

Math-in-CTE Lesson Plan Template

Lesson Title: Floor Plan Design		Lesson # 10
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Occupational Area: Engineering Technology		
Math Concept: Inequalities, area, perimeter, cost, scaling , percentages, algebraic formula		
Lesson Objective:	Students will design their college rooms and calculate the cost for tiling, and crown molding it.	
Supplies Needed:	Paper, pencil, ruler, calculator, eraser, architectural scale.	

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
<p>1. Introduce the CTE lesson.</p> <p>How many of you are really planning to go to college? Are you planning to live on campus? (5 minutes discussing future plans?)</p> <p>Today, you are going to be an Architect. You are going to design your own college efficiency studio with a minimum of 250 sq ft and a maximum of 300 sq ft.</p> <p>It should be designed to accommodate one person, providing living spaces that include a study area, a bathroom, a small kitchen, dinning area and one bedroom. The study area will accommodate a desk, computer center, bookshelves, and a work table.</p>	<p>Explain the importance of attending college. .</p> <p>Floor Plan: A floor plan (floorplan) in <u>architecture</u> and <u>building engineering</u> is a <u>diagram</u>, usually to <u>scale</u> (generally $\frac{1}{4}''=1'$ or $\frac{1}{8}''=1'$), of the relationships between rooms, spaces and other physical features at one level of a structure.</p> <p>Symbols: Symbols are objects, characters, or other concrete representations of ideas, concepts, or other abstractions</p> <p>Scale drawings: Plans are usually scale drawings, meaning that the plans are drawn at specific <u>ratio</u> relative to the actual size of the place or object. Various scales may be used for different drawings in a set. For example, a floor plan may be drawn at 1:50 (or $\frac{1}{4}''=1'-0''$) whereas a detailed view may be drawn at 1:25 (or $\frac{1}{2}''=1'-0''$). Site plans are often drawn at 1:200 or 1:100.</p>

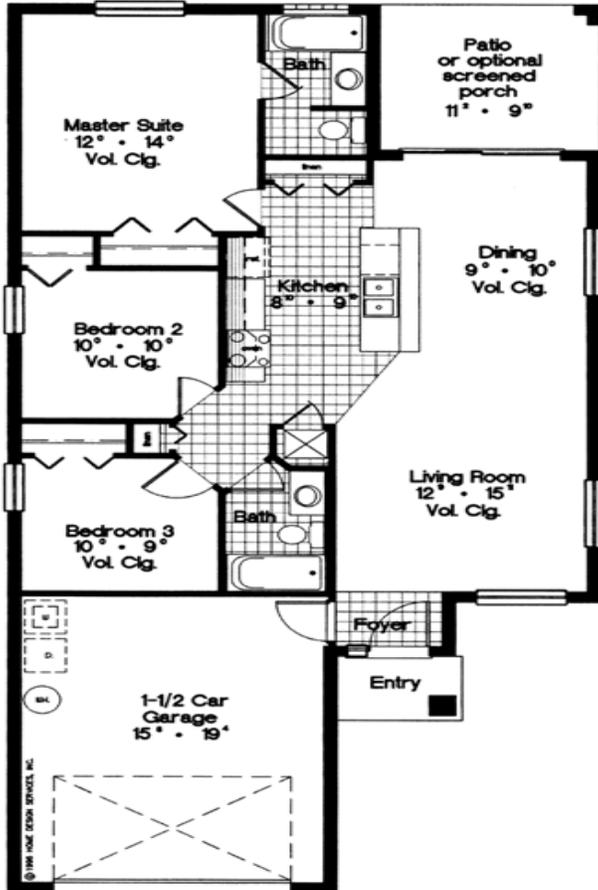
<p>2. Assess students' math awareness as it relates to the CTE lesson.</p> <ul style="list-style-type: none"> • How do you fit a 300 square feet room in a B (11"x 17") paper? • What are possible dimensions of your room? • How do you calculate how much crown-molding would be needed? • How do you calculate the amount of tiles to use? • How much will it cost to tile the entire space? • How much will cost the material to crown-molding the room? 	<ul style="list-style-type: none"> • Scale. Find out if there are problems using the architectural scale. If so, explain how to use it. See sample worksheet. <p>Area: Area is a physical <u>quantity</u> expressing the size of a part of a <u>surface</u>.</p> <p>Price: The price is the assigned numerical <u>monetary value</u> of a <u>good</u>, <u>service</u> or <u>asset</u>.</p> <p>Linear Foot: terms used loosely to describe a one-foot length of any long, narrow object</p> <p>Cost: Cost is the value of money that has been used up to produce something, and hence is not available for use anymore.</p> <p>Perimeter: The distance around the outside of a shape or figure.</p> <ul style="list-style-type: none"> • Calculate the area • $A = L \times W$, must be $250 \text{ sq ft} \leq \text{Area} \leq 300 \text{ sq ft}$ <p><i>Area is equal or greater than 250sq ft and equal or less than 300 sq ft</i></p> <ul style="list-style-type: none"> • $P =$ addition of all sides. • Make sure students use the appropriate cost formulas.
<p>3. Work through the math example embedded in the CTE lesson.</p> <p><i>Calculate Area, perimeter and Cost.</i></p> <p>In a rectangular room 10' x 15'. See Example 1</p> <p>Tiles price= \$ 1.25 /sq foot</p> <p>Crown molding price= \$1.35 /linear foot</p>	<p>Area= Length x Width</p> <p>Cost tiling = Area of the room X Tiles' Price(square foot)</p> <p>. Cost crown molding = Perimeter X CM price(linear foot)</p> <p>$TC = (L \times W) 1.25 + (2w+2L) 1.35$</p>

<p>Q. Area= $L \times W = 15' \times 10'$</p> <p>Q. Cost = 150 sq feet \times \$1.25</p> <p>How many feet of crown molding will be needed for your room?</p> <p>Q. $P = 10' + 15' + 10' + 15'$ Total cost = perimeter of room \times linear feet price <i>Calculate Perimeter(Crown Molding)</i></p> <p>Q. Cost= $50' \times \\$ 1.35$</p> <p>Q Total Cost= Perimeter \times Cost $= 187.50 + \\$67.50$</p> <p>Q. Find Total cost of tiling and molding.</p> <p>$TC = (L \times W) 1.25 + (2w + 2L) 1.35$</p>	<p>A. Area= 150sq ft</p> <p>A. Cost: \$ 187.50</p> <p>Perimeter = Side 1 + side 2+....side N</p> <p>A. Perimeter= 50 ft</p> <p>A. Cost: \$ 67.50</p> <p>A. Total Cost= \$255.00</p> <p>A. TC= \$255</p>
<p>4. Work through <i>related, contextual</i> math-in-CTE examples.</p> <p>Calculate Total cost to tile and crown molding the floor plan. (Example 2)</p> <p><u>Tiling:/ Molding 's cost:</u></p>	<p>Tiles Square feet = 1 box= \$1.25</p> <p>Crown molding linear feet= \$ 1.35</p> <p>Explain the students about loss of material while tile and crown molding installation due to the design of the room</p> <p>10 % of loss due to installation = $A \times 1.10$</p> <p>10% of loss due to installation = Linear footage \times 1.10</p>

<p>$TC = \{ (L \times W) 1.10 \} 1.25 + \{ (2W + 2L) 1.10 \} 1.35$</p> <p>$Tc = (400 \text{ sq ft} \times 1.10) \times 1.25 + (80' \times 1.10) 1.35$</p>	<p>$= \\$668.80$</p>
<p>5. Work through <i>traditional math</i> examples</p> <p>Example 1:</p> <p>A rectangular playground needs to be covered with new grass and fence for safety purposes. Its dimension are 80' X 110'. Calculate the area, perimeter and cost of materials needed for this job knowing that the grass sq feet = \$ 2.50, and linear foot fencing is \$8.00. Assuming there is not loss of materials.</p> <p>$TC = \{ (L \times W) 1.10 \} 1.25 + \{ (2W + 2L) 1.10 \} 1.35$</p> <p>$= \{ (80' \times 110') 1.10 \} 1.25 + [\{ (2 \times 80) + (2 \times 110) \} 1.10] \times 1.35 =$</p>	<p>Calculate area, perimeter and cost.</p> <p>A. TC = \$12664.3</p>
<p>6. Students demonstrate their understanding.</p> <p>Students will start designing their college efficiency studio. They will determine the cost of tile and crown- molding for each unit.</p>	<p>Students will calculate area and perimeter of the room in order to find out cost of tile and crown-molding for their rooms. Each room might be different in shape; therefore students must calculate the percentage of loss of materials.</p>

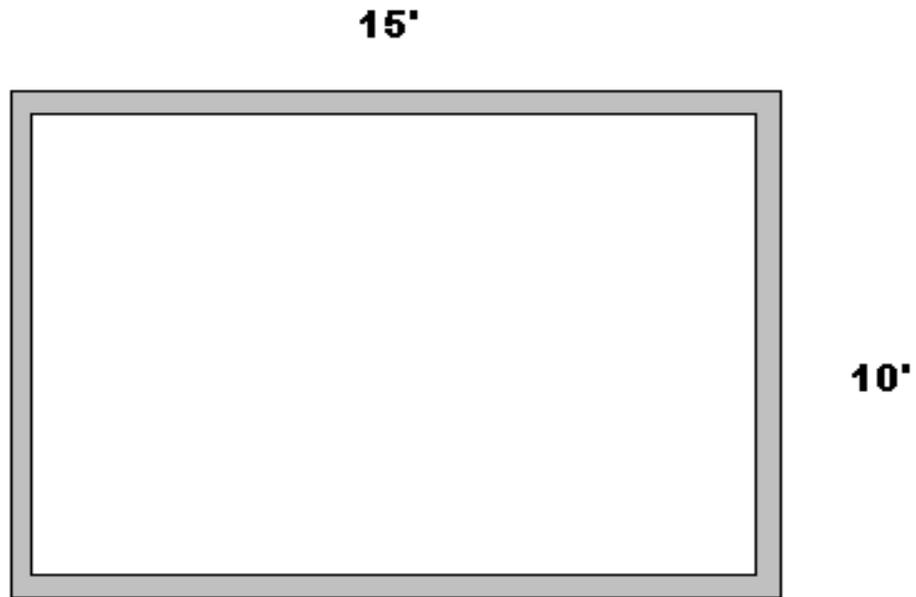
7. Formal assessment.

Calculate the cost to carpet and base-board all bedrooms from floor plan.



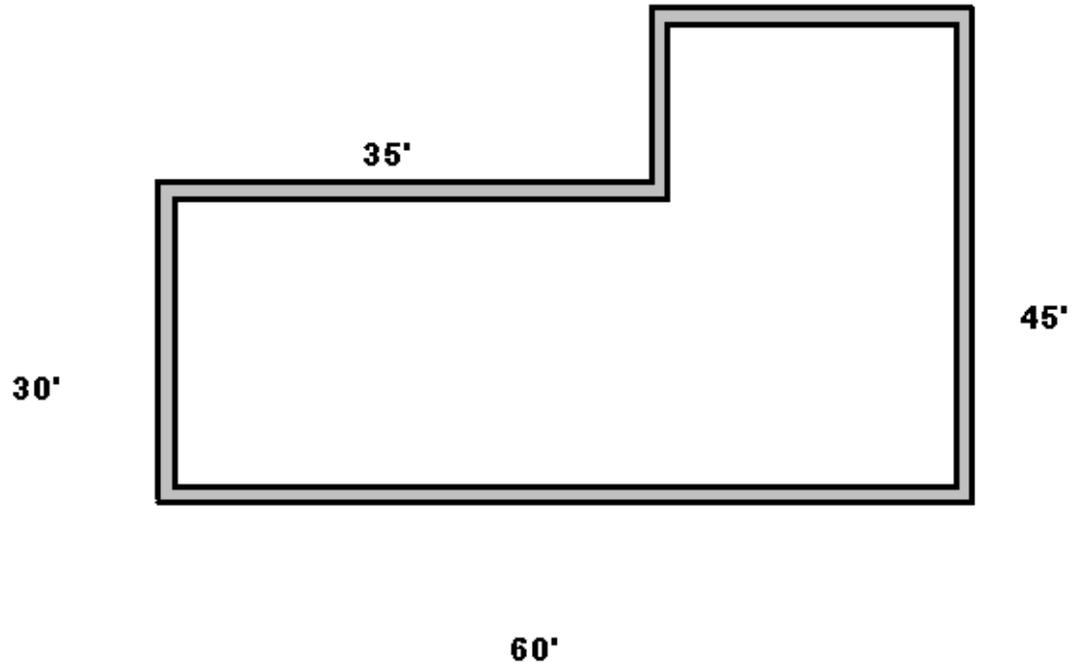
Example # 1

Calculate area, perimeter and materials cost of the room.



Example # 2

Calculate area, perimeter and materials cost of the floor plan.



School Name:
Engineering Technology

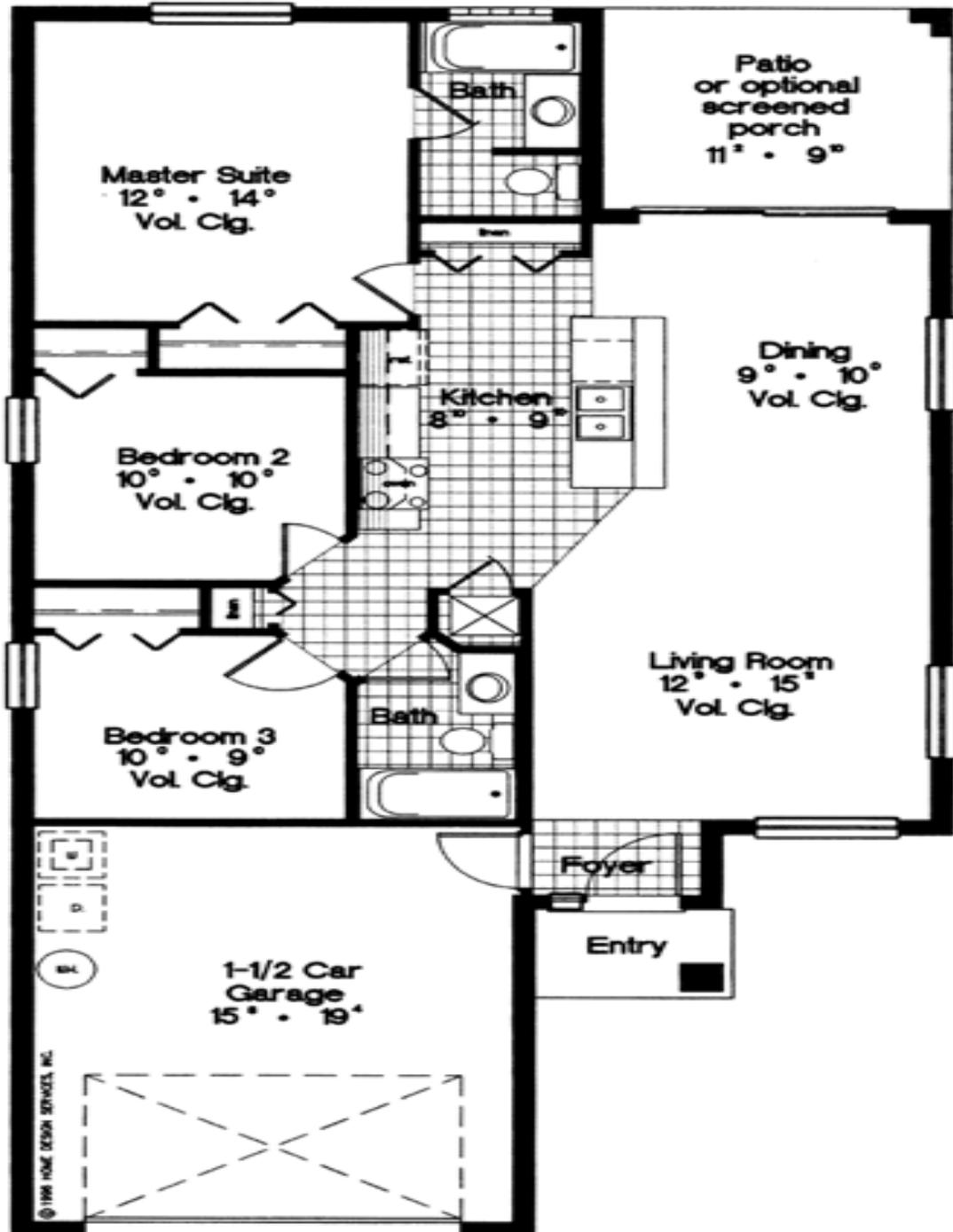
Student name: _____ Period # _____ Date: _____

I. Calculate the cost to carpet and base board all bedrooms from floor plan.

Data: Interior doors 2'-6"

Master Suite- closet doors: 3'-6"

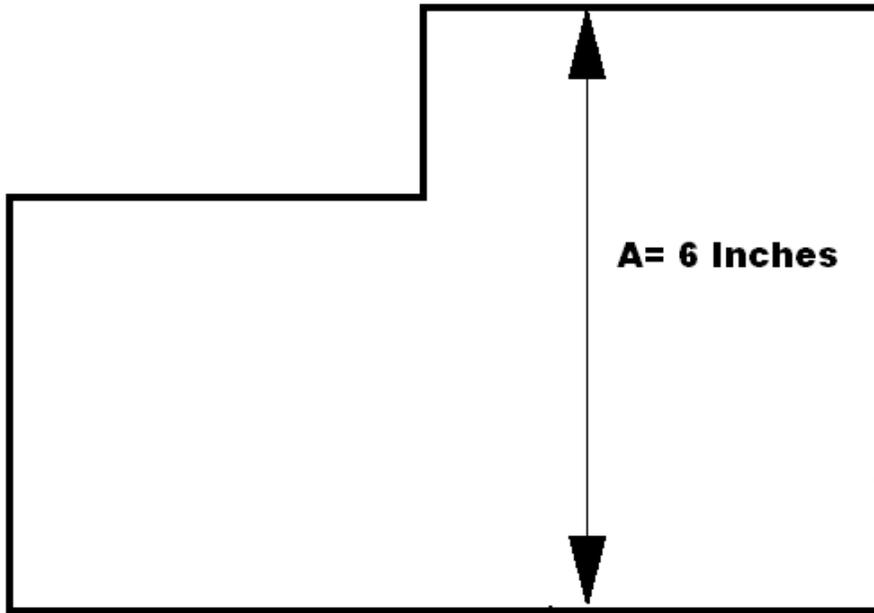
Bedroom 3 _ closet doors: 3'-2"



School Name:

School Name
Program: Engineering Technology

The scale 1" = 3' was used to draw the floor plan below. Determine the value for A using the scale provided.



Scale: 1" = 3'