Task Title: Calculate Volumes of Concrete Required

OALCF Cover Sheet – Practitioner Copy

Learner Name: _____

Date Started: _____

Date Completed: _____

Successful Completion: Yes ☐ No ☐

Goal Path: Employment ☐ Apprenticeship ☐

Secondary School ☐ Post Secondary ☐ Independence ☐

Task Description: Carpenters calculate volumes of window sills, thrust blocks and columns to determine the amount of concrete required.

* Tasks 1, 3, & 4 'C3' tasks are higher than Level 3 OALCF
* Task 3 has been identified as authentic to this particular trade and may need some prior knowledge of the trade to complete.

Main Competency/Task Group/Level Indicator:

- Find and Use Information/Interpret documents/A2.1
- Understand and Use Numbers/Use measures/C3.3
- Understand and Use Numbers/Manage data/C4.1

Materials Required:

- Pen/pencil and paper and/or digital device
- Calculator or digital device with calculator function

Practitioner/Instructor Information

* Tasks 1, 3, & 4 'C3' tasks are higher than Level 3 OALCF
* Task 3 has been identified as authentic to this particular trade and may need some prior knowledge of the trade to complete.

Learner Information

The carpenter calculates the volume (V) of concrete required for building objects.

For square or rectangular objects:

V = L x W x D, where V = volume, L = length, W = width and D = depth.

For round objects:

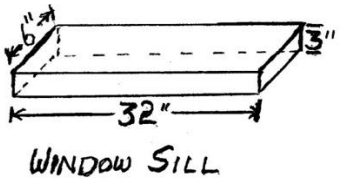
$V = \prod r^2 \times H$, where V = volume, $\prod = 3.14$, r = radius of circle* and H = height

* Radius is ½ of the diameter (diameter = distance across the circle)

1 cubic foot = 0.037 cubic yard

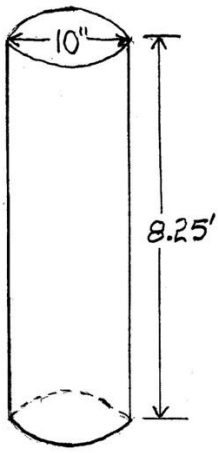
Review the Concrete Building Objects Diagrams.

Concrete Building Objects Diagrams



WINDOW SILL

THRUST BLOCK



COLUMN

Work Sheet

Task 1: Calculate the volume (V) of concrete required for the window sill in cubic feet (ft^3).

Answer:

Task 2: A garage floor measures 12′ 6″ by 13.75′. The concrete pad will be 4″ deep. The cement truck contains 1 cubic yard of concrete. Will you need to order more concrete to complete the garage floor? Concrete can be ordered by ½ and full cubic yards.

Answer:

Task 3: Calculate the volume of concrete required for the thrust block, in cubic yards (yd^3). The thrust block is an odd shape. Consider it as a rectangle (13′ x 14′ 1″ x 26′3″) plus half of another rectangle ((29′6″ – 13′) x 14′ 1″x 26′ 3″).

Answer:

Task 4: Calculate the volume of concrete required for 8 columns, in cubic yards (yd^3); 1 ft^3 = 0.037 yd^3).

Answer:

Answers

Task 1: Calculate the volume (V) of concrete required for the window sill in cubic feet (ft^3).

Answer:

V = L x W x H
Convert measurements to feet
32" = 32 / 12 = 2.67'
6" = .5'
3" = .25'
V = 2.67' x .5' x .25'
V = .334 cubic feet (or .334 ft^3)

Task 2: A garage floor measures 12' 6" by 13.75'. The concrete pad will be 4" deep. The cement truck contains 1 cubic yard of concrete. Will you need to order more concrete to complete the garage floor? Concrete can be ordered by ½ and full cubic yards.

Answer:

V = L x W x H
Convert measures to feet.
12' 6" = 12.5'
4" = .33'
V = 13.75' x 12.5' x .33'
= 56.72 ft^3 x .037 = 2.09 yd^3

Since you only have 1 cubic yard of concrete and you need 2.09 yd^3, you will need to order more concrete.

Task 3: Calculate the volume of concrete required for the thrust block, in cubic yards (yd^3). The thrust block is an odd shape. Consider it as a rectangle (13' x 14' 1" x 26'3") plus half of another rectangle ((29'6" – 13') x 14' 1"x 26' 3").

Answer:

This is one method of solving the problem. The Thrust Block will be viewed as two geometric figures: a rectangle and a triangle (1/2 a rectangle).

V = L x W x H (Rectangle)
V = 13’ x 26’ 3” x 14’ 1”
= 13’ x 26.25’ x 14.08’
= 4804.8 ft^3
V = (L x W x H) / 2 (Half Rectangle)
L = 29.5’ – 13’ = 16.5’
V = 16.5’ x 26.25’ x 14.08’ / 2 = 6098.4 ft^3 / 2 = 3,049.2 ft^3

The volume of the Thrust Block is 4804.8 + 3049.2 = 7854 ft^3
Convert 7854 ft^3 to yd^3
7854 x .037 = 290.60 yd^3
The volume of the Thrust Block is 290.60 yd^3.
Note – Answer may vary depending on how many decimal places were used in the calculations.

Task 4: Calculate the volume of concrete required for 8 columns, in cubic yards (yd^3); 1 ft^3 = 0.037 yd^3).

Answer:

V = πr^2 x H
V = 3.14 x 5”^{2} x 8.25’
Convert 5” to a fraction of a foot : 5/12 = .417
V = 3.14 x .417^2 x 8.25’
= 1.309 ft^2 x 8.25 = 10.80 ft^3
= 10.80 ft^3

Convert ft^3 to yd^3:
V = 10.80 x 0.037
= 0.399 yd^3 (for one Column)

Total concrete required for 8 columns is 8 x 0.399 yd^3 or 3.192 yd^3.

Note: Some rounding has been done so the answer provided is approximate.

Performance Descriptors

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
A2.1	Scans to locate specific details			
	Interprets brief text and common symbols			
C3.3	Calculates using numbers expressed as whole numbers, fractions, decimals, percentages and integers			
	Calculates the radius, diameter and circumference of circles			
	Understands and uses properties of angles and triangles to solve problems			
	Understands and uses formulas for finding the perimeter, area and volume of non-rectangular, composite shapes			
	Chooses and performs required operations; makes inferences to identify required operations			

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
	Selects appropriate steps to solutions from among options			
	Interprets, represents and converts measures using whole numbers, decimals, percentages, ratios and fractions			
	Uses strategies to check accuracy (e.g. estimating, using a calculator, repeating a calculation, using the reverse operation)			
C4.1	adds, subtracts, multiplies and divides whole numbers and decimals			
	identifies and compares quantities of items			
	identifies and performs required operation			
	interprets and represents values using whole numbers, decimals, percentages and simple, common fractions (e.g. ½, ¼)			

Levels	Performance Descriptors	Needs Work	Completes task with support from practitioner	Completes task independently
	follows apparent steps to reach solutions			

This task: Was successfully completed ☐ Needs to be tried again ☐

Learner Comments:

Instructor (print): _____

Learner (print): _____