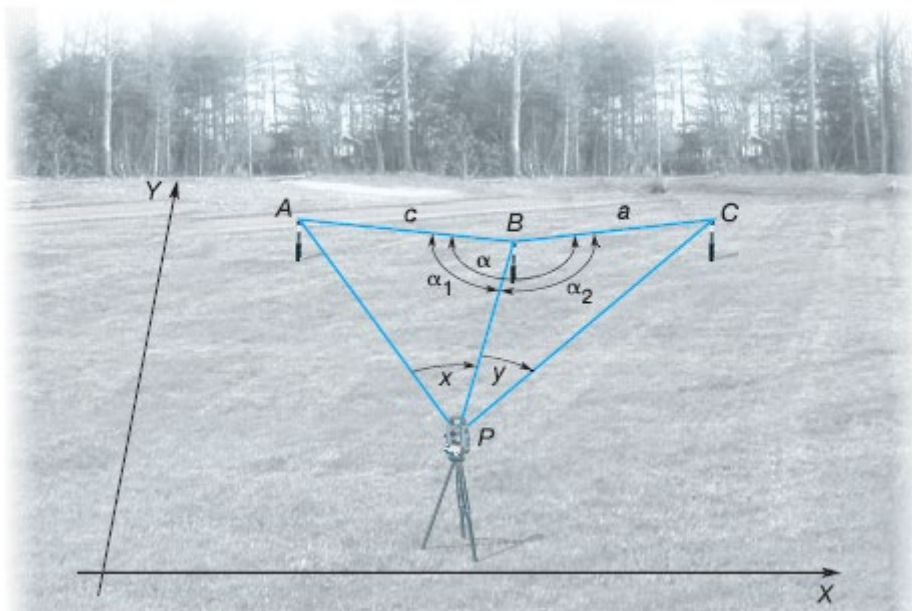


Three-point resection

This procedure locates a point of unknown position by observing horizontal angles from that point to three visible stations whose positions are known. Referring to the figure below, a total station instrument occupies station P , and angles x and y are observed. A summary of the method used to compute the coordinates of station P follows:



1. From the known coordinates of A , B , and C calculate lengths a and c , and angle α at station B .
2. Subtract the sum of angles x , y , and α in figure $ABCP$ from 360° to obtain the sum of angles $A + C$

$$A + C = 360^\circ - (\alpha + x + y)$$

3. Calculate angles A and C using the following:

$$A = \tan^{-1} \left(\frac{a \sin x \sin (A + C)}{c \sin y + a \sin x \cos (A + C)} \right)$$

$$C = \tan^{-1} \left(\frac{c \sin y \sin (A + C)}{a \sin x + c \sin y \cos (A + C)} \right)$$

4. From angle A and azimuth AB , calculate azimuth AP in triangle ABP . Then solve for length AP using the law of sines, where $\alpha_1 = 180^\circ - A - x$. Calculate the ΔE and ΔN of AP followed by the coordinates of P .
5. In the manner outlined in step 4, use triangle BCP to calculate the coordinates of P to obtain a check.

Reference:

Elementary Surveying - An Introduction to Geomatics 13th ed - E. Ghilani, P. Wolf (Pearson, 2012)