic Lesson	Resources	Content Addressed	Standards Addressed
Solving Equations	**1-2 Solving Linear Equations** **Pearson enVision: pg. 11 – 17**	• Create and solve linear equations in one variable	MGSE9-12.A.CED.1 MGSE9-12.A.REI.1 MGSE9-12.A.REI.3
	1-3 Solving Equations with Variables on Both Sides **Pearson enVision: pg. 18 – 23**	• Write and solve equations with a variable on both sides to solve the problem	MGSE9–12.N.Q.2 MGSE9-12.A.CED.1 MGSE9-12.A.REI.1 MGSE9-12.A.REI.3
	1-4 Literal Equations and Formulas **Pearson enVision: pg. 24 – 29**	• Rewrite and use literal equations to solve problems	MGSE9–12.N.Q.1 MGSE9-12.A.CED.1 MGSE9-12.A.CED.4
	Additional Resources: • Teacher Created Notes • Desmos- Smallest Solution Smallest Solution • DOE Framework Tasks - Lucys Linear Equations & Inequalities (DOE Task)		
Solving Inequalities	**1-5 Solving Inequalities in One Variable** **Pearson enVision: pg. 30 – 35**	• Solve and graph inequalities	MGSE9-12.A.CED.1 MGSE9-12.A.CED.3 MGSE9-12.A.REI.3

	1-6 Compound Inequalities **Pearson enVision: pg. 37 - 40**	• Solve problems involving compound inequalities	MGSE9-12.A.CED.1 MGSE9-12.A.CED.3 MGSE9-12.A.REI.3
	Practice Task - Lucys Linear Equations & Inequalities (DOE Task)	• Solving equations and inequalities, in one variable, in context	A.CED.1
	Additional Resources: • Teacher Created Notes • Desmos- Polygraph: Linear Inequalities Polygraph: Linear Inequalities		
Graphing Linear Equations	**2-1 Slope-Intercept Form** **Pearson enVision: pg. 57 – 62**	• Write and graph linear equations using slope-intercept form	MGSE9-12.A.CED.2 MGSE9-12.REI.10 MGSE9-12.IF.6 MGSE9-12.IF.7, 7a MGSE9-12.IF.9
	2-2 Point Slope Form **Pearson enVision: 63 - 68**	• Write and graph linear equations using point-slope form	MGSE9-12.A.CED.2 MGSE9-12.REI.10 MGSE9-12.LE.2 MGSE9-12.IF.7, 7a MGSE9-12.IF.9
	2-3 Standard Form **Pearson enVision: pg 69 - 74**	• Write and graph linear equations using standard form	MGSE9-12.A.CED.2 MGSE9-12.A.CED.3 MGSE9-12.REI.10 MGSE9-12.IF.7, 7a MGSE9-12.IF.9
	MYP B Stained Glass Project	• Graphing slope intercept with all forms of slope project. Justifying and presenting a visual depiction.	
	Additional Resources: • Teacher Created Notes		
Functions	**3-1 Relations and Functions** **Pearson enVision: pg. 89 - 94**	• Introduction to domain and range • Inputs and outputs • Relation vs function	MGSE9-12.F.IF.1

	3-2 Linear Functions **Pearson enVision: pg. 95 - 101**	• Linear functions can be represented in many ways including function notation	MGSE9-12.F.IF.1 MGSE9-12.F.IF.2 MGSE9-12.F.IF.4 MGSE9-12.F.IF.5 MGSE9-12.F.LE.2
	3-3 Transforming Linear Functions **Pearson enVision: pg. 102 - 109**	• Graph transformations of linear functions by multiplying or adding specific values to *k* to the input or output of a function	MGSE9-12.F.IF.7 MGSE9-12.BF.1 MGSE9-12.BF.3
	Additional Resources: • Teacher Created Notes • DOE Framework Task - Cara's Candies Revisited		
Arithmetic Sequences	**3-4 Arithmetic Sequences** **Pearson enVision: pg. 110 – 117**	• Write recursive and explicit formulas for arithmetic sequences	MGSE9-12.F.IF.3 MGSE9-12.BF.1 MGSE9-12.BF.1a MGSE9-12.BF.2 MGSE9-12.LE.1 MGSE9-12.LE.1b MGSE9-12.LE.2
	Additional Resources: • Teacher Created Notes		
Systems	**4-1 Solving Systems of Equations by Graphing** **Pearson enVision: pg. 143 - 149**	• Graph systems of linear equations to find approximate solution	MGSE9-12.A.REI.6 MGSE9-12.A.REI.11
	4-2 Solving Systems of Equations by Substitution **Pearson enVision: pg. 150 - 156**	• Use the substitution method to solve systems of linear equations	MGSE9-12.A.CED.3 MGSE9-12.A.REI.6
	4-3 Solving Systems of Equations by Elimination **Pearson enVision: pg. 157 – 163**	• Use the elimination method to solve systems of linear equations	MGSE9-12.A.CED.3 MGSE9-12.A.REI.5

	Additional Resources: ● Teacher Created Notes ● Desmos – Linear Systems Card Sort: Linear Systems ● Desmos – Playing Catch-Up Playing Catch- Up		
Graphing Inequalities	**4-4 Linear Inequalities in Two Variables** **Pearson enVision: pg. 164 - 169**	● Graph solutions to linear inequalities in two variables	MGSE9-12.A.CED.3 MGSE9-12.A.REI.12
	3-Act Task Get Up There! **Pearson enVision: pg. 170**	● Use mathematical modelling to represent a problem situation and propose a solution	MGSE9-12.A.REI.1 MGSE9-12.A.REI.3 MGSE9-12.A.REI.5 MGSE9-12.A.REI.6 MGSE9-12.A.REI.12
	4-5 Systems of Linear Inequalities **Pearson enVision: pg. 171 - 176**	● Graph the solution set of a system of linear inequalities and interpret solutions	MGSE9-12.A.CED.3 MGSE9-12.A.REI.12
	Additional Resources: ● Teacher Created Notes ● Desmos- Polygraph: Linear Inequalities Polygraph: Linear Inequalities		

Personalized Learning and Differentiation

Teachers differentiate by providing examples (work samples or task-specific clarifications of assessment criteria); structuring support (advance organizers, flexible grouping, peer relationships); establishing flexible deadlines, and adjusting the pace.

-SWD/504- Accommodations provided
-ELL- Five Principle ELL Curriculum Framework and Vocabulary Supports
-Intervention Support- Re-teaching Activities in Small Groups with Progress Monitoring
-Extensions- Enrichment Tasks and Projects

Resources

Savvas Textbook Resources

DOE Alg. 1 Unit 2 Framework