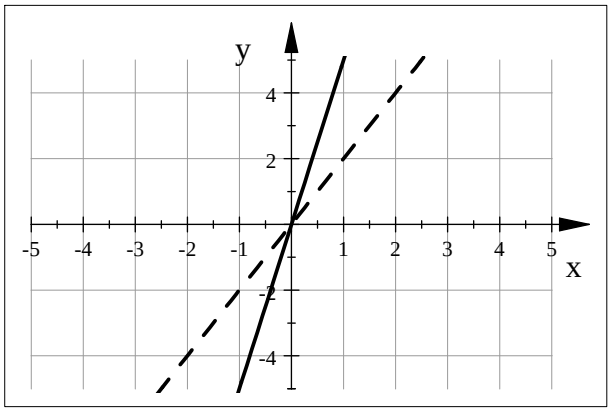
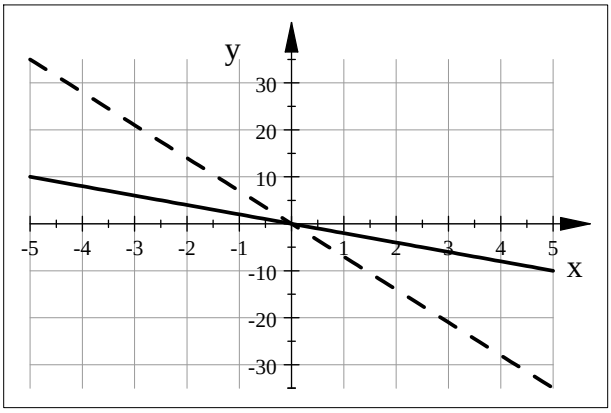
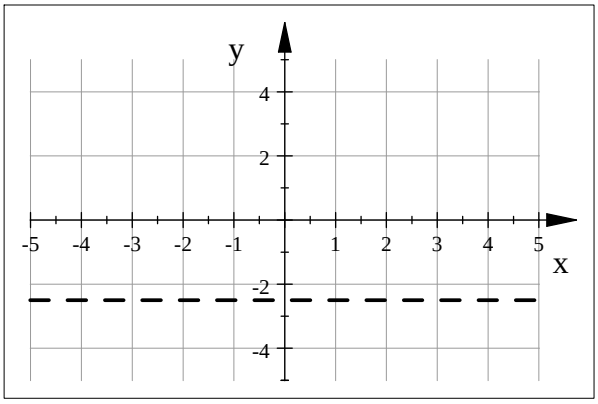
Slope and Graphs of a Line Through Two Points Section 6.4

In this section we are discussing the SLOPE of a line. But before I give you the definition and formulas... let's explore exactly what the slope is by looking at the graphs of lines below.







Definition: The slope of a line is a number that describes the "steepness" of the line.

a) Positive Slope

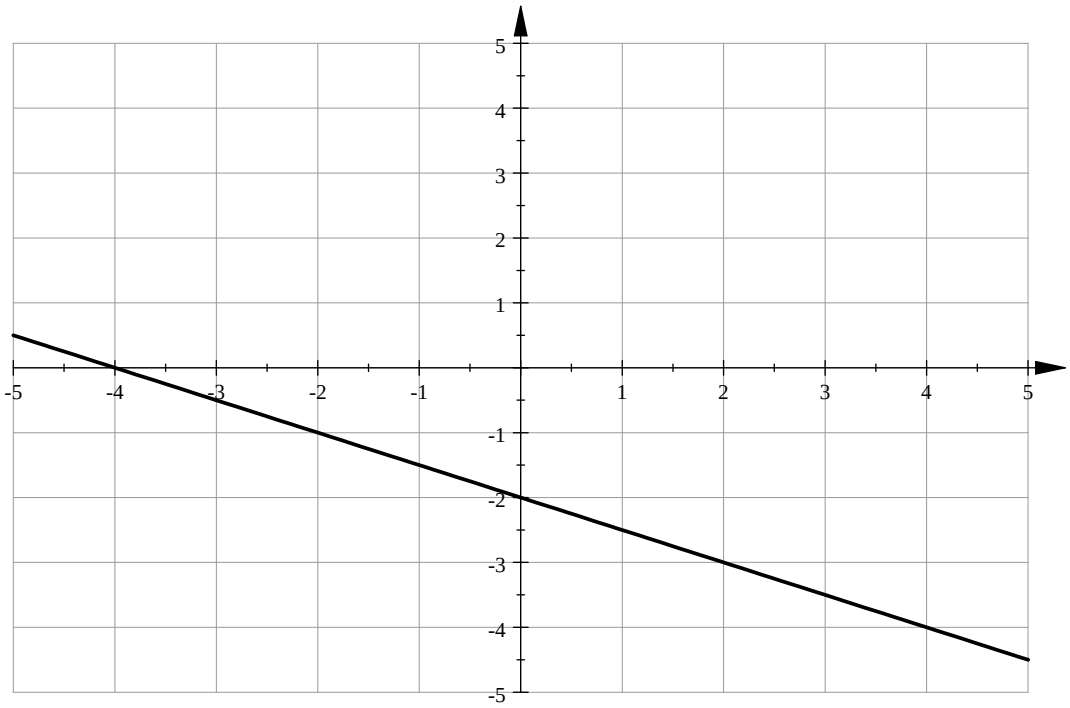
b) Negative Slope

c) No Slope

d) undefined slope

- Is the slope of the line below positive or negative? _____

Lets look at the rate the line is falling...



$$\text{SLOPE} = m = \frac{\textit{change in vertical direction}}{\textit{change in horizontal direction}} = \frac{\textit{change in } y}{\textit{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$

For the line above find the slope using the formula.

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

Task 1

Find the slope of the line passing through the following points and determine if the line rises, falls, horizontal, or vertical

a) $(5, 3)$ and $(-3, 1)$

b) $(-2,-1)$ and $(8,-4)$

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c) $(\frac{5}{4},-\frac{1}{4})$ and $\left(\frac{7}{8},\frac{-3}{4}\right)$

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d) $\left(\frac{3}{4},\frac{17}{53}\right)$ and $\left(\frac{112}{349},\frac{17}{53}\right)$

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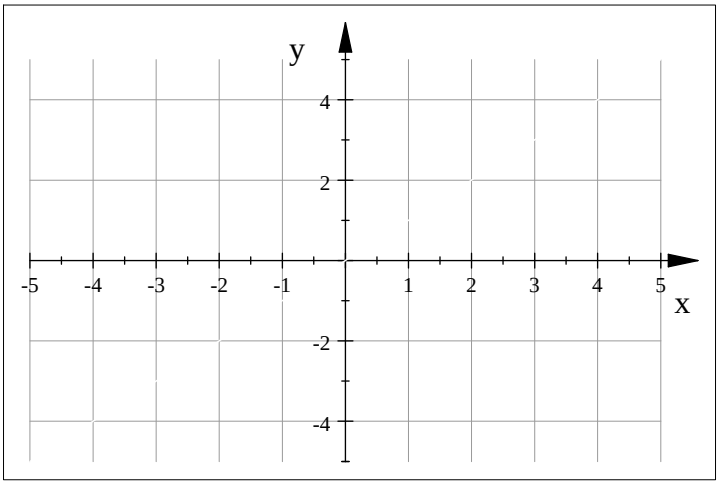
e) $\left(\frac{12}{51},4\right)$ and $\left(\frac{12}{51},\frac{13}{89}\right)$

Task 2

If you know a line contains the point $(2,3)$ and you also know $m = \frac{-1}{3}$.

Can we find other points on the line???



a) Find TWO more points for the line that contains the point $(1,-5)$ with $m = \frac{-1}{4}$

b) Find TWO more points for the line that contains the point $(5,6)$ with $m = 3$

c) Find TWO more points for the line that contains the point $\left(\frac{1}{2}, \frac{3}{4}\right)$ with no slope.

d) Find TWO more points for the line that contains the point $(-4,-8)$ with a slope that is undefined.

Task 3

A linear equation is said to be in **SLOPE INTERCEPT FORM** if it has the form of $y = mx + b$

If your equation has this form it is fairly easy to identify TWO very important parts of a line:

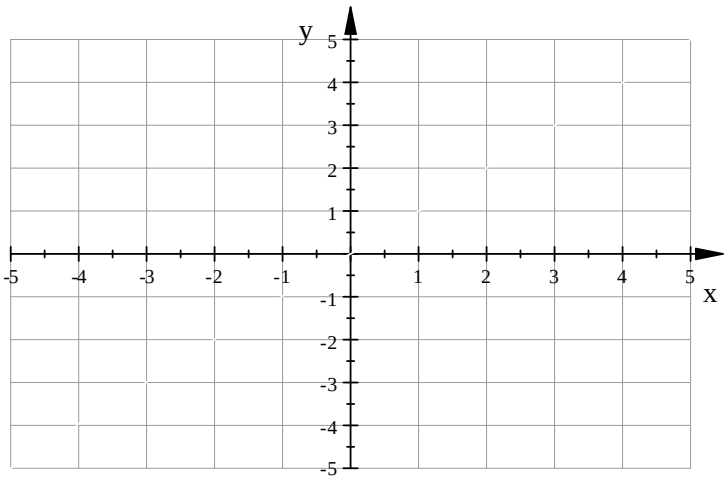
SLOPE $= m$ the coefficient of the x variable

Y-intercept. $= b$

Example 1

Sketch the graph of the linear equation $2x - y - 3 = 0$

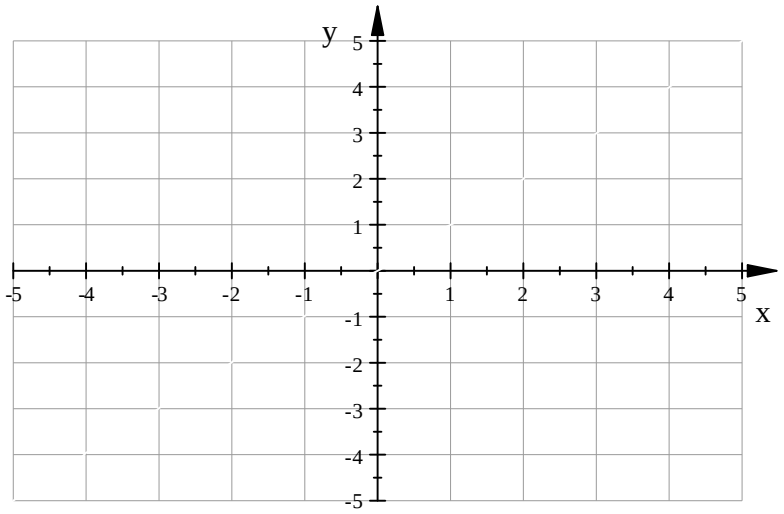
Method 1: **Using a table to find points on the line**



Method 2: **Using a point and the slope on the line**.

To use this method, we first need to rewrite the equation in slope-intercept form.

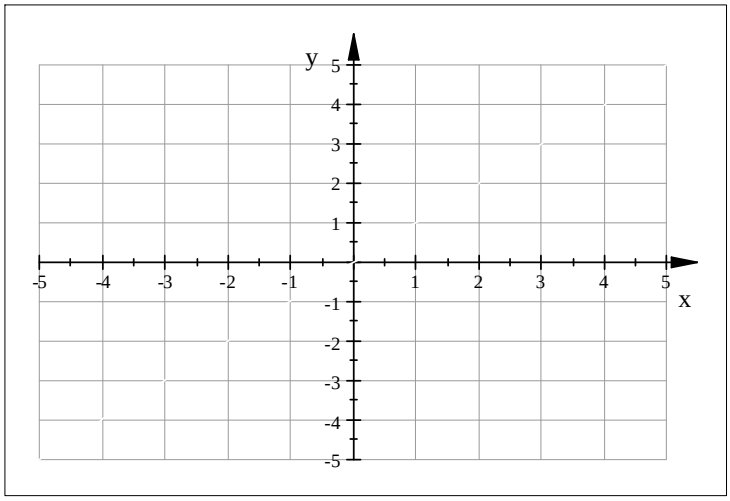
$2x - y - 3 = 0$

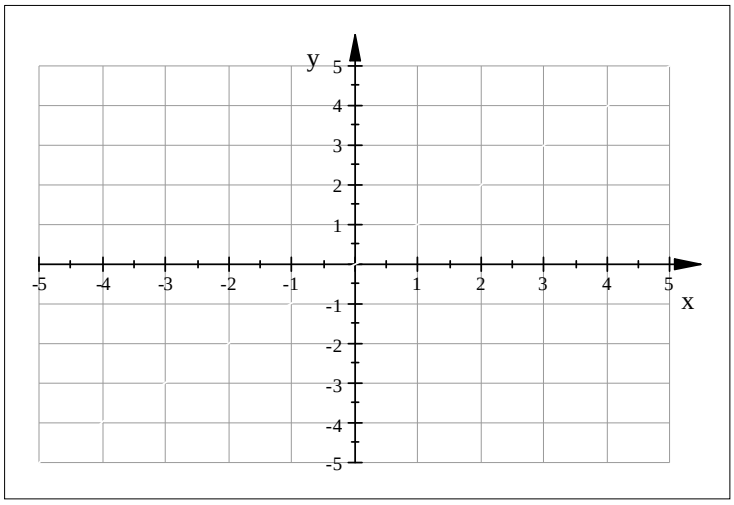


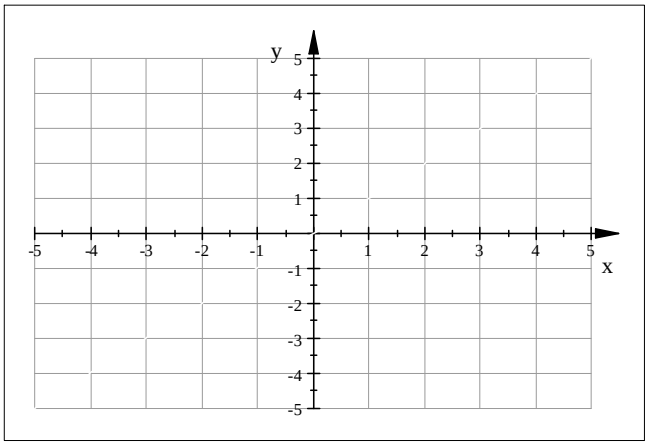
Example #2

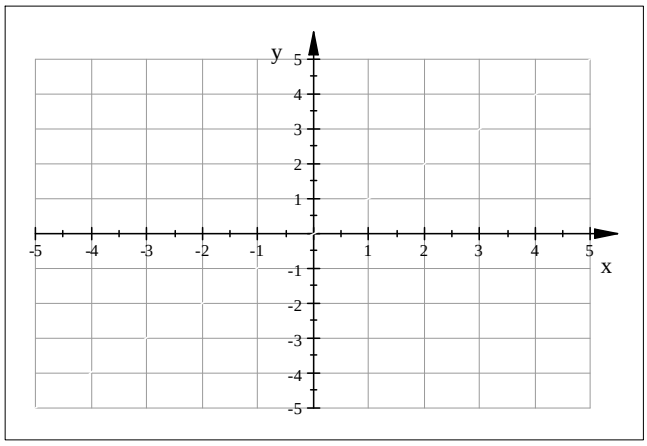
Using the slope and intercept, graph the following lines.

- $x + 3y - 12 = 0$
- $3x - 4y + 2 = 0$
- $\frac{3}{4}x - y = 5$
- $2y - 6 = 0$





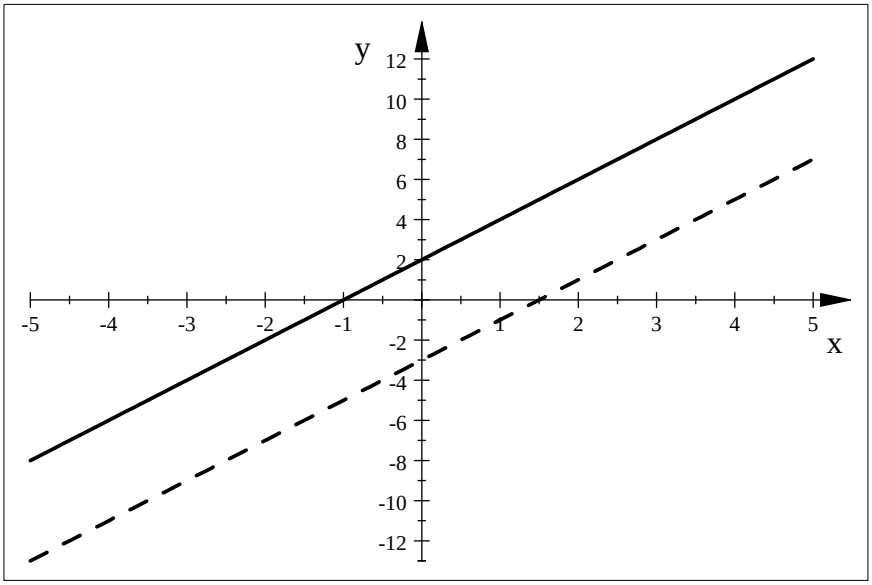




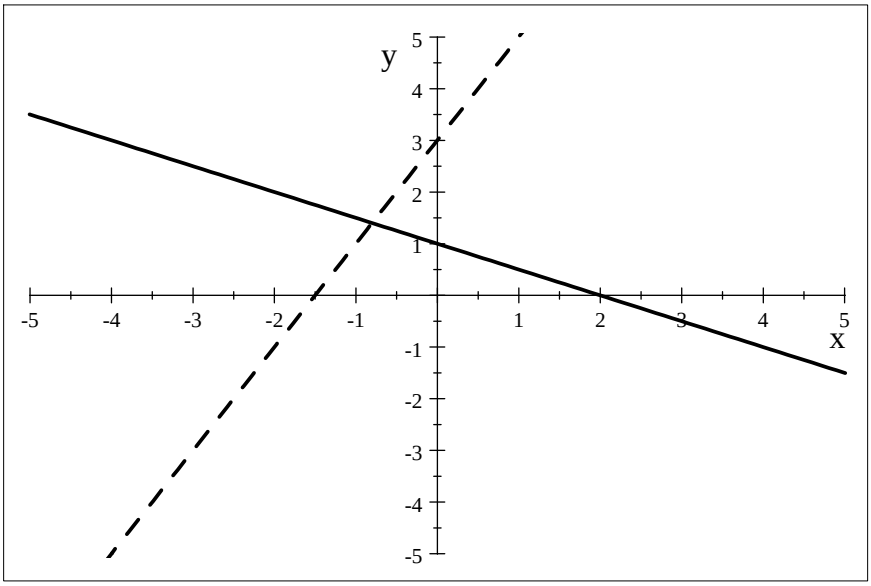
Definitions:

Parallel lines are lines that never intersect

PARALLEL LINES



PERPENDICULAR LINES



Example 2

Determine if L_1 and L_2 are perpedicular, parallel, or neither and state the reason why.

- $y = 2x - 3$ and $y = 2x + 5$
- $y = \frac{-2}{5}x + 3$ and $y = \frac{-5}{2}x + 5$
- $2x + y = 4$ and $2y = x + 4$
- $y + 3x + 6 = 0$ and $y = \frac{1}{3}x + 17$