



SYMBOLS

R1 & R2 = BEND RADII TO Q OF PIPE
ALWAYS GIVEN R1 NEED NOT = R2
DIM. A = DISTANCE BETWEEN CRS.
DIM. B = LENGTH OF STRAIGHT BETWEEN BENDS
DIM. C = OFFSET OF PIPE
 θ = OFFSET ANGLE
LET $R1 + R2 = D$ & $E = D - C$

GIVEN	TO FIND	SOLUTION
R1 R2 A C	B LENGTH OF STRAIGHT	$B = \sqrt{A^2 + E^2 - D^2}$
R1 R2 A C	θ OFFSET ANGLE	$\theta = [90^\circ - (\text{TAN}^{-1} E / A + \text{TAN}^{-1} B / D)]$
R1 R2 C θ	A CENTERS	$A = [(D - E \text{COS } \theta) / \text{SIN } \theta]$
R1 R2 A θ	C OFFSET	$C = [D - ((D - A \text{SIN } \theta) / \text{COS } \theta)]$
R1 R2 B θ	DEVELOPED LENGTH BETWEEN CRS.	$= B + \theta D$ OR $B + \pi D \theta / 180$ (θ IN RADIANS) (θ IN DEGREES)

- NOTE:
1. E WILL FREQUENTLY BE NEGATIVE, HENCE $\text{TAN}^{-1}E/A$ WILL ALSO BE NEGATIVE.
 2. THIS FORMULA CAN BE MODIFIED FOR BEND ANGLES $> 90^\circ$ BUT IT WILL BE EASIER TO CONSIDER FIGURE ROTATED THROUGH 90° THAN FOR DEVELOPED LENGTH. THE FACTOR WILL BE $(\theta + 180)^\circ$ OR $(\theta + \pi)$ RADIANS.
 3. FOR SHEET METAL DEVELOPMENT READ 'PLATE' FOR 'PIPE', PIPE Q THEN REPRESENTS PLATE SURFACE OR BEND LINE AS REQ'D.