

Lesson Title: 45 °, 30°, and 60° Offsets

Terminal Objectives:

Given problems using 30°, 60°, and 45° offsets, students will estimate the length of the “Travel” by rule-of-thumb shortcuts, and find exact values using right-triangle formulas. Measurements will be correct within 1/16” at least 90% of examples.

Enabling Objectives:

1. Students will measure pipe correctly, to the nearest 1/16”, 100% of the time.
2. Students will measure angles within 2°, 100% of the time.
3. Students must have basic pipefitting skills.

Related PA Academic Standards

Mathematics

#2.1.11B Use Estimation to Solve Problems

#2.2.11A Develop and Use Computation Concepts with Real Numbers

#2.3.8C Measure Angles in Degrees

#2.3.11C Produce Measures with Specified Levels of Precision

#2.4.11E Demonstrate Mathematical Solutions to Problems

#2.10.11B Solve Practical Problems Using Pythagorean Theorem

Introduction:

- Need for offsets
- Fittings and bends in pipes

Body:

- Types of offsets
- Handy rules for estimating
- Examples
 1. Pythagorean formula
 2. Using a calculator to solve for the hypotenuse
 3. Comparing estimates with exact values

- **Assignment**

Students will contact their mathematics teachers to find the reason that the shortcuts work. Students will prepare a paragraph summarizing the explanations.

Summary:

You can find offset lengths by using several methods. You should be able to calculate by one method and check by another.

Tools and Materials Needed:

- Tape measure
- Pencil
- Paper
- Calculator