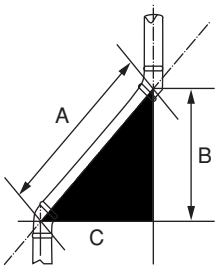
CONTENTS

Study Tip

The hypotenuse is commonly known as the travel.



A. Hypotenuse = Travel
B. Altitude = Advance
C. Base = Offset

Three important lengths include:

A. Travel (Hypotenuse) which is the distance from the initial offset to the second fitting.

B. Advance (Altitude) is the distance parallel to the pipes between the offset fittings.

C. Offset (Base) is the distance the pipe is offset from its original position to the new position.

Some of the pipe fitting angles that are used by plumbers for pipe offsets are:

- 22½ degree elbow or 1/16 bend.
- 45 degree elbow or ⅛ bend.
- 60 degree elbow or ⅙ bend.
- 72 degree elbow or ⅕ bend.
- 90 degree elbow or ¼ bend.

The plumber usually calculates the length of the travel. To calculate the travel, the angle of the fittings and the length of the advance or offset is required. The known values are multiplied by a constant. (See the single pipe offsets constants table below.) A 45° elbow (⅛ bend) is widely used by plumbers. The offset constant for this is 1.414 and should be memorized.

TABLE—SINGLE PIPE OFFSETS CONSTANTS

Fitting	Fitting Angle	Travel = Offset ×	Travel = Advance ×	Advance = Offset ×	Advance = Travel ×	Offset = Advance ×	Offset = Travel ×
1/32	11¼°	5.126	1.019	5.027	0.981	0.199	0.195
1/16	22½°	2.613	1.082	2.414	0.924	0.414	0.383
⅛	45°	1.414	1.414	1.000	0.707	1.000	0.707
⅙	60°	1.155	2.000	0.577	0.500	1.732	0.866
⅕	72°	1.051	3.236	0.325	0.309	3.078	0.951

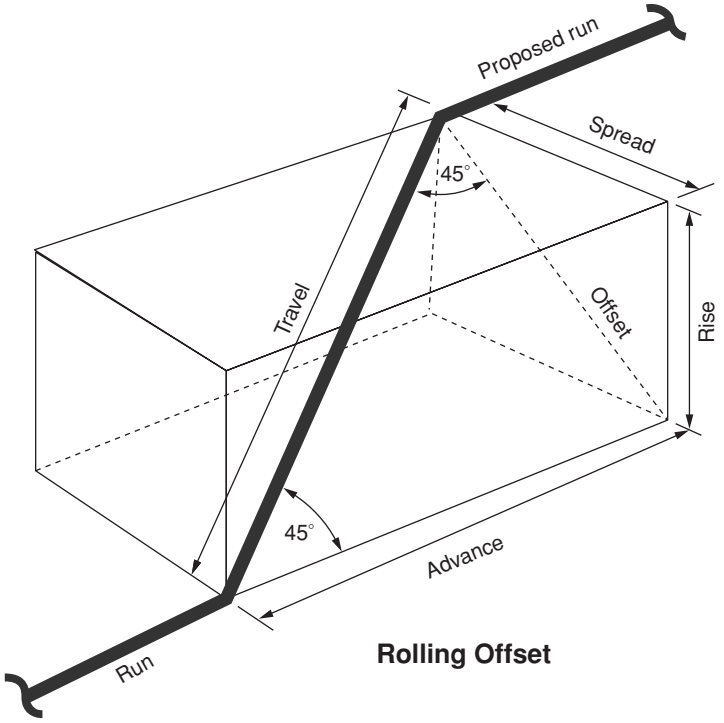
2. Calculate the *d* value. This is the difference in offset pipe lengths.

$d = 12" \times 0.414 = 4.968$
4.968 is approximately 5"

Note: Although pipe lengths change, travel remains the same for all pipes.

Rolling Offsets

Sometimes a pipe changes direction both horizontally and vertically. This is called a rolling offset. The illustration below displays a rolling offset with 45° fittings and a 60° elbow. Often a wye fitting is used instead of the 60° elbow.



Rolling Offset

Squared values and square roots are used to calculate the offset distance. Squared values are written as 5^2 or whatever the number is $\#^2$. To calculate a squared value, take the given number and multiply the given number by itself.

$2^2 = 4$ $3^2 = 9$ $4^2 = 16$ $5^2 = 25$

The offset is calculated by using the square root of the rise and spread. Rise is the actual vertical distance the pipe is offset and the spread is the horizontal distance the pipe is offset.

$$\text{Offset} = \sqrt{\text{rise}^2 + \text{spread}^2}$$

Study Tip

Rolling offset is the horizontal and vertical changes in direction of pipe.

Study Tip

Water fountains are prohibited in restrooms.

19. 15 water fountains are required to be installed in a facility. What is the maximum number of bottled water dispensers allowed to substitute these fountains?

    a. 6

    b. 7

    c. 8

    d. 9

20. Trough urinals are _____.

    a. required

    b. permitted

    c. allowed only when approved by an official

    d. prohibited

21. Which of the following is used to support piping?

    a. Hangers

    b. Anchors

    c. Supports

    d. All of the above

22. Shower receptors shall be constructed of _____ materials.

    a. Impervious

    b. Non-absorbent

    c. Noncorrosive

    d. All of the above

23. A 2" pipe passing through a foundation wall requires protection from a sleeve of at least _____ inches.

    a. 2

    b. 4

    c. 6

    d. 8

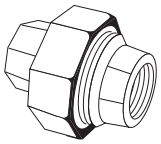
Study Tip

Sludge is the decomposition of organic material found at the bottom of a septic tank.

6. Identify this tool.

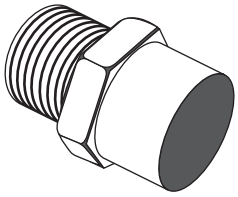
   a. Pipe reamer
   b. Pipe cutter
   c. Pipe threader
   d. Pipe stand

7. Identify the fitting.



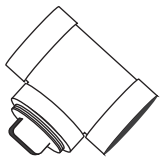
   a. Male adaptor
   b. Plug
   c. Reducer
   d. Union

8. Identify this fitting.



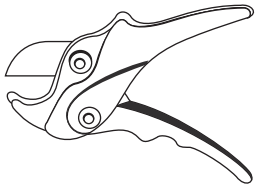
   a. Copper to FIP adapter
   b. Copper coupling
   c. Copper union
   d. Copper to MIP adapter

9. Identify this fitting.



   a. Vent tee
   b. Sanitary tee
   c. Sweep tee
   d. Cleanout tee

10. Identify this tool.



   a. Universal saw
   b. Ratchet cutter
   c. Tubing cutter
   d. Crimping tool

Notes

Part 5: IPC Final Review Exam Answer Key

1. c Table 608.15.1
2. a 604.9
3. d 312.7
4. d 708.3.3 (must be greater than 45 degrees)
5. a 502.3
6. d 405.3.1
7. c Table 308.5
8. b Table 608.17.1
9. c Table 709.1
10. a 802.4
11. c Table 403.1
12. b 417.3
13. d 604.5
14. b Table 710.1(2)
15. b 603.1
16. c 1107.3
17. a 604.8
18. d Table 916.1
19. c 312.3
20. b 306.3
21. d 403.2 exception #2
22. b 405.3.1
23. a Table 709.1
24. a Table 909.3
25. d 302.1