Auxiliary Concept: Engineering Algebra

Engineering Literacy Dimension: Engineering Knowledge
**Domain:** Engineering Mathematics
Overview: *Algebra* is a branch of mathematics that focuses on the conventions related to the use of letters and other general symbols, known as variables, to represent numbers and quantities, without fixed values, in formulae and equations. Algebra is important to Engineering Literacy as engineering professionals habitually select and use algebraic content and practices in the analysis, design, and making of solutions to engineering problems. For example, the related mathematical applications are used on a daily basis to solve formulas to determine an unknown value using a measured or known value such as the voltage in an electrical circuit using Ohm's Law.

## Performance Goal for High School Learners

I can, when appropriate, draw upon the knowledge of algebraic content and practices, such as (a) *the basic laws of algebraic equations*, (b) *reasoning with equations and inequalities*, (c) *representing equations in 2D and 3D coordinate systems*, and (d) *linear algebra*, to solve problems in a manner that is analytical, predictive, repeatable, and practical.
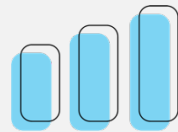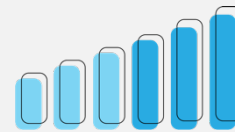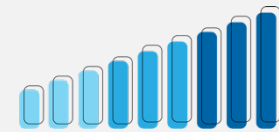
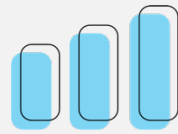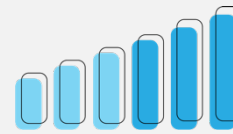|	Basic	Proficient	Advanced
RECOGNIZING, SELECTING, AND APPLYING APPROPRIATE ALGEBRAIC CONCEPTS & PRACTICES	I can distinguish between provided algebraic concepts based on their application.	I can apply a given algebraic concept when provided with direction towards its application.	I can select and use the appropriate algebraic concept for the engineering situation at hand.
MANIPULATION OF ALGEBRAIC EQUATIONS	I can identify the appropriate variable in the equation that I would like to solve for.	I can solve an algebraic equation for the desired unknown variable (e.g. $q = v(a)$ - solve for v).	I can analyze the algebraic relationship that variables have based on their position in an equation.
CURVE FITTING	I can distinguish between different types of curves (e.g. linear, quadratic, cubic, exponential, or logarithmic, etc.).	I can represent a certain algebraic equation in a curve.	I can fit a curve to given data and predict an intermediate value of the independent variable.
LINEAR ALGEBRA	I can explain the main structure of linear algebra and distinguish between learn and non-linear equations.	I can manipulate matrices and vectors using basic operations.	I can solve a linear equation by utilizing matrix and vector operations.

Auxiliary Concept: Engineering Algebra Cont.

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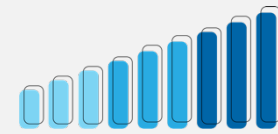
	Basic	Proficient	Advanced
2D & 3D COORDINATE SYSTEMS	I can identify 2D and 3D coordinates and list uses for both.	I can explain and demonstrate the process of plotting 2D and 3D coordinates through solving for coordinates and plotting by hand.	I can create 2D and 3D models based on coordinates through hand-drawing them on coordinate planes or using drafting software.