TikZ Coordinate Tutorial (Legacy Version)

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Compatible with TikZ 2.x

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1 Coordinate Systems

TikZ supports two main ways to define a point:

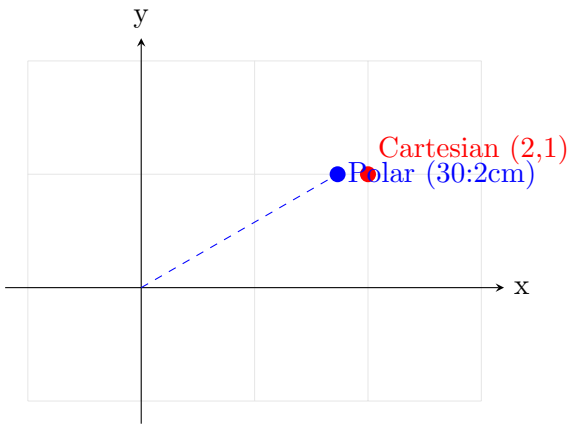
- **Cartesian:** (x, y) — e.g., `(2,1)`
- **Polar:** (angle:distance) — e.g., `(30:2cm)`

```
\begin{tikzpicture}[scale=1.5]
    % Draw a background grid
    \draw[gray!20, very thin] (-1,-1) grid (3,2);

    % Draw Axes using standard arrows
    % Syntax: [->] is a standard arrow. [>=stealth] sets
       the tip style.
    \draw[->, >=stealth] (-1.2,0) -- (3.2,0) node[right]
       {x};
    \draw[->, >=stealth] (0,-1.2) -- (0,2.2) node[above]
       {y};

    % Cartesian Point
    \fill[red] (2,1) circle (2pt);
    \node[red, anchor=south west] at (2,1) {Cartesian
       (2,1)};

    % Polar Point (30 degrees, 2cm away)
    \draw[blue, dashed] (0,0) -- (30:2);
    \fill[blue] (30:2) circle (2pt);
    \node[blue, anchor=west] at (30:2) {Polar (30:2cm)};
\end{tikzpicture}
```


y
x
Cartesian (2,1)
Polar (30:2cm)

2 Relative Coordinates: ++ vs +

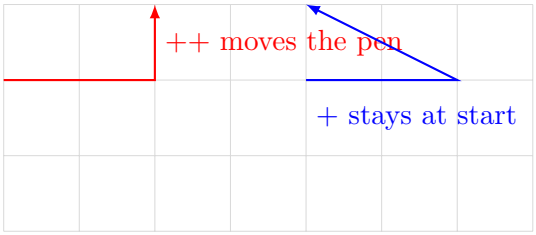
This is the most important concept for drawing paths.

- **++ (Cumulative):** Moves the "pen" to the new location.
- **+ (Non-cumulative):** Draws to the point but returns the "pen" to the previous location.

```
\begin{tikzpicture}[scale=1]
    \draw[help lines, gray!30] (0,0) grid (7,3);

    % Example of ++
    % Starts at (0,2), moves 2 right, then moves 1 up
       FROM THERE.
    \draw[thick, red, ->, >=latex] (0,2) -- ++(2,0) --
       ++(0,1);
    \node[red, right] at (2,2.5) {++ moves the pen};

    % Example of +
    % Starts at (4,2), draws to (4+2, 2), then draws to
       (4, 2+1).
    \draw[thick, blue, ->, >=latex] (4,2) -- +(2,0) --
       +(0,1);
    \node[blue, right] at (4,1.5) {+ stays at start};
\end{tikzpicture}
```



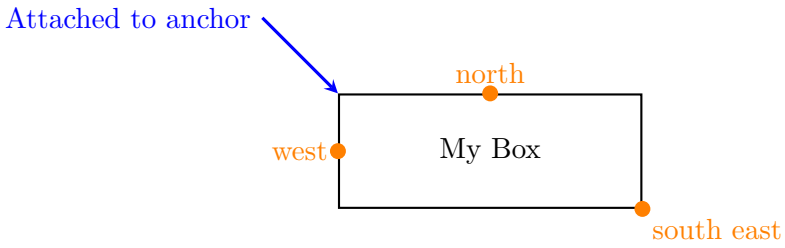
3 Node Anchors

Nodes have "sticky" points called anchors. You can use these to connect lines precisely.

```
\begin{tikzpicture}
    % Define a node
    \node[draw, minimum width=4cm, minimum height=1.5cm,
        thick] (Box) at (0,0) {My Box};

    % Draw points at specific anchors
    \fill[orange] (Box.north) circle (3pt) node[above] {
        north};
    \fill[orange] (Box.south east) circle (3pt) node[
        below right] {south east};
    \fill[orange] (Box.west) circle (3pt) node[left] {
        west};

    % Connect a line to an anchor using old arrow syntax
    % In old TikZ, arrow names are lowercase: stealth,
        latex, to
    \draw[<-, >=stealth, blue, very thick] (Box.north
        west) -- ++(-1,1) node[left] {Attached to anchor
        };
\end{tikzpicture}
```



4 Common Old-Style Arrows

Here are the arrow types available in your version:

```
\begin{tikzpicture}
    \draw[->, >=stealth] (0,3) -- (3,3) node[right] {
        stealth};
    \draw[->, >=latex]   (0,2) -- (3,2) node[right] {
        latex};
    \draw[->, >=to]      (0,1) -- (3,1) node[right] {to (
        default)};
    \draw[<->, >=o]      (0,0) -- (3,0) node[right] {o (
        circle)};
\end{tikzpicture}
```