CASE

Mechanical Systems in Agriculture
Common Core State Standards for High School Mathematics Alignment

		Unit 1 Agricultural Engineering	Unit 2 Structures	Unit 3 Engines	Unit 4 Machines	Unit 5 Engineering Solutions
CCSS: Conceptual Category – Number and Quantity						
The Real Number System	Extend the properties of exponents to rational exponents.					
	Use properties of rational and irrational numbers.					
Quantities	*Reason quantitatively and use units to solve problems.	X	X	X	X	
The Complex Number System	Perform arithmetic operations with complex numbers.					
	Represent complex numbers and their operations on the complex plane.					
	Use complex numbers in polynomial identities and equations.					
Vector and Matrix Quantities	Represent and model with vector quantities.					
	Perform operations on vectors.					
	Perform operations on matrices and use matrices in applications.					
CCSS: Conceptual Category – Algebra						
Seeing Structure in Expressions	*Interpret the structure of expressions.		X		X	
	*Write expressions in equivalent forms to solve problems.		X		X	
Arithmetic with Polynomials and Rational Expressions	Perform arithmetic operations on polynomials.		X			
	Understand the relationship between zeros and factors of polynomials.					
	Use polynomial identities to solve problems.					
	Rewrite rational expressions.					
Creating Equations	*Create equations that describe numbers or relationships.		X		X	
Reasoning with Equations and Inequalities	Understand solving equations as a process of reasoning and explain the reasoning.		X		X	
	Solve equations and inequalities in one variable.		X		X	
	Solve systems of equations. *Represent and solve equations and inequalities graphically.				X	

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CCSS: Conceptual Category – Functions						
Interpreting Functions	Understand the concept of a function and use function notation.					
	*Interpret functions that arise in applications in terms of the context.					
	*Analyze functions using different representations.					
Building Functions	*Build a function that models a relationship between two quantities.					
	Build new functions from existing functions.					
Linear, Quadratic, and Exponential Models	*Construct and compare linear, quadratic, and exponential models and solve problems.					
	*Interpret expressions for functions in terms of the situation they model.					
Trigonometric Functions	Extend the domain of trigonometric functions using the unit circle.					
	*Model periodic phenomena with trigonometric functions.					
	Prove and apply trigonometric identities.					

CCSS: Conceptual Category – Geometry						
Congruence	Experiment with transformations in the plane.					
	Understand congruence in terms of rigid motions.					
	Prove geometric theorems.					
	Make geometric constructions.					
Similarity, Right Triangles, and Trigonometry	Understand similarity in terms of similarity transformations.					
	Prove theorems involving similarity.					
	*Define trigonometric ratios and solve problems involving right triangles.					
	Apply trigonometry to general triangles.					
Circles	Understand and apply theorems about circles.					
	Find arc lengths and areas of sectors of circles.					
Expressing Geometric Properties with Equations	Translate between the geometric description and the equation for a conic section.					
	*Use coordinates to prove simple geometric theorems algebraically.					
Geometric Measurement and Dimension	*Explain volume formulas and use them to solve problems.					
	Visualize relationships between two-dimensional and three-dimensional objects.	X				
Modeling with Geometry	*Apply geometric concepts in modeling situations.	X				

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CCSS: Conceptual Category – Statistics and Probability						
Interpreting Categorical and Quantitative Data	*Summarize, represent, and interpret data on a single count or measurement variable.	X				
	*Summarize, represent, and interpret data on two categorical and quantitative variables.	X				
	*Interpret linear models.					
Making Inferences and Justifying Conclusions	*Understand and evaluate random processes underlying statistical experiments.					
	*Make inferences and justify conclusions from sample surveys, experiments, and observational studies.					
Conditional Probability and the Rules of Probability	*Understand independence and conditional probability and use them to interpret data.					
	*Use the rules of probability to compute probabilities of compound events in a uniform probability model.					
Using Probability to Make Decisions	*Calculate expected values and use them to solve problems.					
	*Use probability to evaluate outcomes of decisions.	X				