.Math-in-CTE Lesson Plan Template

Lesson Title: Calculating Common Rafters			Lesson # C16	
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Occupational Area: Building Construction				
CTE Concept(s): Calculating the length of Common Rafters				
Math Concepts: Pythagtherom				
Lesson Objective:	The students will have the understanding of Calculating the length of common roof rafters			
Supplies Needed:	Calculator, carpenters pencil, paper, Framing square with the rafter tables printed on them tape measure, Stair gauges,			

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
1. Introduce the CTE lesson.	
Today we will finally be working on the roof of our sheds. There are three basic types of sloping roofs. The shed Roof also known as the "Lean-to" has a roof that slopes in only one direction. The Gable roof has a ridge in the center and slopes in two directions. The Hip roof has four sloping sides. (Show Visual Aids on different styles of roof frames.)	
On the sheds we are constructing we will have the Gable style roof. Figuring out the length of the rafters is a fairly easy concept to understand, but there is some very important vocabulary you need to know.	

2. Assess students' math awareness as it relates to the CTE lesson.	Give out handout #1 of the vocabulary terms that they need to know.
The important vocabulary terms you need to know are	
Span=The overall width of the building	Hand out Worksheet # 2 Squaring and Square Root
Total Run= Half the span (1/2 the width of the building)	
Unit Rise=Found on the blueprint The number of inches a common rafter will rise for every foot of run	
Pitch= The angle or slope of the roof	
Ask students to fill out worksheet #2 on squaring and square root.	
3. Work through the math example <i>embedded</i> in the CTE lesson.	
Lets work through a practice example of a common rafter:	
Your building has a span of 12 feet from outside wall to outside wall, but we won't put this information into play until we figure out what the hypotenuse is for every foot of run.	
The blueprint elevation show's a 5/12 Pitch roof. That means for every foot of run horizontally you will rise 5 inches vertically. Draw diagram of the triangle on the white board. The hypotenuse of the 5 and the twelve indicates the slope or pitch of the roof.	
To find the Hypotenuse you must use the Pythagtherom. The formula for the Pythagtherom is A2 x B2 =C2. So lets put some numbers with the formula	

So now that we have determined that the hypotenuse of 5/12 = 13 takes a look at the Blade of your Framing Square. The tops line that say's "Length of Common Rafter Per Foot Run" If you look directly below the 5" mark it will show you the number 13. This Very Important tool already gives you the hypotenuse of common rafter pitches all the way up to 18-inch rise. This saves us one step in figuring out the rafter length.	
Now that you understand per foot run with a unit rise we need bring back the Total Run into our formula.	
Our total run = 6' we need to multiply that by our table $\#$ 13 or the hypotenuse of the 5/12 to get our common rafter length in inch form.	
13 x 6 = 78	
That means our Common Rafter is 78 inches.	
4. Work through <i>related, contextual</i> math-in-CTE examples.	
Now that we have a good understanding of the Pythagtherom and why it is important for figuring the common length of rafters, where else have we already used the Pythagtherom in the carpentry program?	
Squaring building foundation, Floor Frame, and wall frame.	

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j 5. work through <i>traditional math</i> examples.	
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7. Formal assessment.	

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