

Algebra,

Been there – Done that

Equation of a Line

Mathematical Systems

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Algebra, Been there –Done that is a newsletter that links algebra to previously learned concepts and skills or outside experiences

Slope has been defined as the rate of change and we have mathematically written it as:

$$m = \frac{\text{rise}}{\text{run}} \qquad m = \frac{y_2 - y_1}{x_2 - x_1}$$

If we were to rewrite the formula leaving out the subscript 2 , we would have the

$$m = \frac{y - y_1}{x - x_1}$$

Now, if I played with that equation and multiplied both sides of the equation by $x - x_1$, I would have:

Slope is defined as the *rate of change*

$$m(x - x_1) = y - y_1$$

$$m = \frac{y - y_1}{x - x_1}$$

Using the symmetric property, we have

$$y - y_1 = m(x - x_1)$$

That is an equation of a line with slope m passing through the point (x_1, y_1) . It's called the Point-Slope form of a line. The reason for that is simple, you are given a point and a slope in the equation.

Point-Slope
Equation of a Line

What's nice about the Point-Slope form of a line is if you are asked to find an equation of a line, then all you need to know is a point and the slope, then plug that information into the formula

$$y - y_1 = m(x - x_1)$$

Point-Slope Equation of a Line: $y - y_1 = m(x - x_1)$.

Now, anytime someone asks you to find an equation of a line, you can use that formula.

Sometimes you are asked to find an equation of a line and the slope is not explicitly given to you. If that occurs, you must first find the slope, then plug the numbers into the equation. Remember, parallel lines have the same slope – perpendicular lines have negative reciprocal slopes.

What's nice about the Point-Slope Form of an Equation of a Line is that it is derived from the slope formula. That means if you happen to forget it, all you need do is write the equation for slope, then multiply both sides of the equation by the denominator.

While there are other equations of a line, generally, anytime I'm asked to find an equation of a line, I would use the Point-Slope Equation. The other equations; such as Slope-Intercept and General Form of an Equation of a Line are best used to graph lines.

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The other equations for lines follow directly from the Point-Slope Equation of a Line.