Math-in-CTE Lesson Plan Template

Lesson Title: GMAW Shielding Gas mix		Lesson # 27 lesson 3 of 3		
Author(s):	Phone Number(s):	E-mail Address(es):		
Evan "Buddy" Botting		ebotting@mtbluersd.org		
Rob Olsen	rolsen@mtbluersd.org			
Occupational Area: Metal Fabrication				
CTE Concept(s): GMAW Shielding Gas Mixtures				
Math Concepts: Percents				
Lesson Objective:	Students will be able to choose the proper shielding gas for wire and weld process			
Supplies Needed:	Handouts, Shielding gas cylinders, white board w/markers			

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
1. Introduce the CTE lesson.	
As we move on with the welding processes we will be looking for students to be able to choose the correct shielding gas.	
The gauges as we learned earlier have a high and low-pressure side. The high-pressure side shows how much pressure is left in the cylinder and the low-pressure side shows the amount of gas flow at the wire feed gun shielding the weld.	Show pressure gauge and cylinder on wire feed Demonstrate how cylinder is opened and gauge is adjusted
For the same reason it's important that you choose the right rod for a weld, it's important to use the correct shielding gas. Because of the wire we are using, we will be using a shielding gas that is 75% argon and 25% CO2. The wire is an ER-70 solid wire. The shielding gas should have a flow of 30 to 40 CFH. These numbers	Show wire feed charts for voltage and wire speed Show students where gases are labeled and percentages are given

are just starting points. Some of the shielding gases will require a higher or lower flow rate. Please consult your shielding gas flow charts	
 2. Assess students' math awareness as it relates to the CTE lesson. As I said, the shielding gas we use contains 75% Argon and 25% CO2but what exactly does a percentage tell us? If you look at the word "per-cent" it has two parts. What comes to mind when you hear the word "per"???? How about "cent" or "cents" You probably learned how to convert decimals and percentages in your math class, but just in case your memory has become foggy try to use the meaning of percent to help you. Per> Divide 	 Per can mean "for every" or "each" or "divide" in math. (Miles PER Gallon) The most common answer would be 100 cents in a dollar but expect confusion with scent and sense.
Example 28% would be 28/100 = 0.28 467% would be 467/100 = 4.67	(Can be written on a white/black board if present.)
Sometimes we want to go backwards and convert a decimal to a percent. Any idea on how we could reverse the process?	Rather than multiply by 100, divide by 100.
So what you're sayin is: 0.73 would be 0.73 • 100 = 73 or 73% GOOD! Take a look at this worksheet and give it a try, I'm not gonna judge you so just do your best.	CTE Worksheet #1 (Questions and answers are paired)

Raise your hand if you got at least 2 right3 rightetc	Use a hand-raising too assess how students scored.
3. Work through the math example <i>embedded</i> in the CTE lesson.	
Here's another sheet I want you to take a look at.	CTE Worksheet # 2
Look at the picture on the left. Notice the three pieces of the tank.	1. Arg = 75 CO2 = 25
gas contained within the cylinder. We've talked about the percents	2. Arg = 170 CO2 = 30
already. The last piece is called the "part" and basically tells us how	3. Arg = 294 CO2 = 6
	4. Arg = 320 CO2 = 60 O2 = 20
In this example, we know the amount of the whole and the percent but we need to find the part. <mark>A simple way to find the part is to</mark> multiply the % (as a decimal) by the whole.	% • Whole = Part (On whiteboard)
Within the first cylinder, how many cubic feet would be argon?	
(0.75)(100) = 75 ft3	Emphasize the importance of converting to a decimal first.
How many cubic feet would be CO2?	
$(0.25)(100) = 25 \ ft3$	
<i>Try your luck with the three tanks on the right. I'll be nice and leave the formula for the part on the board.</i>	



Alright, I'm going to turn you loose. Try the three problems on the back-side. Use your pyramid, if you have questions just raise your hand.

The pyramid tells us to divide the part by the whole to get our percent.

5. Work through <i>traditional math</i> examples	
There's one more way that you might see this. You guys all	CTE Worksheet #4
know what the Accuplacer is right? I have a couple problems	
taken right off the Accuplacer I want you to try using the percentage	The Accuplacer is the typical entrance exam for Comm. Colleges.
pyramid. Before you just go takin off and doing this, let me give you	Answers'
a hint because there's no more pictures. <mark>Whenever you see the</mark> word	1. E 2. B
"of" the whole comes RIGHT after it.	3. C 4. A
	5. D 6. B
	7. B 8. All of the Above
6. Students demonstrate their understanding.	
Alright, everyone come up and take a post-it note. Either you have a % written on your post-it or you have a capacity, written in cubic-feet.	With 15 students: 10 %'s and 5 Capacities

	You can create groups of three as needed.
The first task applies only to people with a percentage. You have 15 seconds to pair up with someone that will make 100% with you.	
capacity person. Once you are matched up your group will have 30 seconds to figure out exactly how many cubic-feet of each gas is contained in your group.	Any time allowances can be changed to suit.
7. Formal assessment.	
Have students find and identify 5 cylinders located in the shop and explain the type of shielding gas. What percentages of gas are in each cylinder? How many cubic feet of each gas are in it?	
Students will setup and operate a wire feed with the proper shielding gas. Each student will test their weld to ensure that they have chosen the proper gas. Then with an incorrect shielding gas, the class as a whole will create a weld and test it.	It should become evident that the incorrect choice of shielding gas will result in a poor weld.
	Extra Credit
	Locate the extra cylinder that is not a shielding gas and identify what kind of gas(es) it contains, and what the fuel mixture is.

NOTES: