Math-in-CTE Lesson Plan Template

Lesson Title: Setting Amperage		Lesson # M17			
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Occupational Area: Welding					
CTE Concept(s): Gauge Settings					
Math Concepts: Order of Operation, solving formulas, calculating units					
Lesson Objective:	Calculating amperage				
Supplies Needed:	calculators,				

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)	
1. Introduce the CTE lesson.		
There are numerous manufactures of welding machines, such as Lincoln Electric, Thermo Dynamic, Hobart, and Miller. Every manufacturer uses their own system for setting amperage. Some are digital, some are analog, other are rheostats. Some of these manufacturers have amperage settings written out beside them. Others just have numbers from 1-10. What we are going to talk about today is a way to set the machine to different amperages when there are no amperages given. We are going to learn how to calculate and set the amperage today.	Draw the face of the machine on the board with its circle dial with 0-10 and the high/low range switch on it. The low range is 35 amps-155 amps and the high range is 95 amps-250 amps.	

2. Assess students' math CTE lesson.	awareness as it relates to the	
<u>180 - 40</u> =	ans: 70	Talk about order of operations . Parentheses, exponents, multiple/divide left to right and then add and subtract left to right. " P lease E xcuse M y D ear A unt S ally"
205 - 40 =	ans: 16.5	P = parenthesis and symbols of inclusion
10		E = exponents(the little raised number)
		MD = multiplication and division in order from left to right
40 + 7(6) =	ans: 82	AS = addition and subtraction in order from left to right
55 + 2(4) =	ans: 63	Have students do examples at right.
 3. Work through the math example embedded in the CTE lesson. Explain the face of the machine and have them try to estimate the amperage at different numbers on the dial. 		Ask students to share how they would work out estimating the amperage for each number. Show students on the board how to figure out the amperage . For this example you are going to use low range. On a low range setting the amperage goes from 35 to 155, the dial is broken into 10 equal increments. so the first thing you would do is to subtract 35 amps from 155 amps. This would give you 120 amps. Now you look at your
		dial , because it divided into 10 increments you would divide 120 amps by 10 which would give you 12 amps. Because the lowest setting is 35 amps, meaning 0 is 35 amps, you then add 12 amps to every increment you go up. An example would be: When you turn the dial to 1 you would add 12 amps to 35 amps which would give you 47 amps. Now if you turn the dial up to 2 you would add 12 amps to 47 amps giving you 59 amps. Another way to do this if you turned this to 5, you would multiply by 5. That is 5*12 which would give you 60 amps, then add the 35 amps for a total of 95 amps

4. Work through related, contextual math-in-CTE examples.			
These are the math formulas that will make it easier for you to work the amperage on the dial.			
I = <u>H - L</u> I = amperage Increments10H = High amperage for chosen setting		The first formula will give them the value of I (the amperage increment between each number on the dial).	
		The secon amperage e	d formula will enable students to find the equivalent for each number on the dial.
A = L + I * D	A = the Amperage at each number on the dial		
L = Low amperage for the chosen setting		* means multiplication	
I = amperage Increments			
	D = number on the D ial		
5. Work through <i>traditional math</i> examples.			
		Give studer out the amp	nt a worksheet so that they get practice working berage at different dial settings
Worksheet: D	ial Setting	Do the first	one together
	5	Worksheet	answers
		1. 47	10. 126
		2. 59	11. 141.5
		3. 71	12. 157
		4. 83	13. 172.5
		5. 95	14. 188
		6. 107	15. 203.5
		7. 119	16. 219
		8. 131	17. 234.5
		9. 143	

6. Students demonstrate their understanding.	
Have student use worksheet information on an actual dial for a welding problem.	
Handout an assessment with the face of a welding machine and have students use the worksheet they previous completed to transfer numbers onto the dial both for low and high range.	
7. Formal assessment.	
Explain to students they are doing a welding job with a welding procedure specification (WPS) using 3/32 " E7018 in the flat position. Ask them to calculate where to set the dial for the appropriate amperage. Now have the student calculate the setting for 1/8" E7018.	Students should already know settings for selected electrodes.