

This Ag Mechanics Crosswalk is credited to Brent Young, Doctorial Student at Oklahoma State University, 2006.

“Effects of a Math-enhanced Curriculum and Instructional Approach on the Performance of Secondary Education Students Enrolled in a Year-long Agricultural Power and Technology Course: an Experimental Study”

The following is a list of the math identified as part of an agricultural mechanics curriculum. The math applications are similar to those that you might include in your Spring curriculum. Please use this list as a starting point in your discussions of CTE math enhancement. The items you ultimately choose to enhance do not necessarily have to be on the list but should be at least at the algebra and geometry levels if at all possible.

Math in Agricultural Mechanics Education Map

Agricultural Mechanics Problem-Solving Applications	Mathematics Content Standards	PASS Standards	NCTM Standards
Determining sprayer nozzle size given flow rate and speed	Problem solving involving cross-sectional area, volume, and related rates	PASS Process Standard 1: Problem Solving	NCTM Problem Solving Standard for Grades 9-12
Determine pipe size and water flow rates for a water pump	Problem solving involving cross-sectional area, volume, and related rates		
Determine amount of paint needed to paint a given surface (calculate surface area, etc)	Problem solving involving surface area, ratio and proportions		
Determine the concrete reinforcements and spacing needed when building a concrete platform or structure	Problem solving involving cross-sectional area, volume, and related rates		
Determine measurements in feet and inches as well as metric equivalences (meters and centimeters)	Conversions (English-metric and/or within each system)	PASS Algebra I Standard 2- 8a	NCTM Measurement Standard for Grades 9-12: Apply appropriate techniques, tools, and formulas to determine measurements
Determine torque wrench conversions (foot pounds, etc)	Conversions (English-metric and/or within each system)		
Determine temperature conversions (Fahrenheit and Celsius)	Conversions (English-metric and/or within each system)		
Develop different bale stacking schemes that maintain balanced loads on a trailer bed of a given dimension	Problem solving involving volumes and weight	PASS Geometry Standard 2- 4	NCTM Measurement Standard for Grades 9-12
Determine the time needed to cut a field of a given acreage	Problem solving involving area and related rates		
Determine the volume of a fuel tank	Calculate volume		
Determine engine displacement	Calculate distances in 3-dimensional space		

Calculate the dimensions of a gate, panel, loading ramp, or chute and the number of board feet required to build it.	Calculate surface area/ estimating materials	PASS Geometry Standard 4-4	NCTM Geometry Standard for Grades 9-12
Calculate lengths of diagonals using the Pythagorean theorem while designing and building gates, panels, ramps, chutes, etc.	Solving problems using the Pythagorean theorem		
Calculate the bill of materials, accounting for waste, efficiency, etc.	Estimating costs		
Calculating and using scales for 3-D drawing	Calculating and using scales (ratio and proportion)	PASS Geometry Standard 2-2,2-5	NCTM Geometry Standard for Grades 9-12
Determine the amounts of sand, aggregate, concrete mix, water, etc. needed to make a given amount of concrete	Solving mixture problems using ratio and proportions		
Calculate the required dimensions of a bunker or tank to hold a given volume of feed/fuel and one of the cylinder's dimensions	Calculating cylinder dimensions given volume and one of the dimensions	PASS Algebra I Standard 1-1 and 6a	NCTM Algebra Standard for Grades 9-12
Design bale feeders with equal sections	Using ratio and proportion to solve problems		
Build a materials list for a given project (ex: lbs of penny nails, number of 2x4's, number of 2x6's, etc.)	Calculating materials using estimation, ratio & proportion, charts, and graphs		
Determine center/midpoint of a board or area when calculating center of gravity, etc.	Calculating center/midpoint of a line or area		
Use appropriate graphs and charts to determine welding rod thickness to voltage (and/or amperage) to metal thickness relationships	Using composite graphs to solve problems	PASS Algebra I Standard 3-1a and 3-1b	NCTM Data Analysis and Probability Standard
Read and interpret values from tap and die charts when drilling on metal	Reading and interpreting graphs		
Read and interpret safety charts to determine exposure limits for a potentially unsafe element (ex: excessive noise)	Reading and interpreting graphs		
Use tables and graphs to determine compression ratios	Reading and interpreting graphs	PASS Algebra Standard 2-	NCTM Problem Solving

Calculate the amount of compression/pressure to use for a given set of project specs.	Solve problems involving ratio and proportions	8b	Standard
Use histograms and scatter plots of safety data in making decisions	Reading and interpreting graphs	PASS Algebra I Standard 2- 5b, 3-2	NCTM Data Analysis and Probability Standard
Determine flow and distribution rates for a give nozzle	Reading and interpreting graphs		
Graph and interpret time spent and cost of projects	Reading and interpreting graphs		
Chart and interpret water flow and restriction for a given pump	Reading and interpreting graphs		
Plot distribution of seeds from a seed drill and use to determine equal distribution (uniformity)	Reading and interpreting graphs		
Chart water flow differences through straight or bent pipes and pipes of different sizes. Use the charts to determine the best pipe for a given water flow.	Reading and interpreting graphs		