Literacy Northwest
Regional Literacy & Basic Skills Network

OALCF Tasks for the Apprenticeship Goal Path: Prepared for the Project, *Developing Best Practices for Increasing, Supporting and Retaining Apprentices in Northern Ontario (2014)*

OALCF Task Cover Sheet

Task Title: Calculating Offsets in Plumbing

Learner Name:	
Date Started:	**Date Completed:**
Successful Completion: Yes___ No___	
Goal Path: Employment___ Apprenticeship✓ Secondary School___ Post Secondary___ Independence___	
Task Description: Calculating offsets using multiple step formulas to determine measurements of pipes when installing around obstacles. ***Please note that some of these tasks are beyond Level 3***	
Competency: A: Find and Use Information C: Understand and Use Numbers	**Task Group(s):** A1: Read continuous text A2: Interpret document C3: Use measures
Level Indicators: A1.2: Read texts to locate and connect ideas and information A2.2: Interpret simple documents to locate and connect information C3.3: Use measures to make multi-step calculations; use specialized measuring tools	
Performance Descriptors: see chart on last page	
Materials Required: • Pen and paper • Calculator with square root • Attached document - Understanding Offsets in Plumbing	

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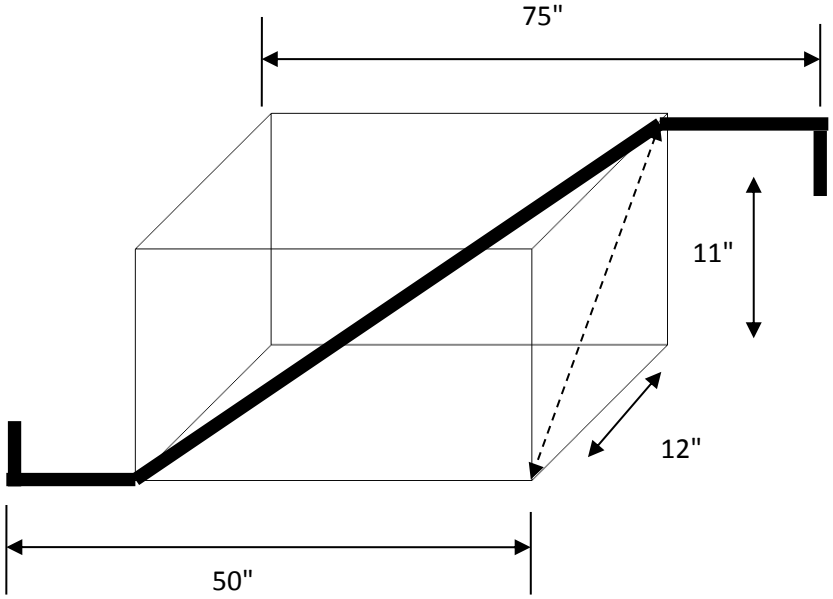
Learner Information and Tasks

Plumbers encounter obstacles when installing pipes and must always calculate offsets to determine where pipes should be located and to ensure the correct elbows are used for fittings. Read the document **Understanding Offsets in Plumbing.**

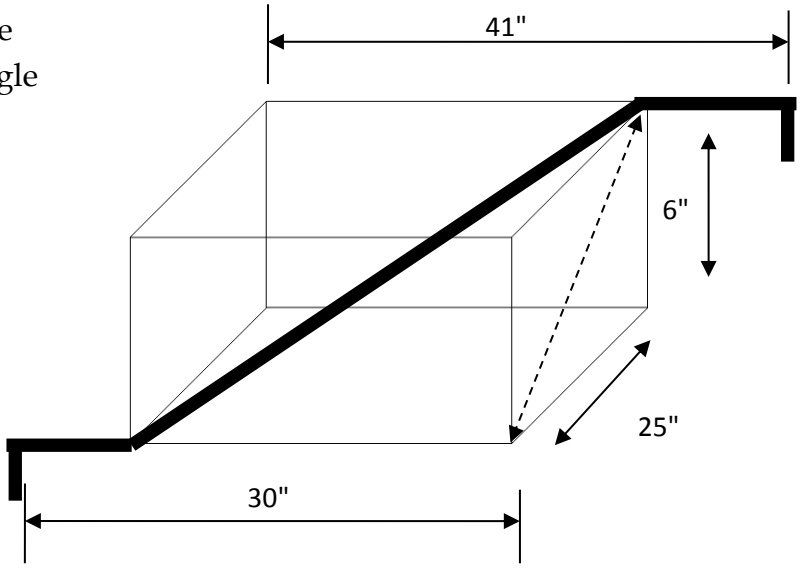
Task 1: Calculate the setback and diagonal for the following pipe schematic using a

a) 45° angle
b) 22½° angle



Task 2: Calculate the setback and diagonal for the following pipe schematic using a

a) 45° angle
b) 22½° angle



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Understanding Offsets in Plumbing

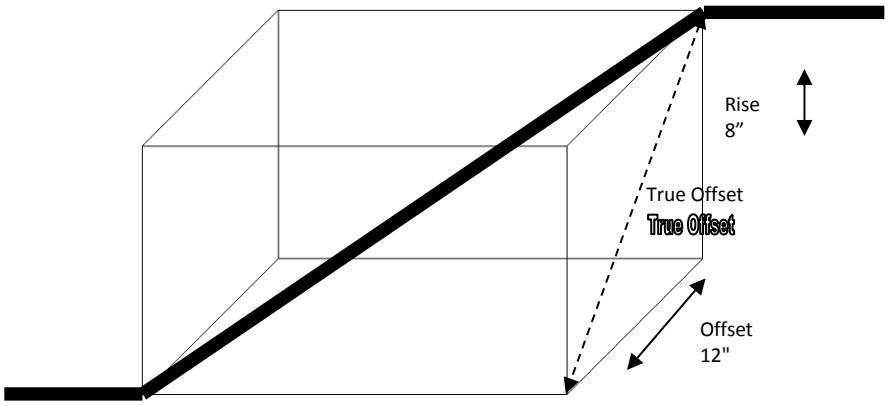
A fitting or combination of fittings consisting of elbows or bends that brings one section of pipe out of line with, but into a line parallel with, another section of pipe. An offset permits an abrupt change in the direction of a pipe to avoid an obstruction for example, and continue in the same direction.

An offset in a line of piping is a combination of elbows or bends which brings one section of pipe out of line but into a line parallel with the other section.

When two pipes are parallel to each other they are an offset distance apart. They may both be horizontal or vertical. The distance between the centerlines of the two parallel pipes is called the offset. If two parallel pipes are connected by fittings other than 90 degrees then the centre-to-centre length of the connecting pipe is a diagonal.

A rolling offset refers to the changes in direction that a pipe can make in a piping system.

Calculating the offset



Step 1 - Calculate the True Offset

Use the Pythagoras Theorem

Offset squared + Rise squared = True Offset squared

True Offset = Square Root of True Offset

- $12^2 + 8^2$ = True Offset squared
- (12 x 12) + (8 x 8) = 144 + 64 = 208
- True Offset squared = 208 = 14.42

Step 2 - Calculate the Setback and Diagonal

Use the Common Fitting Constants Table

Fitting Angle	60°	45°	22.5 or 22 1/2°
Diagonal = true offset x constant	1.155	1.414	2.613
Setback = true offset x constant	0.577	1.000	2.414

Diagonal = True Offset x 45° angle constant

Diagonal = 14.42 x 1.414 = 20.39

20.39" is the diagonal measurement for the rolling offset

Setback = true offset x 60° angle constant

Setback = 14.42 x 0.577 = 8.32

8.32" is the setback measurement for the offset

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Task Title: Calculating Offsets in Plumbing

Answer Key

Task 1 a: Calculate the setback and diagonal for the following pipe schematic using a 45° angle.

$12^2 + 11^2 = 144 + 121 = 265$
265 squared = 16.28
16.28 x 1.414 = 23.02 The diagonal is 23.02"
16.28 x 1.000 = 16.28

The setback is 16.28"

Task 1 b: Calculate the setback and diagonal for the following pipe schematic using a 22.5° angle.

$12^2 + 11^2 = 144 + 121 = 265$
265 squared = 16.28
16.28 x 2.613 = 42.54 The diagonal is 42.54"
16.28 x 2.414 = 39.3

The setback is 39.3"

Task 2 a: Calculate the setback and diagonal for the following pipe schematic using a 45° angle.

252 + 62 = 625 + 36 = 661
661 squared = 25.71
25.71 x 1.414 = 36.35 The diagonal is 36.35"
25.71 x 1.000 = 25.71

The setback is 25.71"

Task 2 b: Calculate the setback and diagonal for the following pipe schematic using a 22.5° angle.

252 + 62 = 625 + 36 = 661
661 squared = 25.71
25.71 x 2.613 = 67.18 The diagonal is 67.18"
25.71 x 2.414 = 62.06

The setback is 62.06"

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Performance Descriptors		Needs Work	Completes task with support from practitioner	Completes task independently
A1.2	• scans text to locate information			
	• locates multiple pieces of information in simple texts			
	• makes low-level inferences			
	• makes connections between sentences and between paragraphs in a single text			
	• follows the main events of descriptive, narrative and informational texts			
A2.2	• performs limited searches using one or two search criteria			
	• extracts information from tables and forms			
	• uses layout to locate information			
	• makes connections between parts of documents			
	• makes low-level inferences			
C3.3	• calculates using numbers expressed as whole numbers, fractions, decimals, percentages and integers			
	• 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			
	• manages unfamiliar elements (e.g. context, content) to complete tasks			
	• makes estimates involving many factors where precision is required			

	• chooses and performs required operations; makes inferences to identify required operations			
	• 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)			

This task: was successfully completed___ needs to be tried again___

Learner Comments

_____ _____

Instructor (print) **Learner Signature**