Math-in-CTE Lesson Plan Template

Lesson Title: Unit of Measurement – Using the Planer		Lesson #10
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Occupational Area: Carpentry Instructor		
CTE Concept(s): unit of measure		
Math Concepts: converting fractions to decimals (and vice versa)		
Lesson Objective:	Students will be able to use a tape measure to find the thickness of a wooden object and then convert these measurements into decimals to be entered into the digital keypad of the plainer in our shop.	
Supplies Needed:	Rough Sawn Pine stock, tape measures, Powermatic Planer, paper, pencil, Whiteboard, Markers	

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
Introduce the CTE lesson. Today we will be reviewing the Powermatic Plainer – what its purpose is and how to use it	

safely. Planers are used to reduce the thickness of wooden materials. To save money you can buy what is called rough sawn lumber (which we've talked about before).	Write on the white board 5 examples of actual and nominal lumber dimensions, to see if the students have remembered the actual dimension of the lumber. This is an on going process throughout the year because the students must memorize the actual dimensions of the lumber they are using not the nominal number the lumber is labeled as. Examples: 2"x4" = 1 ½" x 3 ½" 2"x6"= 1 ½" x 5 ½" 2"x8"= 1 ½" x 7 ¼" 2"x12"= 1 ½" x 11 ¼" 1"x10"= ¾" x 9 ¼"

2. Assess students' math awareness as it relates to the CTE lesson. Call students' attention to the ***"fraction to decimal conversion sheet"*** that was laminated and handed out at the beginning of the year (that they should have been studying)… let them know that they are about to take a timed quiz on these conversions and that they will be matched up according to who can do the conversions and who can't (bad with good). Reflect with the students the importance of being able to ***convert fractions to decimals*** for accuracy in the construction industry.	(Handout #1 = Fraction/Decimal conversion charts) Hand out the pre-assessment quiz (not for a grade) to gain an understanding of who can or cannot ***convert fractions to decimals.*** 10 questions. (see handout #2)

3. Work through the math example *embedded* in the CTE lesson. Now lets go out into the shop and go over the Powermatic Planer we have in our shop. • Not all power Planers are the same as ours in the shop. We are fortunate enough to have a planer that can plane lumber down within the thousandths of an inch of the desired thickness that we are trying to achieve with our workplace. • Show the students all the features on the Planer in the shop. From all the functions of the buttons. And go through the safety procedures required to operate the machine. Now assign each student a piece of lumber that they are going to reduce the thickness of using the planer. • The students need to measure the thickness of the object with the tape measure and record this on a piece of paper. This will be a measurement in ***fraction form*.**	Explain ***place digits or significant digits*** – that our machine goes three places out after the decimal… and that after the decimal it goes ***tenths, hundredths, and then thousandths*.** *Significant digits*: how many places after the decimal you wish to go to Hand out the safety sheets on the power planer. Give the students the safety test on the Planer. *Place value lesson:* A mixed number contains a whole number and a fraction. The whole number is to the left of the decimal. So if I have 1 7/8, the 1 would be before (or to the left of the decimal) –

• The teacher will now explain how to manually divide out this fraction to obtain its decimal form. The kids will then change their fractions to decimals. Next the teacher will let each student know what the target thickness is for the object. • The teacher will explain how the digital read out works and how the crank on the planer works (every two turns is 1/16 of an inch) • The teacher will explain briefly how to subtract the target thickness from the original thickness in order to find the difference.	1. The next step would be to divide the fraction out. 7/8 is simply saying I am 7 divided by 8. (Show trick for setting up division problem) The seven is over the eight with a line in the middle. Tell the students that the top number (#7) jumped off the top to be the (#8) Right hand man. So now the #7 is on the right hand side of the #8 with the line still between them. The #8 is so grateful that to show the #7 his gratitude he decides to protect him by putting a roof over his head. That is when the teacher takes the line in the middle of the #7 and #8 and draws the division symbol over the # 7. 7÷8 = .875 (see handout #3) The teacher will draw an inch on the board and demonstrate how to figure out how many 1/16ths they will have to reduce by to get to their target thickness. Example: You have a 7/8” thick board and we need to reduce it down to a ¾”

	thick board. How much material is being removed? 7/8 – 6/8 = 1/8 (show how ¾=6/8) So how many turns on the planer crank wheel must you perform? 4 turns See handout for board example instructions.
4. Work through *related, contextual* math-in-CTE examples. Go through Post and Beam Framing and describe the larger sizes of the materials used.	Give the students one example of a post & beam Timber with the actual Width and Thickness in fraction form. Then the students have to figure out the fraction measurements of the timber then convert the measurement into Decimal form. Then I will give them an actual square dimension that I want the timber to be. (See handout #4)

5. Work through *traditional math* examples.	Fraction/Decimal Practice Worksheet. Have students work individually on the worksheet practicing their skills with converting fractions and mixed numbers into decimals and subtracting fractions with unlike denominators. (See handout # 5) Equivalent Fractions Worksheet. Have students work on creating equivalent fractions and using equivalent fractions to simplify. (See handout #6)
6. Students demonstrate their understanding.	Students will go out into the shop and retrieve one piece of scrap wood. The students will measure length, width and thickness of the scrap piece of lumber they selected. With a tape measure. Students will record the dimensions on a scrap piece of paper in ***fraction form***. Next students will convert all fractions into decimals. Collect for a grade (could be used as a quiz).

7. Formal assessment. **The students will demonstrate their ability to operate the Planer Safely and in a professional manner while also being able to convert their.**	Students will be provided a rough sawn piece of wood material approximately 1 inch thick and they need to demonstrate they know the thickness of the material in fraction form to the nearest sixteenth of an inch, by measuring with a tape measure. This measurement will then need to be converted into decimal form so they can enter the information into the planer correctly. Next the students will demonstrate safe operation of the planer in the shop as well as demonstrating their knowledge of how to reduce the rough sawn piece of wood material down to an exact ¾" thickness.

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