Math-in-CTE Lesson Plan Template

Lesson Title: Intro to footers		Lesson # 9
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Occupational Area: Building Trades		
CTE Concept(s): Footings/Foundations		
Math Concepts: Cubic Yards/Volume		
Lesson Objective: Students will be able to calculate concrete, in cubic yards, to build a footing.		
Supplies Needed: smartboard, laptop, worksheets, pencils, calculators, powerpoint slides, speakers		

THE "7 ELEMENTS"	TEACHER NOTES (and answer key)
1. Introduce the CTE lesson.	
ke students' hands and welcome them to s. Ask students about weekend plans and ball games.	A footing is the bearing for a foundation wall, it supports the structure.
	Standard footing-a footing below the frost, below-grade (most of these are used in house basements)
ay we are going to be introducing footings. s anyone know what a footing is? What is purpose of a footing?	Haunch footing—a footing used for above grade concrete slabs (these are found usually in garages and house slabs)
re are different types of footings. Today will be discussing the standard footing haunch footing. A standard footing is a ing is below the frost, below grade, usually d in house basements. A haunch footing is sed for on- grade concrete slabs, usually	http://www.youtube.com/watch?v=Mq4kE9BbKvc (common cement truck) http://www.youtube.com/watch?v=q2ejKGFfY0c&feature=related

d for garages, car washes, and house s. (showing pictures)

t, I want to show you some videos showing how footings are made. The first video ws a common footing being poured by a ent truck. (discuss) The second video ws a common footing being poured by a p truck.

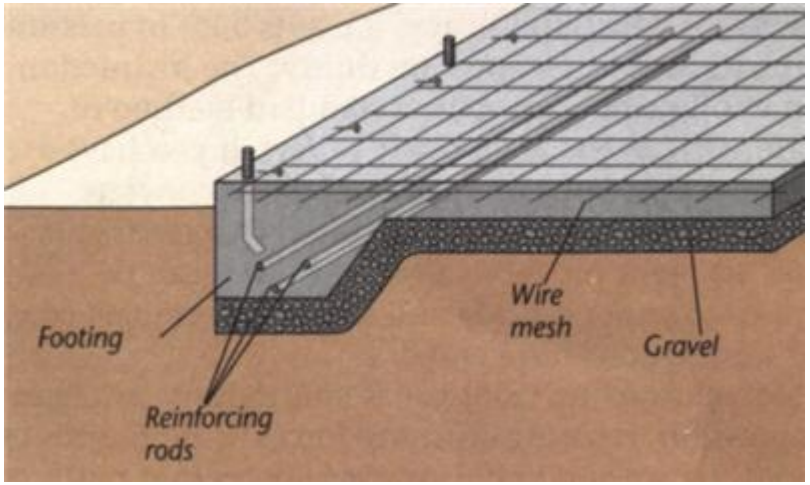
last video shows how they pour a haunch concrete slab manually.

purpose of this lesson is for you to figure how to calculate how much concrete you need to pour a footing. Does anyone know you might do this?

(haunch video)

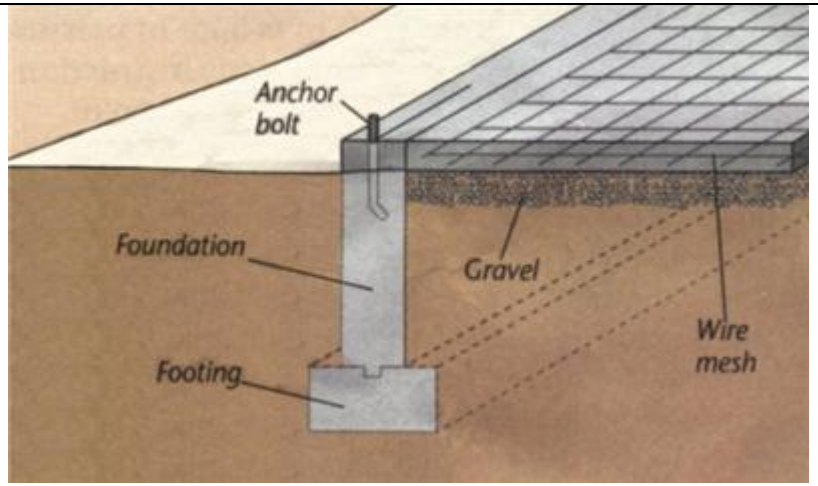
http://www.youtube.com/watch?v=mFOP6p5EJhA&feature=related

(pump truck)



Haunch

Footing

	 **Standard footing**
Assess students' math awareness as it relates to the CTE lesson. formula to calculate how much concrete is ded to build a footing depends on the	Teacher will demonstrate definitions and equations on white board (or other visual aide).

mation presented. You need to identify the th, width and height of a footing. Once you e done that you'll need to be able to calculate ollowing:

meter (If needed)

ic Feet or Volume

verting inches to feet (If applicable)

verting cubic feet (volume) to cubic yards

tangular Prism

ets discuss what the meanings and equations for each of these vocabulary words. Does one remember what these words are, if so, the ations too?

Definitions and Equations for:

Perimeter: Addition of all sides of foundation wall find the length of the footing

L + L + W + W…OR…2(L) +2 (W)

Cubic Feet or Volume: Length x Width x Height

L x W x H

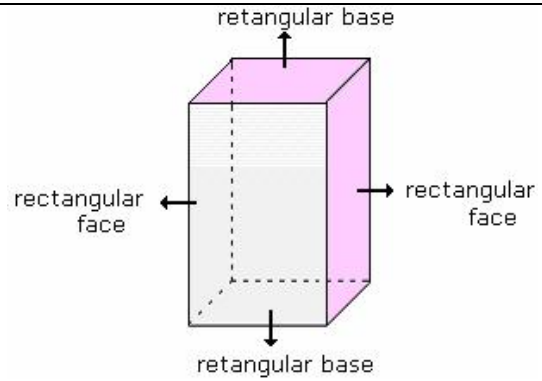
Converting Inches to feet: Cross multiplication to find foot conversion

12 inches= 1 foot

Converting cubic feet (Volume) to cubic yards: Volume divided by 27 cubic yards

V / 27

Rectangular Prism: A solid (3-dimensional) object, which has six faces that are rectangles.



Students can complete Area and Perimeter Worksheets for understanding

Work through the math example *embedded* n the CTE lesson.

look at some examples using these ulations.

ese examples would be presented to the class a powerpoint slide with corresponding hand-

ollowing the steps, you should be able to use process to complete the problems. The first is to sketch the diagram and label the length, n, and height. Afterwards, calculate the th, width and height.

Pass Out Lesson #3 Questions Student Worksheet

1. Calculate the number of cubic yards of concrete needed for the footing of a house measuring 24 '-0" x 42'-0". The footing is to be 16" wide and 8" high. Sketch a diagram.

Steps:

1. Label l, w, and h:

2. Calculate the l, w, and h:

r calculating the length, width, and ht….find the volume. Next convert the volume ubic yards by dividing your answer by 27. rwards, round your answer to the nearest n of a number.

't forget to round your answer and label it!

look at another example.

Length equals 2(24 + 42) –Perimeter of walls

28 + 84= 132 '

Width equals 16 inches···convert to feet, which is $\frac{12" = 1'}{16" = x}$

12x = 16···solve for x·····$\frac{12x = 16}{12 = 12}$, **x = 1.33 '**

Height equals 8 inches···convert to feet, which is $\frac{12 " = 1'}{8" = x}$

12x = 8···solve for x·····.$\frac{12x = 8}{12 = 12}$, **x = .67 '**

3. Calculate the volume and convert to cubic yards:

Volume is: 132 x 1.33 x .67 =117..63···..to convert to cubic yards···.divide by 27

, sketch the diagram and label the length, n, and height. Afterwards, calculate the th, width and height.

r calculating the length, width, and ht….find the volume. Next convert the volume

cubic feet..

117.63/27= 4.36, round to 4.5 yards

4. Round and label answer

4.5 yards

2. Calculate the number of cubic yards of concrete needed for the footing of a house measuring 26 ‘-0” x 34’-0”. The footing is to be 16” wide and 8” high. Sketch a diagram.

Steps:

1. Label l, w, and h.

2. Calculate the l, w, and h.

Length equals 2(26 + 34) –Perimeter of walls

ubic yards by dividing your answer by 27. rwards, round your answer to the nearest n of a number.

't forget to round your answer and label it!

look at another example, where a diagram is ented, but be careful, some information is sing! Follow the steps and answer the wing questions.

72 + 78= 150 '

Width equals 16 inches···convert to feet, which is 12" = 1'

16" = x

12x = 16···solve for x·····12x = 16 , x = 1.33 '

12 = 12

Height equals 8 inches···convert to feet, which is 12 " = 1'

8" = x

12x = 8···solve for x·····.12x = 8, x = .67 '

12 =12

3. Calculate the volume and convert to cubic yards:

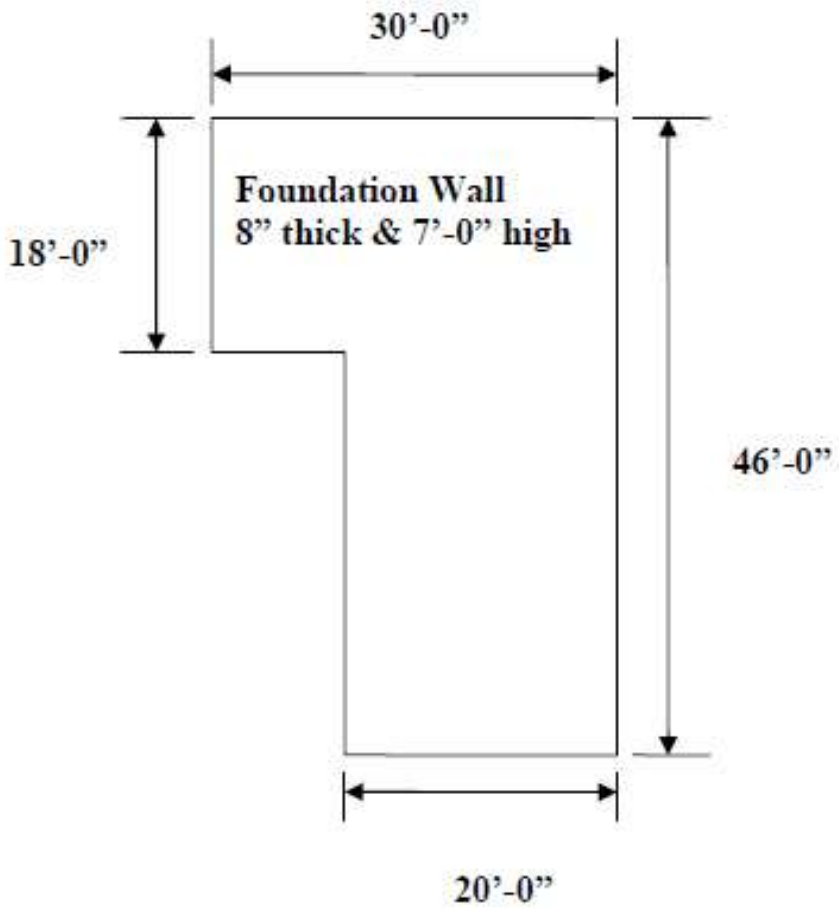
Volume is: 150 x 1.33 x .67 =133.67 to convert to cubic yards···.divide by 27 cubic feet..

133.67/27= **4.95, round to 5 yards**

4. Round and label answer

5 yards

Example 3:



The dimensions of the house are noted above.
Including wall thickness and height. Assume the footings to

be 8 inches high and twice the thickness of the foundation wall; the basement floor is to be 4 inches thick. For the foundation dimensions given, calculate the amount of concrete needed for the footing..

1. Find dimensions of Footing
    a. Perimeter of building: 20' + 46' + 30' + 18' + 28' + 10' = 152' (length)
    b. Width of the footing: 8" x 2 = 16"
    c. Height of footing: 8 "

Convert inches to feet:

Width equals 16 inches···convert to feet, which is $\frac{12" = 1'}{16" = x}$

$12x = 16$···solve for x·····$\frac{12x = 16}{12 = 12}$, **x = 1.33** '

Height equals 8 inches···convert to feet, which is $\frac{12 " = 1'}{8" = x}$

$12x = 8$···solve for x·····.$\frac{12x = 8}{12 \quad 12}$, **x = .67** '

	Volume of footing: 152' x 1.33' x .67' = 135.45 cubic ft 10 to convert to cubic yards….divide by 27 cubic feet.. 135.45/27= **5.02, round to 5.25 yards** 2. If the concrete costs $75 per cubic yard, find the total cost for the footings. **Cost: 5.25 x $75 = $393.75**
Work through *related, contextual* math-in-TE examples. ere else would you use this formula to order aterials? look at an example using mulch instead of oncrete. t is your first step? Sketch diagram and label w, and h. t would you do next? Find the height, onverting it to feet.	**Pass Out Student Worksheet #4** Answers: Backfill, gravel, loam, stone, mulch, etc…. Your task is to fill in a section of a playground with mulch. The playground section measures: 30 ' by 40' and the depth of the mulch needs to be 8 inches in height. Find how much mulch and the cost. Mulch is $26 a cubic yard. 1. Sketch and label. 2. Calculate height.

step 3, you would calculate the volume. Then onvert to cubic yards and round your answer ith a label.	Height: $\frac{12" = 1'}{8" = x}$ **cross multiply** $\frac{12x = 8}{12 = 12}$ **, x = .67** 3. Calculate volume, convert to cubic yards, round answer: **30 x 40 x .67 = 804 cubic feet / 27 cubic feet = 29.78 cubic yards…so need to order 30 cubic yards.**
5. Work through *traditional math* examples. our math class, you may have had to find the me of rectangular prisms. Does anyone ember doing this in class? Let's review a le of problems and then convert the answer ubic yards.	**Pass Out Student Worksheet #5** Examples of traditional math word problems: 1. The length of a rectangular prism is 4cm, the width is 5 cm and the height is 12. Sketch the prism and find the volume of the rectangular prism? **Length x Width x Height: 4 x 5 x 12 = 240 cm^3 or cubic centimeters**

e students will be provided these problems in a dout, as well as on a powerpoint slide.)	2. A concrete form is 2 feet wide, 7 feet high, and 684 feet long. How many cubic yards does the form contain? **Volume: 2 x 7 x 684 = 9576 cubic feet** **To find cubic yards: 9576/27= 354.67 cubic yards** 3. A large building requires a basement 9 feet deep, 78 feet wide and 96 feet long. How many cubic yards of earth must be removed? **Volume: 9 x 78 x 96 = 67,392 cubic feet** **To find cubic yards: 67,392/27 = 2,496 cubic yards**
6. Students demonstrate their understanding. we are going to go to the jobsite and today will need to make some footings from a print. Please follow the steps provided. You be able to work in teams for this project.	Students are given a blueprint, with steps, and expected to build a footing appropriately. Steps: 1. Read blueprint for layout 2. String center line, place 2 x 12 forms on both sides of center line 3. Shoot grade 4. Figure out lineal feet of rebar, multiply by 2, to be imbedded in the concrete. 5. Calculate the concrete cubic yards

ormal assessment. will be graded on your footing and be taking a en assessment with examples of how to ulate cubic yards of concrete.	**Pass out Footers Assessment** At this point the students would take a written test.

NOTES: