Unit Title	All Systems Go		**Length of Unit**	5 weeks
Focusing Lens(es)	Modeling Concurrence	**Standards and Grade Level Expectations Addressed in this Unit**	MA10-GR.HS-S.2-GLE.4	
Inquiry Questions (Engaging-Debatable):	• How do you determine when a hybrid car would pay for itself in gas savings compared to a less expensive conventional car? (MA10-GR.HS-S.2-GLE.4-EO.d)			
Unit Strands	Algebra: Reasoning with Equations and Inequalities Algebra: Creating Equations			
Concepts	Systems, constraint, linear, equations, inequalities, solutions, viable, non-viable, intersections, graph, model, approximation, half-plane, substitution, elimination			

Generalizations **My students will Understand that…**	**Guiding Questions** **Factual**	**Conceptual**
When solving systems of linear equations mathematicians can determine the type of solution set (one solution, no solutions, or infinite solutions) both graphically and algebraically. (MA10-GR.HS-S.2-GLE.4-EO.d)	What do the different types of solutions for a system of linear equations look like on a graph? How are solutions to systems of equations visualized or approximated on a graph? Is it possible for a system of equations to have no solution, what would this look like on a graph?	Why does graphing a pair of lines describe the possible solution sets for a system of a pair of linear equations?
The characteristics of the equations in a system determine the most efficient strategy for finding a solution. (MA10-GR.HS-S.2-GLE.4-EO.d)	What are the different types of solution processes for solving systems of linear equations?	Why do different types of systems require different types of solution processes? Why if you use an inefficient method will you still get the correct solution to system of equations? Why is substitution sometimes more efficient than elimination for solving a system of linear equations algebraically and vice versa?
The intersection of two half-planes provides a means to visualize and represent the solution to a system of linear inequalities. (MA10-GR.HS-S.2-GLE.4-EO.e.iii)	What would a graph of a system of linear inequalities with no solution look like?	Why are solutions to linear inequalities better represented graphically than algebraically?

Mathematicians evaluate mathematical solutions for their relevance to a model; not all solutions to a system are viable in context. (MA10-GR.HS-S.2-GLE.4-EO.a.iii)	What are characteristics of non-viable solutions? How do you know when a solution will be viable?	Why is it important to evaluate all solutions within the original context?

Key Knowledge and Skills: **My students will…**	*What students will know and be able to do are so closely linked in the concept-based discipline of mathematics. Therefore, in the mathematics samples what students should know and do are combined.*

- 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. (MA10-GR.HS-S.2-GLE.4-EO.d.i)
- Solve systems of linear equations exactly and approximately, focusing on pairs of linear equations in two variables. (MA10-GR.HS-S.2-GLE.4-EO.d.ii)
- 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 of polynomials using technology to graph the functions, make tables of values, or find successive approximations; and, include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value. (MA10-GR.HS-S.2-GLE.4-EO.e.ii)
- 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. (MA10-GR.HS-S.2-GLE.4-EO.e.iii)
- 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. (MA10-GR.HS-S.2-GLE.4-EO.a.iii)
- Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. (MA10-GR.HS-S.2-GLE.4-EO.a.iv)

Critical Language: includes the Academic and Technical vocabulary, semantics, and discourse which are particular to and necessary for accessing a given discipline. EXAMPLE: A student in Language Arts can demonstrate the ability to apply and comprehend critical language through the following statement: *"Mark Twain exposes the hypocrisy of slavery through the use of satire."*	
A student in _____ can demonstrate the ability to apply and comprehend critical language through the following statement(s):	*The intersection of two linear equations is their solution set; and, if the lines do not intersect, there are no viable solutions.*
Academic Vocabulary:	Intersection, efficiency, characteristics, solutions, one solution, no solutions, infinite solutions, viable, non-viable, approximation, constraints, relevance, context
Technical Vocabulary:	Systems of equations, linear equations, solution set, graphically, algebraically, equations, inequalities, system of inequalities, half-plane, model, elimination, substitution, function, linear