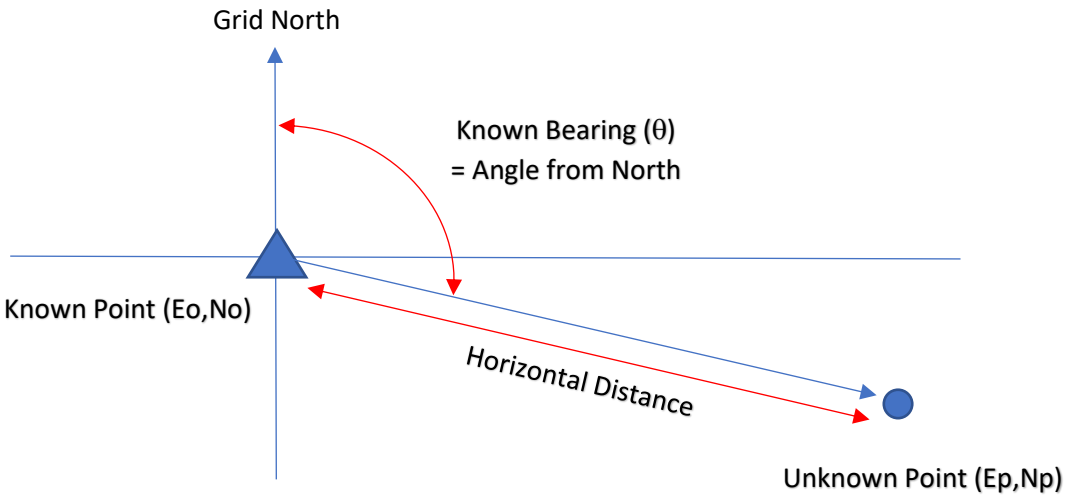
Converting Bearings and Distances to Coordinates

Given a known Bearing (θ) and Horizontal Distance (HzDist) from a known point (Eo,No), the coordinates (Ep,Np) may be calculated as follows:



Ep = [Sin(θ) x HzDist] + Eo

Np = [Cos(θ) x HzDist] + No

This works for ALL bearings 0°<360°

Hand Calculating

(i) It is important to carry out the above calculation in the correct sequence:

Sin(θ) x HzDist is not the same as Sin(θ x HzDist)

(ii) Typing the above formulae into a Scientific Calculator, it may be necessary to enter the bearing before the SIN/COS functions…

Eg, θ [SIN] [x] HzDist etc

Microsoft Excel

The calculation may also be done using an Excel spreadsheet.

Note, that Excel assumes angles are measured in "radians" and so the Bearing (measured in Degrees) must be converted using the "RADIANS(x)" function.

=(SIN(RADIANS(Bearing))*HzDist)+East0
=(COS(RADIANS(Bearing))*HzDist)+North0

Where "Bearing" is the known bearing in degrees (or decimal degrees) and HzDist is the known Horizontal Distance.

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Example

Q: Calculate the coordinates of an unknown point measured from a Survey Station at known coordinates (123.456mE, 456.789mN), given a measured Bearing of 127.5 degrees and a measured Horizontal Distance of 34.567m?

A:

Easting:

Sin (127.5)	= 0.79335334	Hint: You may need to enter 127.5 SIN on a calculator
x 34.567	= 27.42384491	
+ 123.456	= **150.880mE**	

Northing:

Cos(127.5)	= -0.608761429	Hint: Take care to note the "negative" sign
x 34.567	= -21.04305632	
+ 456.789	= **435.746mN**	

Note: The figures in RED show the "differences" in position between the Survey Station and the Unknown point. In this case, the point lies 27.424m to the EAST and 21.043m to the SOUTH of the Survey Station. As a check, this is where would expect the bearing 127.5 degrees to point to.