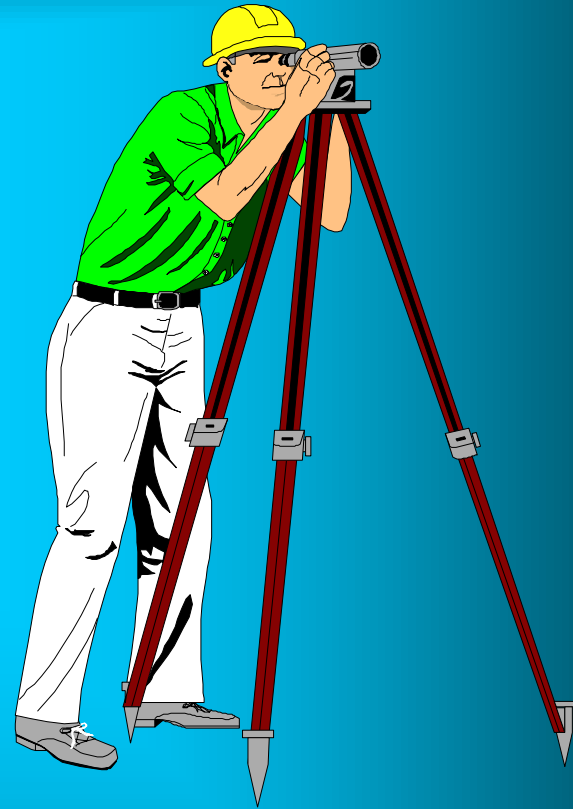


Basic Coordinates

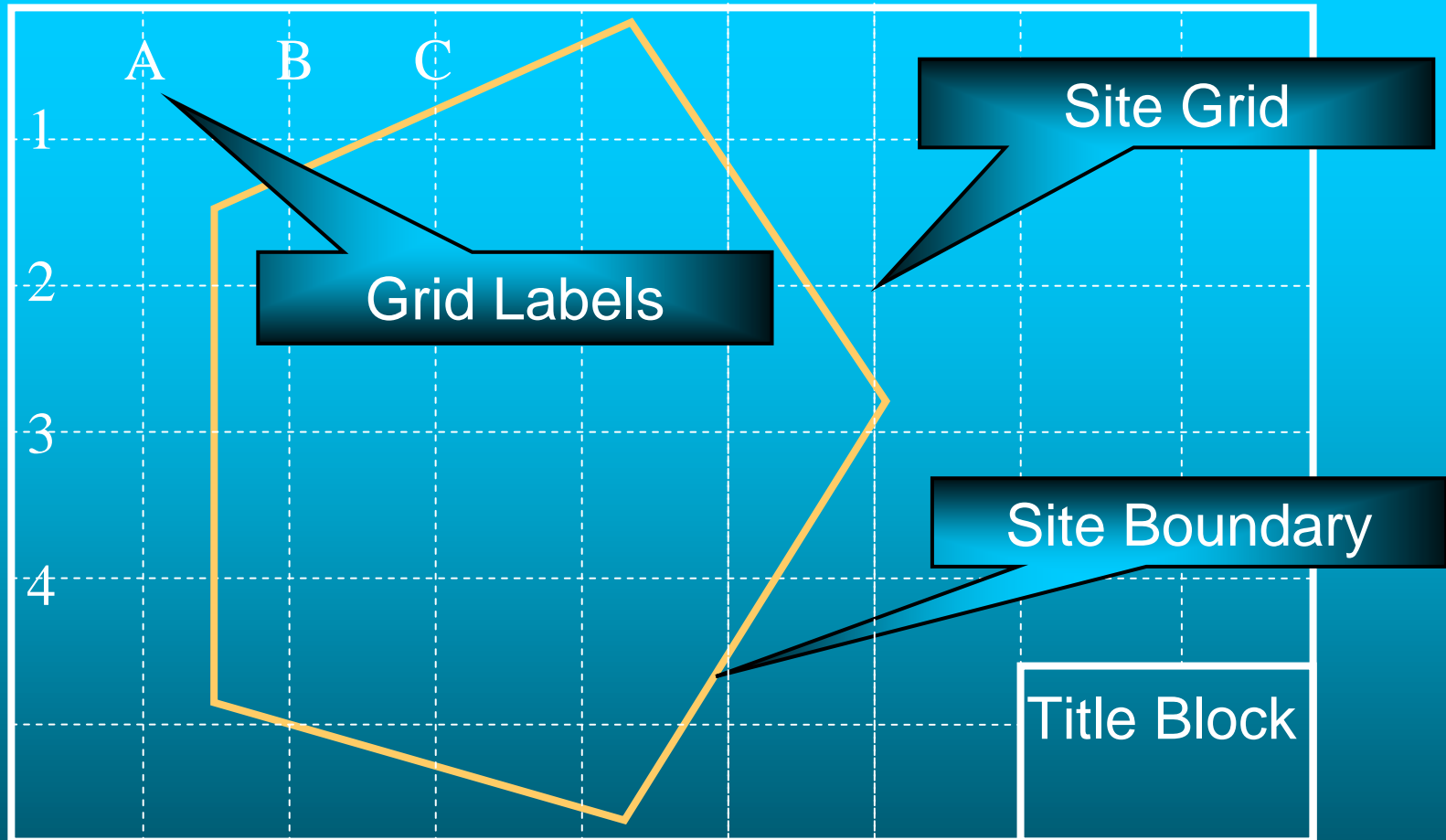


1. Rectangular to Polar Coordinates, (2D)
2. Polar to Rectangular Coordinates, (2D)
3. 3D Coordinates

Warning

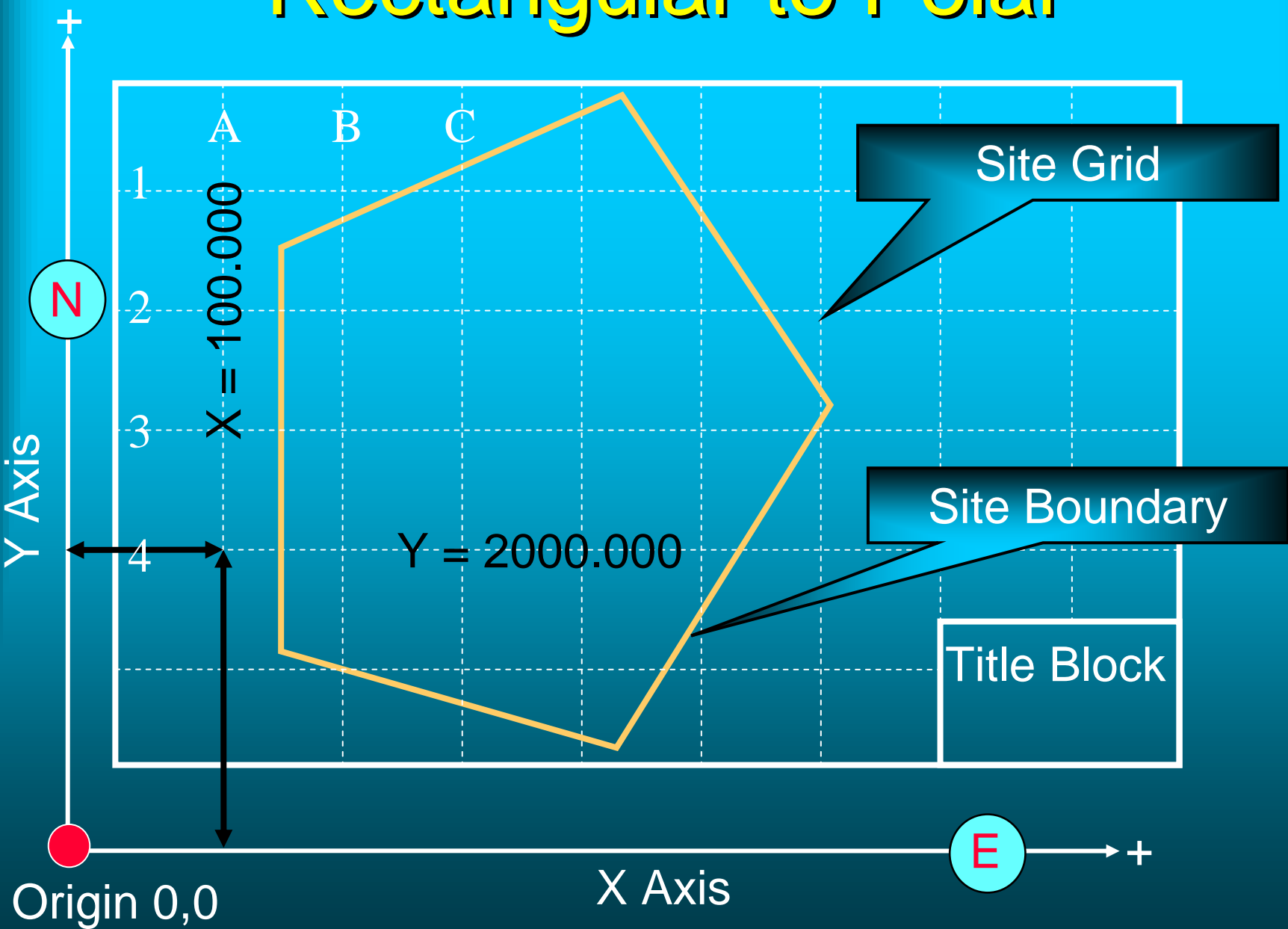
- In this country it is common practice to measure angles in the sexagesimal system.
- There are 360 degrees in a circle, 60 minutes in a degree, and 60 seconds in a minute.
- If you use a pocket calculator for angular calculations make sure it has conversion keys.

Rectangular to Polar

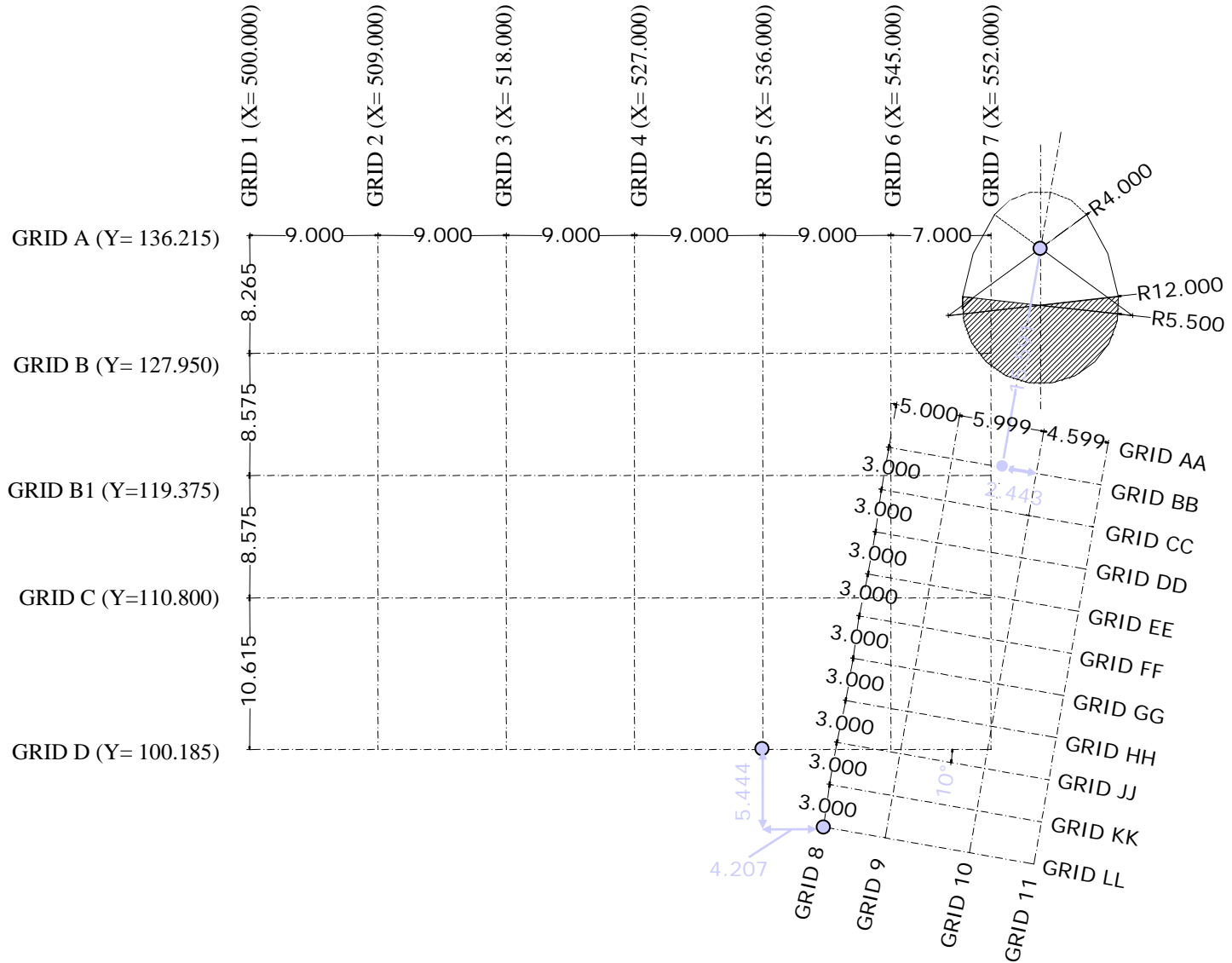


Grid spacing is given on the drawing
Grid to Newbuild dimensions are also given on the drawing

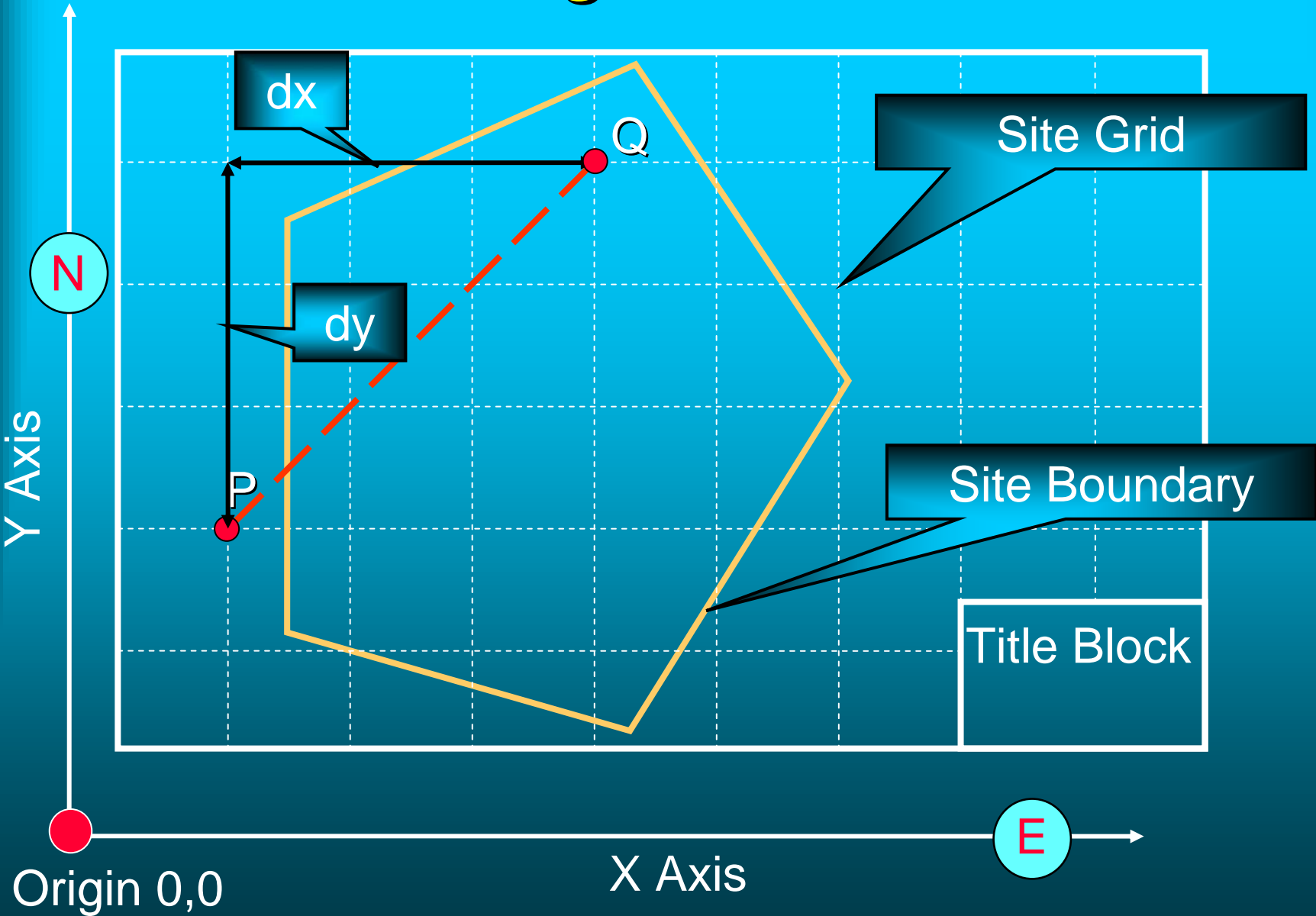
Rectangular to Polar



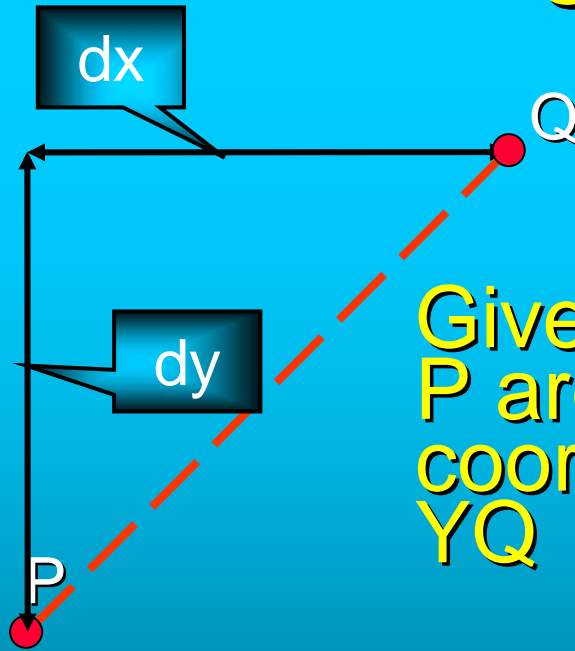
Multiple Grids Example



Rectangular to Polar



Rectangular to Polar



Given that the coordinates of P are X_P and Y_P , and that the coordinates of Q are X_Q and Y_Q

- Let $dx = X_Q - X_P$, and let $dy = Y_Q - Y_P$
- Then $(P \text{ to } Q)^2 = (dx)^2 + (dy)^2 = \text{Horizontal Distance}^2$
- And $\tan^{-1}(dx/dy)$ is the angle at P

Polar to Rectangular.



Further Terminology

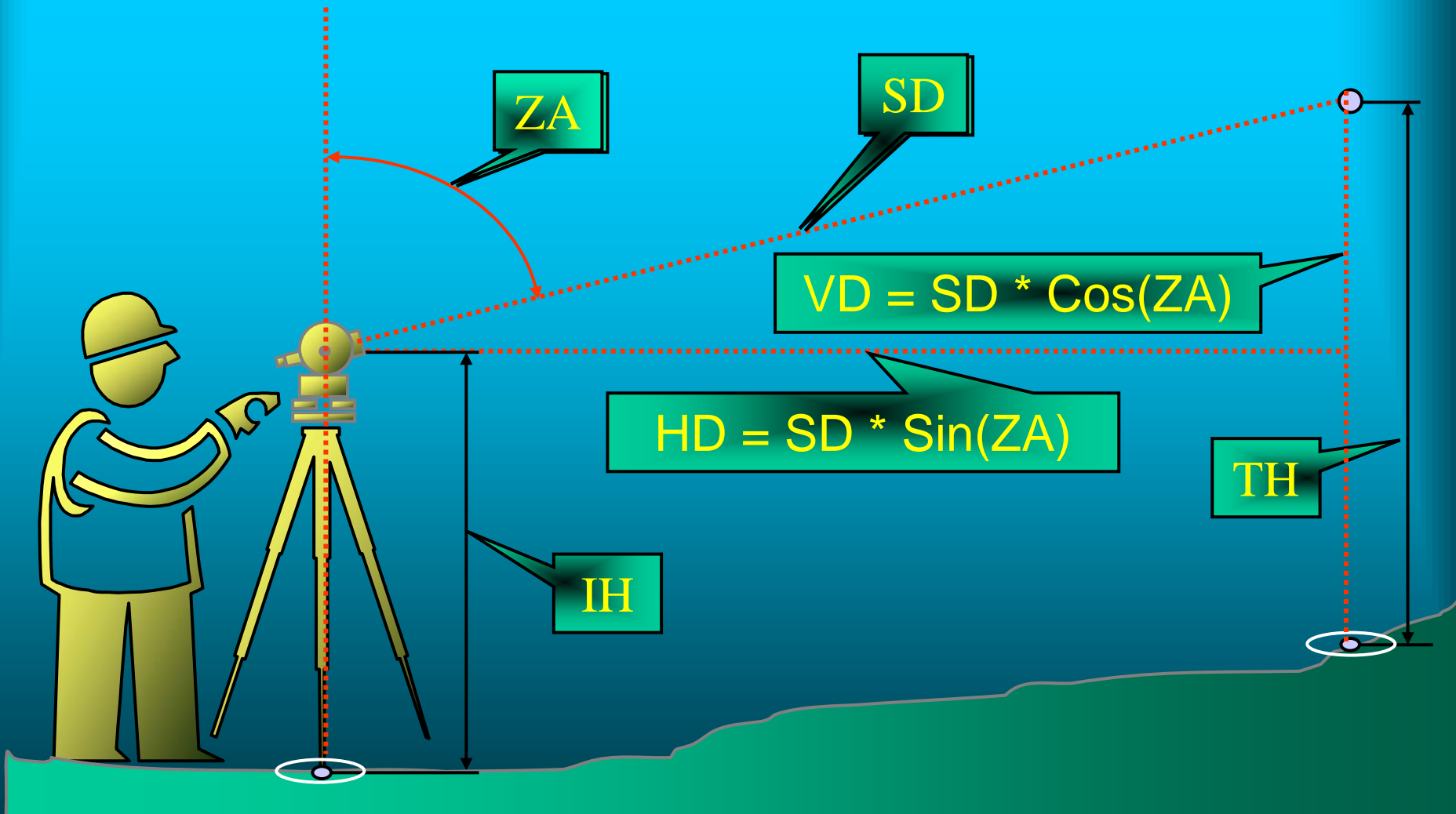
Zenith Angle, (ZA)

Vertical Distance, (VD)

Instrument Height, (IH)

Target Height, (TH)

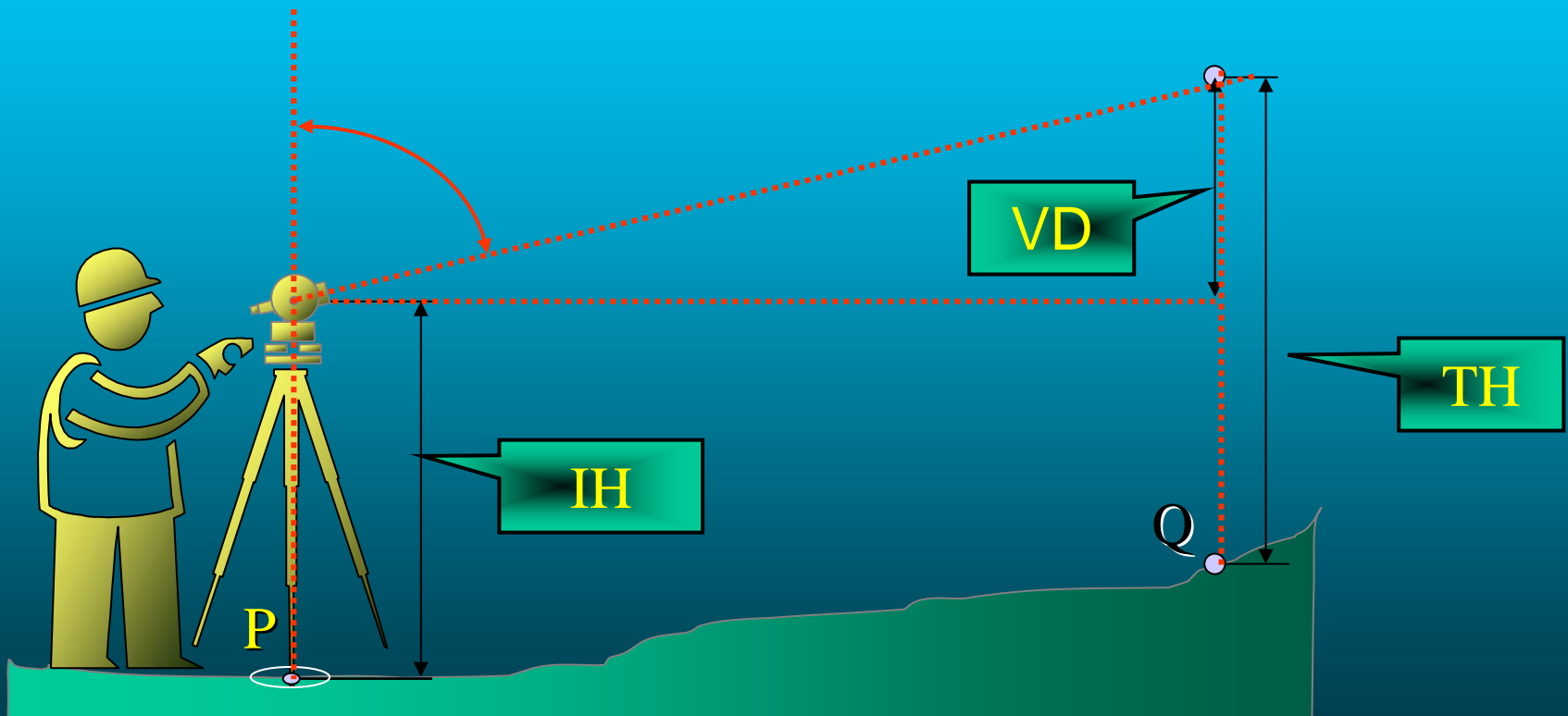
Polar to Rectangular.



Polar to Rectangular

Given that the Z coordinate of P is ZP and that the Z coordinate of Q is ZQ, then:-

$$ZQ = ZP + IH + VD - TH$$



Polar to Rectangular, (x and y)

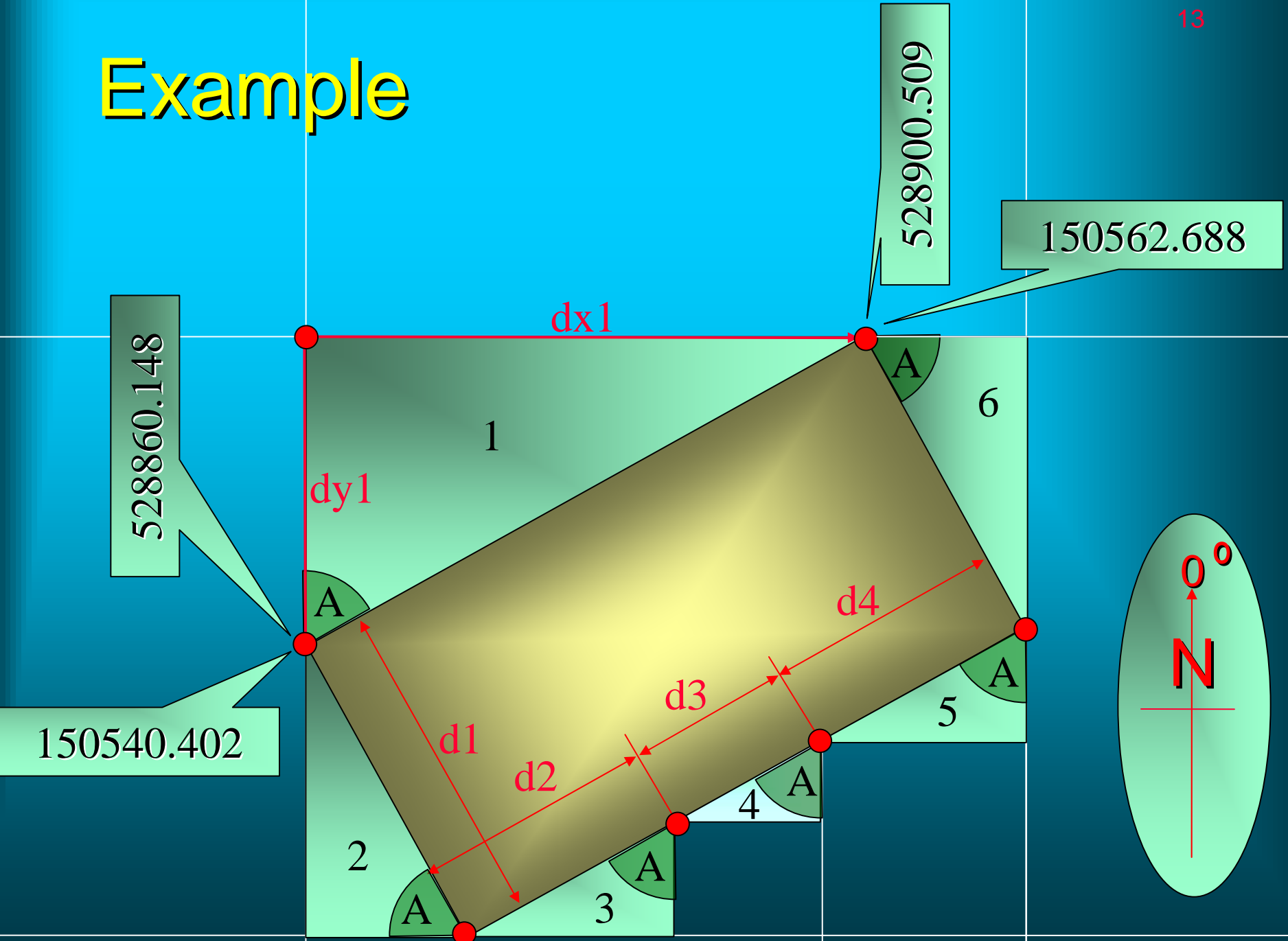
$$XQ = XP + [HD \times \sin(WCB)]$$

$$YQ = YP + [HD \times \cos(WCB)]$$

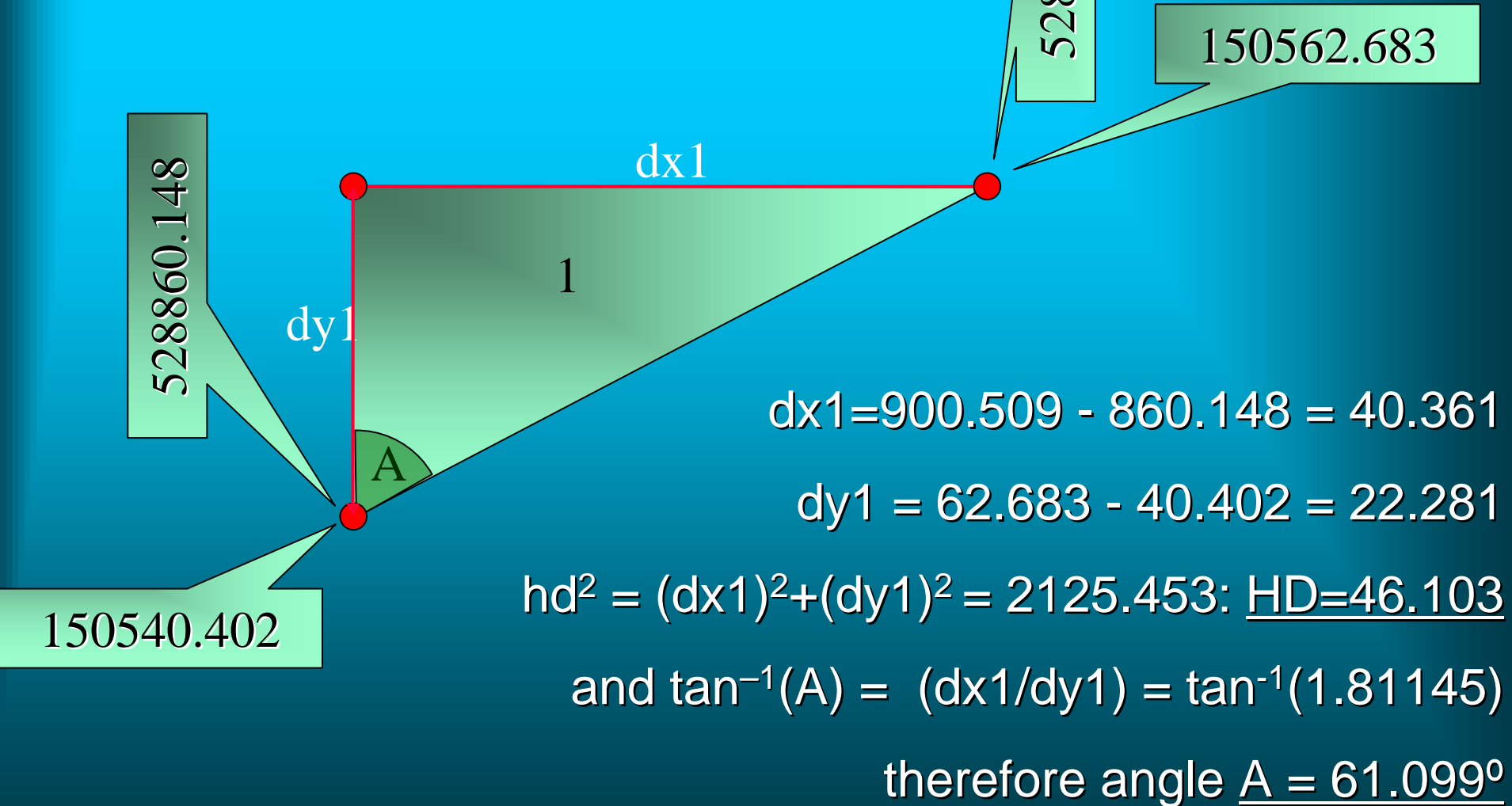
For this calculation the quadrant location is irrelevant.



Example



Triangle 1



Triangle 2

$$dx_2 = d_1 * \cos(A) = 20.250 * \cos(61.099)^\circ = \underline{9.7867}$$

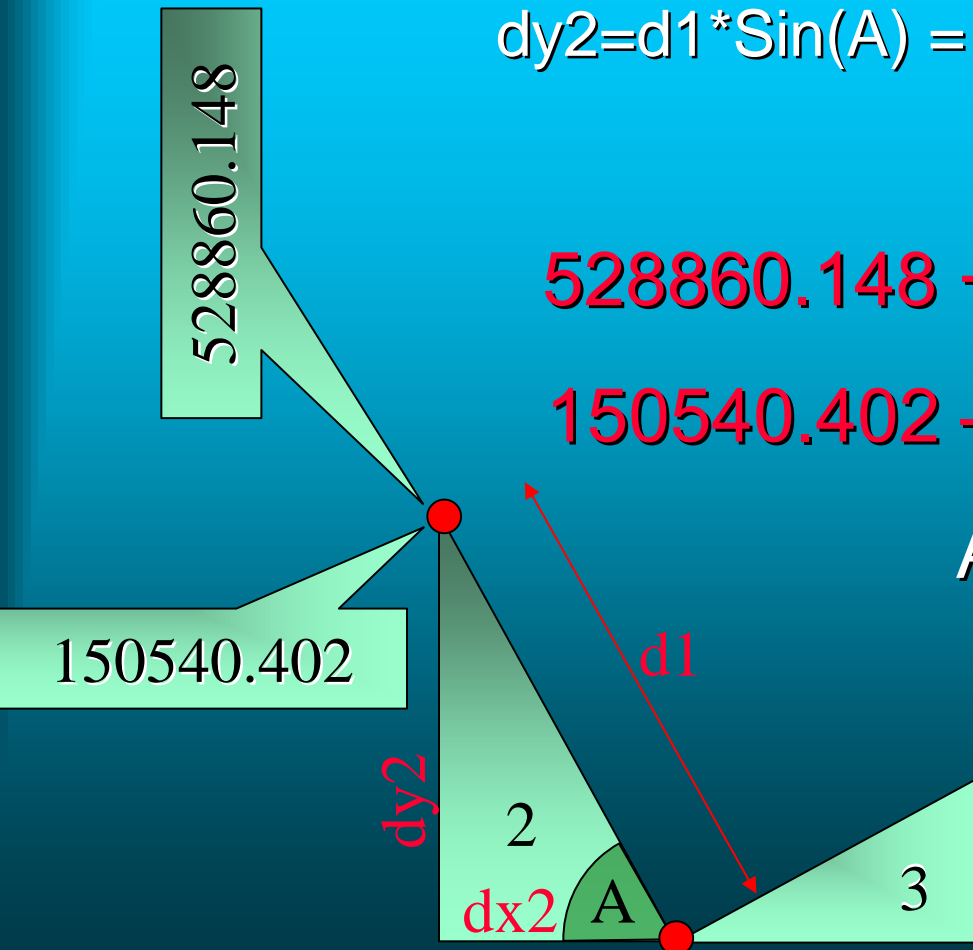
$$dy_2 = d_1 * \sin(A) = 20.250 * \sin(61.099)^\circ = \underline{17.7280}$$

So:

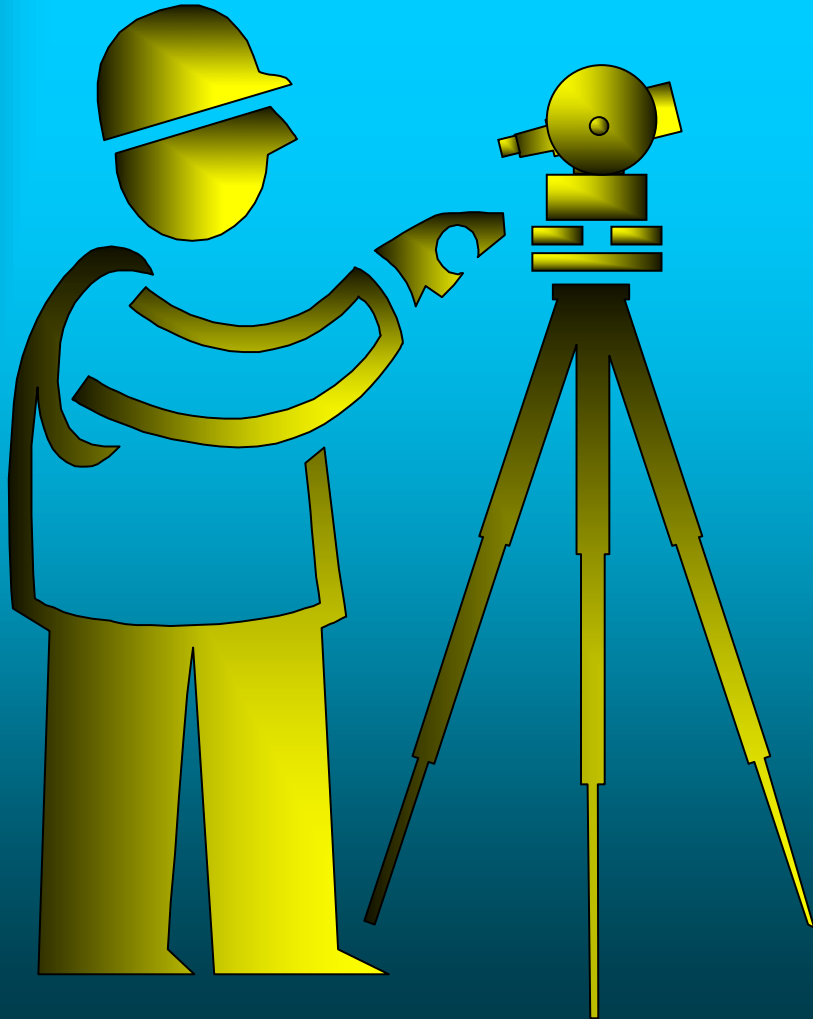
$$528860.148 + 9.7867 = \underline{528869.9347}$$

$$150540.402 - 17.7280 = \underline{150522.674}$$

And so forth



THE END



Slide 5

The grid covering the largest area is the main sports hall/swimming pool.

The bottom right grid is the consulting rooms block.

The egg shaped grid is the restaurant. It is aligned with the main grid but dimensioned from the consulting grid.

Slide 8

The QB is the angle obtained by taking the tangent of the difference in X coordinates divided by the difference in Y coordinates between two known points. Its value lies between zero and 90 degrees.

The WCB, or Azimuth, is the direction of a line expressed as a value between zero and 360 degrees, and measured clockwise.

The SD is the slope distance between two points, it can have any magnitude.

The HD is the horizontal distance between two points, it can have any magnitude.

Slide10

If you do not have the horizontal distances but only slope distances, it is necessary to calculate the HD's before the X and Y coordinates can be computed.

It is expedient to calculate the VD's at the same time so that levels, (Z coordinates), can also be computed.

If the SD's are measured by tape it will be necessary to correct for temperature, tension, standard, and sag, before calculating the HD's and VD's

Slide 11

If the VA is greater than 90 degrees but less than 270 degrees, then VD is negative.

Slide12

Given that XP = 500.000, and YP = 1200.000, and P to Q= 35.123

$$XQ = 500 + (35.123 * 0.7071) = 524.836$$

$$YQ = 1200 + (35.123 * 0.7071) = 1224.836$$

$$XR = 500 + [35.123 * (-0.7071)] = 475.164$$

$$YR = 1200 + [35.123 * (-0.7071)] = 1175.164$$