Educational Epiphany ™

Districtwide PLC Protocol for **Mathematics**

Teacher/Teacher Team:
Grade/Course: Algebra 2
Date: Week of August 22, 2022

#	Planning Question	Teacher/Teacher Team Response	
	Algebra 2 Coherence Tool: Access the foundational standards to make connections to previously taught skills during the lesson introduction.		
1	Which **state standard** is your lesson progression addressing?	**Lesson 1.5 – Solve Equations and Inequalities by Graphing**	**Lesson 1.6 – Linear Systems**
		• **A2.A.CED.A.1** Create equations and inequalities in one variable and use them to solve problems. ★ **Embedded with A2.A.CED.A.1 is A2.N.Q.A.1** Scope and Clarification Include equations arising from linear and quadratic functions, and rational and exponential functions. Tasks have a real-world context. **Foundational Standard:** A1.A.REI.B.3a • **A2.A.REI.D.6** 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 approximate solutions using technology.★ **Embedded with A2.A.REI.D.6 is A2.N.Q.A.1** Scope and Clarification: Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. Tasks may involve any of the function types mentioned in the standard. **Foundational Standards:** None	• **A2.A.REI.C.4** Write and solve a system of linear equations in context. Scope and Clarification: When solving algebraically, tasks are limited to systems of at most three equations and three variables. With graphic solutions systems are limited to only two variables. **Foundational Standard:** A1.A.CED.A.3
2	What **mathematical concepts** are embedded in the state standard?	**Understand that:** • To solve an equation or inequality by graphing, set each expression equal to y and graph the two equations on the same grid. The intersection represents the solution. • Students use a graph, a table, or a graphing calculator to find exact or approximate solutions of an equation or inequality by considering the expressions on either side of the equality symbol as functions.	**Understand that:** • The solution of a system of linear equations or inequalities is the set of ordered pairs that satisfy all the equations or inequalities in the system. • Systems of equations or inequalities can also be represented by a matrix. • Students approximate the solution(s) of a system of equations by graphing and find the exact solution(s) of the system algebraically, including systems of equations in three variables. • Students identify the region of a graph that represents the solutions of a system of inequalities. • Students rewrite systems of equations in standard form, then represent the system as either a coefficient matrix or an augmented matrix.

Additional supporting and prerequisites standards are indicated on the curriculum map. In addition, this is not a comprehensive breakdown of each lesson for this weekly PLC protocol guide.

3	What teacher **knowledge, reminders, and misconceptions** are assumed in the standard?	**Knowledge:** • The lesson emphasizes a blend of conceptual understanding and procedural skill and fluency. • Students understand that when both sides of an equation or inequality are set equal to y, the intersection of their graphs is the solution of the equation or inequality. • Students set each side of an equation or inequality equal to y and then graph both equations on the same grid to find the point of intersection. • Students see relationships between the solution of a system of equations and the point of intersection when they graph the system. **Reminders and Misconceptions:** • Students solved linear, quadratic, and absolute value equations and inequalities algebraically. • Students graphed linear, quadratic and absolute value equations. • Students may confuse which way the inequality signs should face when finding the solution. Have students check their solution by graphing the inequality and testing points in the shaded region.	**Knowledge:** • This lesson emphasizes a blend of procedural skill and fluency and application. • Students solve systems of linear equations and inequalities using graphing and elimination. • Students write inequalities to model constraints in real-world situations such as time spent mowing lawns and walking dogs. • Students solve systems of linear equations and inequalities using graphing or elimination. • Students write systems of linear equations as a matrix. • Students see relationships between equations and matrices that represent the same system of linear equations. • Students understand that the solution of a system of linear equations is the set of ordered pairs that make all equations in the system true. **Reminders and Misconceptions:** • Students solved linear equations using graphing, tablets, and technology. • Students used a matrix to represent an equation.
4	What **objective(s)** must be taught? In what order? Why?	**PBO:** • SWBAT create one variable linear, quadratic, rational, or exponential equations and inequalities IOT use them to solve real-world situations. **(A2.A.CED.A.1)** • SWBAT 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) IOT solve the problem in a real-world context. **(A2.A.REI.D.6)** • SWBAT approximate the solution(s) for f(x) = g(x) using technology including when f(x)and g(x) are non-linear, non-quadratic polynomial; rational; exponential; or logarithmic functions, given two equations f(x) and g(x) IOT solve a real-world situation. **(A2.A.REI.D.6)** **Lesson objectives**: • Use graphs, tables, and graphing technology to find or approximate solutions to equations and inequalities. • Find approximate solutions to equations and inequalities by setting each expression equal to y and graphing.	**PBO:** • SWBAT write and solve a system of linear equations in two or three variables IOT solve a real-world situation. **(A2.A.REI.C.4)** **Lesson objectives**: • Solve linear systems graphically and algebraically.
5	What **academic language** must be taught before the teacher models for students? How will the academic	**Academic Language:** • **context** – a situation used to describe a mathematical problem • **create** – to produce or generate • **equation** – a mathematical statement containing an equal sign to show that two expressions are equal	**Academic Language:** • **dimensions -** the measurement of length, width, height of anything • **inconsistent systems -** a system of equations that has no solution is an inconsistent system

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	language be **taught and assessed**?	• **explain** – make clear by describing; to make something clear by describing it in more detail or by revealing relevant facts or ideas • **exponential equation –** an equation that contains the form b^{cx}, with the exponent including a variable • **Graph** – a pictorial diagram used to show a numerical relationship using distinctive plots. lines, bars, etc. • **Inequality** – a mathematical sentence that uses symbols (<,≤, >, ≥, ≠) to show the relationship between quantities not equal • **intercept** - the point at which a line or curve crosses the -axis; the location on the graph where a line intersects the -axis • **Intersect –** cross • **interval** - all the values between two given end point • **linear equation–** an equation that can be written in the form ax + by = c • **point of intersection** - the point at which lines or curves meet • **problem** – a question that needs a solution • **quadratic equation –** an equation of degree 2, which has at most two solutions • **rational** – a real number that can be written as a ratio • **real-world** – relating to a concrete setting • **situation -** a set of circumstances in which one finds oneself; a state of affairs • **solution** – the answer to a problem; the value(s) of a variable that satisfies a given algebraic equation • **solve** – to apply an operation(s) in order to find a value; to find an answer • **use** – take or hold; apply; deploy (something) as a means of accomplishing a purpose or achieving a result • **variable** – a quantity that changes or can have different values **Instructional Practice 2:** Strategies used to teach unfamiliar words will include: • 30 – 30 – 30 (common math-related word parts in the text, problem, or objective) • Point of Use Annotation of the Performance-Based Objective • Universal Language of Literacy • Word and Definition Walls • Word Parts • Context Clues • Point of Use Annotation of the Text (in Real-Time)	• **matrix -** a rectangular array of numbers written within brackets • **real-world** – related to a concrete setting • **situation -** a set of circumstances in which one finds oneself; a state of affairs • **solution of a system of linear equations -** a set of values for the variables that makes all the equations true • **solve** – to apply an operation(s) in order to find a value; to find an answer • **system of linear equations** –two or more linear equations with the same set of unknowns • **system of linear inequalities** - two or more linear inequalities written with the same variables • **variable** – a quantity that changes or can have different values • **write** – to create using words, symbols, equations, expressions, etc. **Instructional Practice 2:** Strategies used to teach unfamiliar words will include: • 30 – 30 – 30 (common math-related word parts in the text, problem, or objective) • Point of Use Annotation of the Performance-Based Objective • Universal Language of Literacy • Word and Definition Walls • Word Parts • Context Clues • Point of Use Annotation of the Text (in Real-Time)
6	What **practice problems** are you planning to use for the I Do, We Do, You Do in Pairs and You Do Without Assistance?	**Station Rotation Model Suggestions** **Teacher-Led Station:** Teachers can work with students on additional We Do problems. • Additional Examples – TE pg. 40, pg. 41 • 1-5 Reteach to Build Understanding	**Station Rotation Model Suggestions** **Teacher-Led Station:** Teachers can work with students on additional We Do problems. • Additional Examples – TE pg. 47, pg. 48, pg. 49 • 1-6 Reteach to Build Understanding

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	What did you learn from working the problems **in advance** of using them in class with students?	**Online Station**: Students can watch and engage with Virtual Nerd Video lessons. Students will initially tell what they think the answer to the question is or their opinion regarding an issue, and/or their thoughts based on a prompt. Then the students will watch the video to decide as to whether their original assertion was accurate, justified, etc. • 1-5: Virtual Nerd™: How Do You Solve a Quadratic Inequality by Graphing? **Offline Station:** Students would complete problems and exercises selected for the You Do in Pairs part of the lesson. • Lesson Performance Task #35 – Pg. 46 • 1-5 Additional Practice • 1-5 Mathematical Literacy and Vocabulary • 1-5 Enrichment	**Online Station**: Students can watch and engage with Virtual Nerd Video lessons. Students will initially tell what they think the answer to the question is or their opinion regarding an issue, and/or their thoughts based on a prompt. Then the students will watch the video to decide as to whether their original assertion was accurate, justified, etc. • 1-6: Virtual Nerd™: How Do You Solve a System of Equations in Three Variables? **Offline Station:** Students would complete problems and exercises selected for the You Do in Pairs part of the lesson. • Lesson Performance Task #38 – Pg. 54 • 1-6 Additional Practice • 1-6 Mathematical Literacy and Vocabulary • 1-6 Enrichment
7	What **manipulatives** might be integrated into the gradual release of responsibility (I Do, We Do, You Do in Pairs, You Do Without Assistance)? What did you learn from using the manipulatives **in advance** of using them in class with students?	**Reference:** Interactive Manipulatives • Didax Virtual Manipulatives • Savvas Math Tools • Realize Desmos (Graphing Calculator) • Realize Desmos (Scientific Calculator)	**Reference:** Interactive Manipulatives • Didax Virtual Manipulatives • Savvas Math Tools • Realize Desmos (Graphing Calculator) • Realize Desmos (Scientific Calculator)
8	What **graphic organizer(s)** might support students' conceptual understanding of the process outlined by the performance-based objective(s)?	**Reference:** • Graphic Organizer Templates • Google Drawing Graphic Organizers • Teacher Vision	**Reference:** • Graphic Organizer Templates • Google Drawing Graphic Organizers • Teacher Vision

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