Math-in-CTE Lesson Plan Template

Lesson Title: AT07 Fluid Levels		Lesson		
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Occupational Area: Automotive Technology				
CTE Concept(s): Drive Train				
Math Concepts: Estimation, fractions, conversion between quarts and liters				
Lesson Objective:	Students will learn how to diagnose fluid loss and condition; check fluid level on transmission/trans with and without dipstick; determine appropriate action.			
Supplies Needed:	Vehicle with automatic transmission/transaxle, vehicle lift, proper lubricant, exhaust hose/s, shop flash light or shop light, optional: fluorescent dye and ultraviolet light (students have prior knowledg this diagnosis tool), empty transmission fluid containers of various sizes and types, 1 worksheet, 1 sheet.			

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
1. Introduce the CTE lesson.	
Today's topic is to learn the importance of the proper procedure to check fluid level. What do you already know about checking the fluid level of the automatic transmission?	Students will most likely know about a dip stick to check the level with. They may know that the color of the fluid is red.
Do you think that the fluid level could decrease or increase from the <u>original</u> level?	Listen to students' responses.
In this lesson you will be converting quarts to liters, liters to quarts and skills related to these ideas.	

What factors could have an effect on the amount and level of	Most students will assume that there would be no other
the fluid?	factors that would impact the level of fluid. Or that fluid level
Thanks for your responses, in this lesson we will be	can change due to temperature changes.
investigating this question in regards to checking fluid levels.	Students may also state that a leak would affect the level.
 2. Assess students' math awareness as it relates to the CTE lesson. Show students a photo of someone checking fluid levels. Ask: What is happening here? Get students to identify the activity that is going on in the photo. Teacher says: "This person is checking transmission fluid. He discovers that the level is low. He finds that he needs to add some. So he will need to find out what type it is and the proper amount needed to adjust to the proper level. It is listed in the manual in quarts and on the dip stick in liters. You may have to CONVERT! 	

NEXT

Show students some different containers of transmission fluid. . Explain that consumers can purchase these different size containers, in quarts or liters.

Ask students which has a larger capacity, quart or liter? (QUART)

As you can see from the examples of transmission fluids I have here (showing) that it comes in various sized amounts. How can you determine which amount you need to buy or convert if only one size is available?

Today I will show you how to convert liters to quarts and quarts to liters.



Listen to students and discuss their responses. Students should respond with Quart, however, they may not.

Check to see if students know the conversion equation, if not...see below.

3. Work through the math example <i>embedded</i> in the CTE	
lesson.	Hand out the worksheet AT-07-WS1 "Conversion Practice in the Auto Shop"
Now you are going to do some work on converting from quarts to liters and also you may encounter situations where you need to convert liters to quarts, so you will be practicing that skill as well	Write these equivalences on the board. 1 US quart = 0.95 liter
Hand students the conversion practice worksheet	1 liter = 1.05 quart
Please work with me on the heard to do these examples	
converting from liters to quarts and vice verse.	Show the formula out on the board. Use the traditional math method for multiplication.
4 qts. = liters.	
	4 * 0.95 = 3.8
2 liters = quarts.	Answers:
	4 qts. = 3.8 liters.
6.5 qts. =liters.	
	2 liters = 2. 1 quarts
4.56 liters = quarts	
	6.5 qts. = 6.175 liters.
3 pints = liters	
	4.56 liters = 4.788 quarts
	3 pints = 1.41 liters
What questions do you have?	
	Listen and discuss the student's responses.

4. Work through <i>related, contextual</i> math-in-CTE examples.	
Sometimes, transmission fluid is sold in larger quantities. Why do you think this is done?	Listen and discuss student's responses.
This helps to save costs. Let's take this thinking to a larger scale.	
So now let's work with larger quantities. Can someone give me an example of a larger quantity of fluid?	Listen to student's responses. If no one volunteers "gallon" then be sure that is stated. Give the conversion for gallon to liters: 1 US gallon = 3.79 liters.
Fuel is a good one.	
Work through the following examples of amount of transmission fluid with the class. Do this on the board with the class. Have them do this on their worksheet.	Do a problem with the students on the board: 5 * 3.79 = 18.95 (use the traditional method for
1 gallon = liters	multiplication – not a calculator)
5 gallon pail = liters	Here are the answers: (3.79)
30 gallon drum = liters	(18.95)
3 - 30 gallon drums = liters	(113.7)
	(341.1)

5. Work through <i>traditional math</i> example	Make copies of worksheet from the link below, if desired.
Here in automotive tech class we worked with conversions, in your math class, you will do the same mathematics, but it is called "solving proportions".	Keep in mind that problems 15-20 are challenging and can be used to differentiate instruction. Answers are provided by clicking on the appropriate key.
Now we will work on the worksheet I have given you. We will do 1 or 2 examples together, and then you will complete the worksheet alone.	www.algebrahelp.com/worksheets/view/proportionbasics.q
What questions do you have?	
Work for 10-15 minutes. Do as many as you can. Some are more challenging problems. Do your best thinking.	
6. Students demonstrate their understanding.	
Along with the math work, students will be going into the shop right after this point in the lesson to perform Task Sheet C 484 – checking and adjusting transmission fluid level.	This task sheet is Obtained from CDX GLOBEL. It is a Web based Student training program that is subscribed to yearly. Hand out Automotive Task sheet AT-07-WS2

7. Final assessment. As a follow-up (bringing the lesson to a close) ASK:	Look for these responses:
Based on the new knowledge you have gained by doing	 It is important to have it at the proper amount of
conversions and comparisons on fluid amounts and	fluid so we do not damage the transmission. We want to understand the relationship between
performing the Task sheet, why is it important to check fluid	quarts and liters so we are adding the right amount. Students should also understand that temperature is
level properly?	a factor for checking proper fluid level.

NOTES: