

# Lines in a Plane

- Slope of a Line
- Point-Slope Form Equation of a Line
- Slope-Intercept Form Equation of a Line
- Graphing Linear Equations in Two Variables
- Parallel and Perpendicular Lines
- Applying Linear Equations in Two Variables

~Linear equations are used extensively in applications involving business and behavioral science.

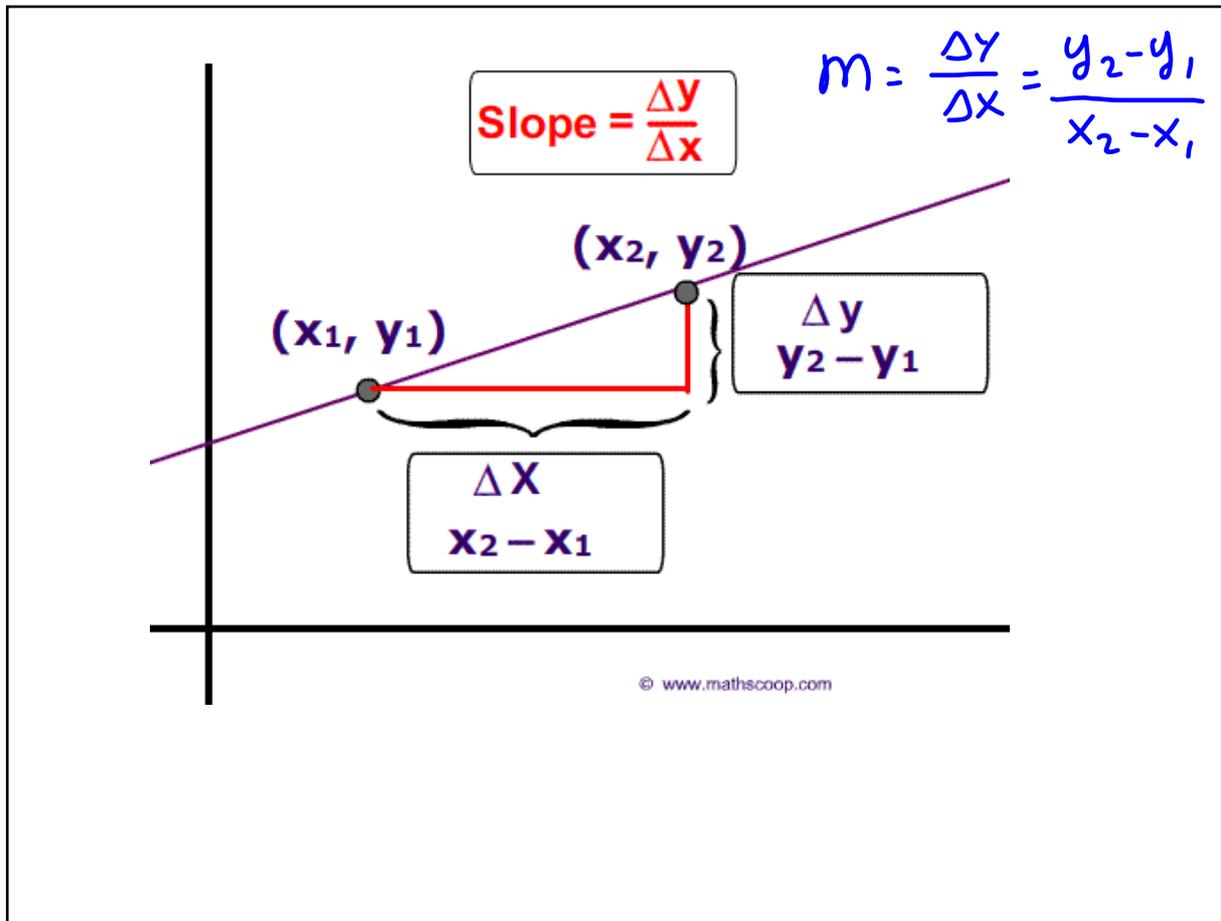
## Sections P4:

HW: Pg 36 #'s 4, 5, 7, 9, 12, 18, 25, 29, 42, 43

Aug 20-7:12 AM

$$\begin{aligned}
 24) \quad & \underline{15z - 9} - \underline{8z - 4} = 5z - 2 \\
 & \quad \quad \quad 7z - 13 = 5z - 2 \\
 & \quad \quad \quad \underline{-5z \quad \quad -5z} \\
 & \quad \quad \quad 2z - 13 = -2 \\
 & \quad \quad \quad 2z = 11 \\
 & \quad \quad \quad z = \frac{11}{2}
 \end{aligned}$$

Aug 26-11:18 AM



Aug 20-8:56 AM

### Finding the Slope of a Line

Find the slope of a line through two points.

$$\begin{array}{cc} (-1, 4) & \text{and} & (3, 5) \\ x_1, y_1 & & x_2, y_2 \end{array}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 4}{3 - (-1)} = \boxed{\frac{1}{4}}$$

Aug 20-8:43 AM

# Point-Slope Form

any point

slope

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

known point

Aug 20-8:58 AM

## Using Point Slope Form

Use the point slope form to find an equation of the line that passes through the point  $(-3, 4)$  and has slope 2.

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

$$y - 4 = 2(x - -3)$$

$$y - 4 = 2(x + 3)$$

$$y - 4 = 2x + 6$$

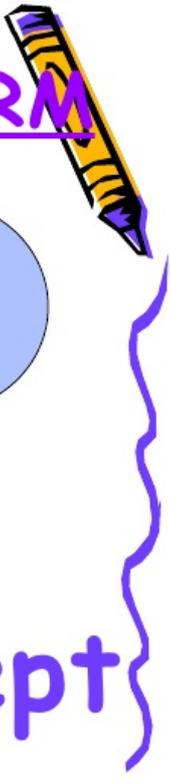
$$y = 2x + 10$$

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SLOPE-INTERCEPT FORM

**y = mx + b**

SLOPE
y-  
Intercept




Aug 20-9:00 AM

### Using Point Slope Form

Using the slope-intercept form, write an equation of the line with slope 3 that passes through the point (-1, 6).

m

 $x_1, y_1$ 

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

$$y - 6 = 3(x - (-1))$$

$$y - 6 = 3(x + 1)$$

$$y - 6 = 3x + 3$$

$$y = 3x + 9$$

Aug 20-9:03 AM

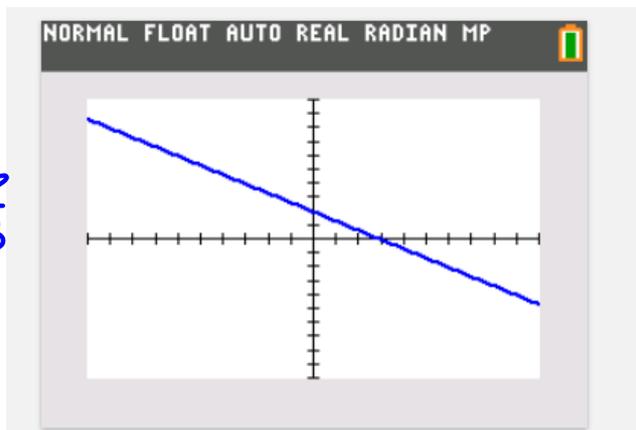
## Using a Graphing Calculator

Using your calculator, draw the graph of  $2x + 3y = 6$ 

$$2x + 3y = 6$$

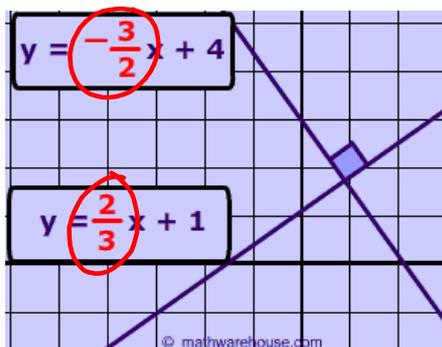
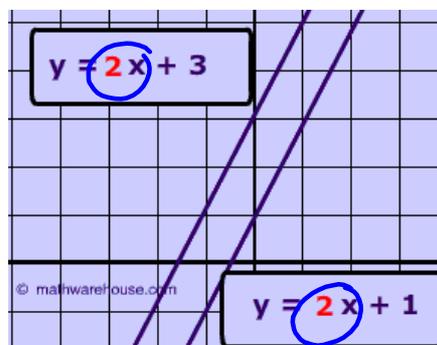
$$\frac{3y}{3} = \frac{-2x + 6}{3}$$

$$y = -\frac{2}{3}x + 2$$



Aug 20-9:03 AM

Parallel Lines have the SAME slope



$$\left(-\frac{3}{2}\right)\left(\frac{2}{3}\right) = -1$$

Perpendicular Lines have  
OPPOSITE RECIPROCAL slopes

Aug 20-9:08 AM

### Finding an Equation of a Parallel Line

Find an equation of the line through  $(1, -2)$  that is parallel to the line with equation  $3x - 2y = 1$ .

$x, y,$

$$3x - 2y = 1$$

$$\frac{-2y}{-2} = \frac{-3x + 1}{-2}$$

$$y = \boxed{\frac{3}{2}}x - \frac{1}{2}$$

$m$

$$y = mx + b$$

$$-2 = \frac{3}{2}(1) + b$$

$$-2 = \frac{3}{2} + b$$

$$\frac{-3}{2} - \frac{3}{2}$$

$$\frac{-7}{2} = b$$

$$\boxed{y = \frac{3}{2}x - \frac{7}{2}}$$

Aug 20-9:16 AM

### Finding an Equation of a Perpendicular Line

Find an equation of the line through  $(2, -3)$  that is perpendicular to the line with equation  $4x + y = 3$ .

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## Various Forms of an Equation of a Line.

Slope-Intercept Form

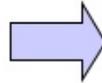


$$y = mx + b$$

$m$  = slope of the line

$b$  =  $y$  - intercept

Standard Form

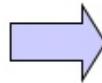


$$Ax + By = C$$

$A$ ,  $B$ , and  $C$  are integers

$A > 0$ ,  $A$  must be positive

Point-Slope Form



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

$m$  = slope of the line

$(x_1, y_1)$  is any point

Aug 20-9:05 AM

9)  $(-3, -5)$      $(4, y)$      $m = 3$   
 $x_1$     $y_1$      $x_2$     $y_2$

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

$$\frac{3}{1} = \frac{y + 5}{7}$$

$$3 = \frac{y - (-5)}{4 - (-3)}$$

$$3(7) = y + 5$$

$$21 = y + 5$$

$$16 = y$$

Aug 26-11:34 AM

$$15) \quad \begin{matrix} (-7, -2) \\ x \quad y \end{matrix} \quad \boxed{\begin{matrix} (1, 6) \\ x \quad y \end{matrix}} \quad y = \underline{m}x + \underline{b}$$

$$m = 1$$

$$6 = 1(1) + b$$

$$6 = 1 + b$$

$$5 = b$$

$$y = x + 5$$

$$Ax + By + C = 0$$

$$-1(-x + y - 5 = 0)$$

$$x - y + 5 = 0$$

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$$42) \quad \begin{matrix} (-2, 3) \\ x \quad y \end{matrix} \quad y = \boxed{-2}x + 4 \quad //$$

$$y = -2x + \underline{b}$$

$$3 = -2(-2) + b$$

$$3 = 4 + b$$

$$-1 = b$$

$$\boxed{y = -2x - 1}$$

$$y = \frac{1}{2}x + b$$

$$3 = \frac{1}{2}(-2) + b$$

$$3 = -1 + b \quad \perp$$

$$4 = b$$

$$\boxed{y = \frac{1}{2}x + 4}$$

Aug 26-2:27 PM

$$\checkmark y - y_1 = m(x - x_1) \quad Ax + By + C = 0$$

$$m = \frac{-2 - (-5)}{-4 - (-1)} = \frac{3}{-3} = -1 \quad \begin{matrix} (-1, -5) \\ x_1 \quad y_1 \end{matrix}$$

$$y - (-5) = -1(x - (-1))$$

$$y + 5 = -1(x + 1)$$

$$y + 5 = -x - 1$$

$$x + y + 6 = 0$$

Aug 30-7:21 AM