Math-in-CTE Lesson Plan Template

Lesson Title: Power tool		Lesson # 6		
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Occupational Area: Electrical Technology				
CTE Concept(s): Power tool				
Math Concepts: Percents to Decimals; Multiplication & Division; Using & Solving Formulas				
Lesson Objective:	Students will develop an understanding of power cord safety, how to calculate voltage			
	drop and determining wire size.			
Supplies Needed:	Various power tools with name plates, Various extension cords, Circular Mil Table;			
	Voltage Powerpoint ; voltage pre-test, voltage practice, voltage post-test			

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
1. Introduce the CTE lesson.	
Extension cord safety and use for power tools	OSHA requirement of no extension cords plugged
 How are extension cords rated for capacity 	together.
How are cords sized (Gauge Size)	Molded plug cords cannot have attached end caps.
What is voltage drop	Extension cords can be made to custom length and gauge with attached end caps using UL listed materials.
How does voltage drop affect power tools	Electric motors run at 10% above intended operating temperature have motor life reduced by 50%
	Higher current draw reduces the life of electric power tools and increases the chance of fire because of extension cords operating too hot.

2. Assess students' math awareness as it relates to the CTE	Find out if students are unable to calculate %
	Find out if students are unable to manipulate formulas
	Voltage Pre test
What is 3% of line voltage? 120 vac and 240 vac	5
Pre-test on % and manipulating formulas	1. 32 amps
	2. \$495.00 3. voltage = power / current
	4. current = voltage / resistance
	5. voltage = power / current
	Use power point
3. Work through the math example <i>embedded</i> in the CTE lesson.	Explain: constant, Circular Mil Area,
Introduce voltage drop formula	One mil=.001"
Circular Mil Area	I=current flow
K constant	L=length of conductor
Practice problems	Use K of 12 for Copper conductor
$Voltago = \frac{2KIL}{-}$	12 ohms of resistance for copper .001" thick, 1 foot long at 86°F
$VOIIUge_{drop} - \frac{1}{CMA}$	Constant number changes with change of material.
$CMA = \frac{2KIL}{2KIL} =$	Aluminum has different conductivity from copper
Voltage _{drop}	

4. Work through <i>related, contextual</i> math-in-CTE examples.	Safety lesson of sizing conductors of extension cords for various power tool
Voltage drop value and % of source voltage	Math lesson in the process of sizing conductors
Current draw values for different power tools	
Sizing wire for various current loads	
Using formulas, reading charts, calculations	
Develop understanding of American Wire Gauge (AWG)	
5. Work through <i>traditional math</i> examples.	power point
Explanation of Voltage drop formula	
Demonstration of using Voltage drop Formula	
Practice problems	
6.Students demonstrate their understanding. Practice problems work sheet	Several examples of construction site fixed and portable power equipment Table saw; Compound Miter saw; Lighting; Hammer drill; etc. Voltage Practice work sheet 1. C 2. A 3. D 4. B
7. Formal assessment. Post test on voltage drop,%, choosing wire gauge size	Voltage drop post test answer 1. D 2. C 3.A 4. C

NOTES: