Find angle in degrees from one point to another in 2D space?

Given Point A and Point B in 2D space, how can I find the angle Point B is from Point A? 0° can be any direction; it doesn't matter. For example, Point A is at `(0, 10)` and Point B is at `(10, 20)`. The angle is 45° in this example (assuming 0° is up).

(geometry)

asked Mar 11 '14 at 4:45

Keavon
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1 Answer

From what I understood about your question, you want to find the angle between two points given their coordinates. In that case, first find the slope of the line using the slope formula:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

where (x_1, y_1) and (x_2, y_2) are coordinates on the line. Next, use this formula:

$$\tan(\theta) = m$$

where θ is the angle. Therefore, the angle θ equals:

$$\theta = \tan^{-1}(m)$$

Let's use the points $(0, 10)$ and $(10, 20)$ as an example (you mentioned it in your question).
The slope is:

$$m = \frac{10 - 20}{0 - 10}$$

$$m = \frac{-10}{-10}$$

$$m = 1$$

Now we will find θ.

$$\tan(\theta) = 1$$

$$\theta = \tan^{-1}(1)$$

$$\theta = 45^\circ$$

Note: The $\tan(\theta) = m$ formula only gives the angle facing the positive x-axis (i.e. facing the "right"). So for a negative slope, you should get an angle that is greater than 90°.

edited Mar 14 '14 at 3:20

answered Mar 11 '14 at 5:09

JChau

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In your example using my two points you used the Xs over the Ys. Is that intentional? Why does it differ from the equation above? – Keavon Mar 14 '14 at 2:08

@Keavon Nice observation, it is supposed to be the Ys over the Xs, sorry – JChau Mar 14 '14 at 3:19