Review: Linear Relations

① Graphs: Straight Lines

⇒ strategy: $y = \ldots$

Table of Values | x | y |

② Slope:

⇒ $m = \frac{y_2 - y_1}{x_2 - x_1}$

$\frac{\Delta y}{\Delta x} = \frac{\text{Rise}}{\text{Run}}$

Zero: Horizontal Line

Undefined: Vertical Line

Positive: /

Negative: \

*Parallel Lines have equal slope

*Perpendicular Lines have negative reciprocal slopes

Equations of Lines

$y = mx + b$ ⇐ slope y-Intercept form

slope, y-Int. ex. $3x + 2y - 8 = 0$

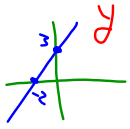
$\frac{2y}{2} = -\frac{3}{2}x + \frac{8}{2}$

$y = -\frac{3}{2}x + 4$

Intercepts

x-Int: (Sub. $y = 0$)

y-Int: (Sub. $x = 0$)



Point-Slope Formula: $y - y_1 = m(x - x_1)$

Slope Form

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

2 Acceptable forms of equations of Lines:

General Form: $Ax + By + C = 0$

Slope y-Int.: $y = mx + b$

*Area of a triangle:

$A = \frac{1}{2}\left|(\text{Sum of Ups}) - (\text{Sum of Downs})\right|$

Distance: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint: $MP = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

Review:

// Sketch the following Lines:

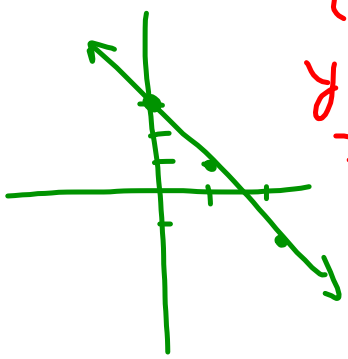
a) $y = -2x + 3$

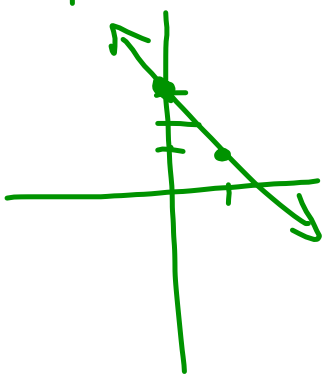
$m = -2, b = 3$

OR

x	y
0	3
1	1
2	-1

$m = \frac{-2}{1}$





b) $3y + x - 6 = 0$

x-Int.

$x - 6 = 0$

$x = 6$

$(6, 0)$

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

y-Int.

$3y - 6 = 0$

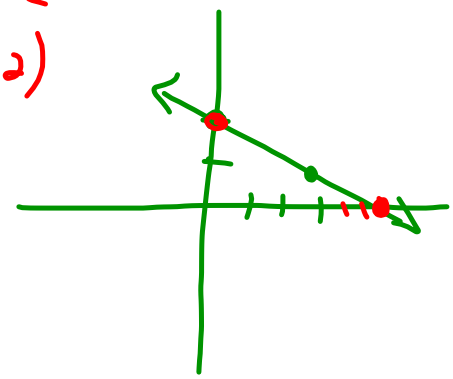
$3y = 6$

$y = 2$

$(0, 2)$

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

$m = \frac{-1}{3}$ $b = 2$



2/ Determine the slope of a line through $(-1,7)$ and $(-5,-8)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-(-8)}{-1-(-5)} = \frac{15}{4} = +\frac{15}{+4}$$

3/ Determine the x & y Intercepts:

$3x - 5y + 15 = 0$

$y = mx + b$ (b = y-Int.)

y-Int. ($x = 0$)

$-5y + 15 = 0$

$\frac{-5y}{-5} = \frac{-15}{5}$

$y = 3$

$(0,3)$

x-Int. ($y = 0$)

$3x + 15 = 0$

$\frac{3x}{3} = \frac{-15}{3}$

$x = -5$

$(-5,0)$

4/ Are these lines parallel, perpendicular or neither?

① $A(-1,3)$ $B(4,4)$

$m_{AB} = \frac{4-3}{4-(-1)} = \frac{1}{5}$

② $C(2,7)$ $D(1,12)$

$m_{CD} = \frac{5}{-1} = -\frac{5}{1}$

$AB \perp CD$

5/ Determine the equation is slope-y-Int form... $(y = mx+b)$

a) Through $(-2,7)$ with slope $\frac{3}{4}$

$y-7 = \frac{3}{4}(x+2)$ ← $y-y_1 = m(x-x_1)$

$4y-28 = 3x+6+28$

$\frac{4y}{4} = \frac{3x}{4} + \frac{34}{4}$

$y = \frac{3}{4}x + \frac{17}{2}$

OR

$y-7 = \frac{3}{4}x + \frac{6}{4}$

$y = \frac{3}{4}x + \frac{3}{2} + \frac{7}{1}$

$y = \frac{3}{4}x + \frac{3}{2} + \frac{14}{2}$

$y = \frac{3}{4}x + \frac{17}{2}$

(b) Through $(0,-7)$ and $(-4,-5)$

$m = \frac{-7-(-5)}{0-(-4)}$ $b = -7$

$m = \frac{-2}{4}$

$m = \frac{-1}{2}$

$y = \frac{-1}{2}x - 7$

c) x-Intercept of 5 and perpendicular to $3x-5y+7=0$

$(5,0)$ Point

$y-0 = -\frac{5}{3}(x-5)$

$y = -\frac{5}{3}x + \frac{25}{3}$

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

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

$m = \frac{3}{5}$

$m = -\frac{5}{3}$

6/ Determine Equation in General Form for the following Lines...

a) x-Int. of -3 and y-Int. of 4

(-3, 0) (0, 4)

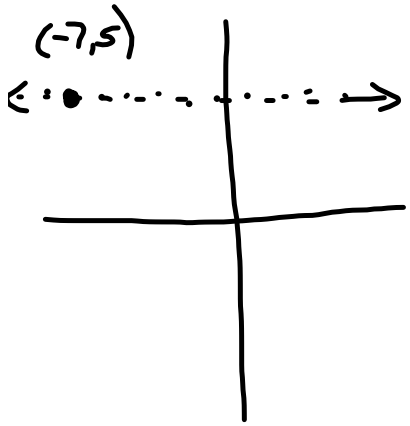
$m = \frac{4-0}{0-(-3)} = \frac{4}{3}$ (3) (3) (x)

$y - 0 = \frac{4}{3}(x+3)$

$3y = 4x + 12$

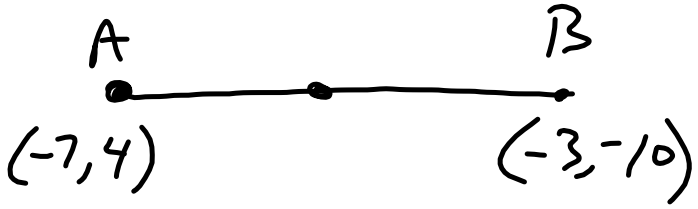
$0 = 4x - 3y + 12$

(b) Through (-7, 5) and parallel to x-axis.



Horizontal Line: $y = 5$

$y - 5 = 0$



Midpoint?

$$MP = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$MP = (-5, -3)$$

length?

$$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

$$d = \sqrt{212}$$

Extra Practice :

Pg. 383

2, 4, 6, 7, 8, 9, 11, 12, 13, 16, 18, 21, 25

Attachments

coord geom review.doc