# Slope and Line Information

**Definition of slope of a line:**   The slope of a line is a number that describes the 'steepness' of a line; or is the ratio of the vertical change (change in $y$) to horizontal change (change in $x$). It is often described as 'rise' over 'run'.

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Formula for Slope given two points $(x_1, x_2)$ and $(y_1, y_2)$:

$$m = \frac{\Delta y}{\Delta x} = \frac{\text{change in } y}{\text{change in } x} = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1} \text{ or } \frac{y_1 - y_2}{x_1 - x_2}$$

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Every line will have one of these types of slopes.
(1)    A line with a positive slope rises from the left to the right.

(2)    A line with a negative slope falls from the left to the right.

(3)    A line with a slope of zero is a horizontal line.

(4)    A line with an undefined slope is a vertical line.
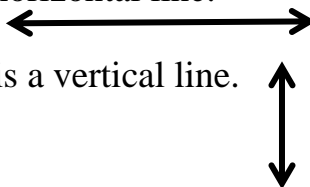
**Linear Equations or Equations of Lines:**
   **Let $m$ represent the slope of a line and the line includes the point $(x_1, y_1)$.**

(1)    **Point-Slope Form: $y - y_1 = m(x - x_1)$**

(2)    **Slope-Intercept Form: $y = mx + b$, where the $y$-intercept is $(0, b)$**

(3)    **General Form: $Ax + By + C = 0$, where $A$, $B$, and $C$ are integers and $A > 0$**

(4)    **Standard Form: $Ax + By = C$, where $A$, $B$, and $C$ are integers and $A > 0$**

(5)    **Vertical Line through point $x = x_1$**

(6)    **Horizontal Line through point $y = y_1$**