LINES IN THE CARTESIAN PLANE

EQUATION OF A LINE

$$y = ax + b$$

a= slope
(rate of change)
$\left(\frac{\text{rise}}{\text{run}}\right)$

b = y-intercept
(initial value)

NOTES/EXAMPLES/REMINDERS

GETTING AN EQUATION, GIVEN 2 POINTS

(1) WRITE OUT "$y = ax + b$"

(2) FIND SLOPE $a = \frac{y_2 - y_1}{x_2 - x_1}$

(3) INTO $y = ax + b$, PLUG IN THE VALUE FOR "a" WITH ONE SET OF COORDINATES FOR (x, y) AND SOLVE FOR "b"

(4) WRITE THE FINAL RULE IN "$y = ax + b$" FORM

NOTES/EXAMPLES/REMINDERS

GETTING AN EQUATION, GIVEN 2 POINTS… *example*

Find the equation of the line passing through $(\underset{x_1}{-2}, \underset{y_1}{-6.5})$ *and* $(\underset{x_2}{3}, \underset{y_2}{16})$

$$\boldsymbol{a} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{16 - -6.5}{3 - -2} = \frac{22.5}{5} = \mathbf{4.5}$$

$$\boldsymbol{y} = \boldsymbol{ax + b}$$

$$16 = 4.5(3) + b$$

$$16 = 13.5 + b$$

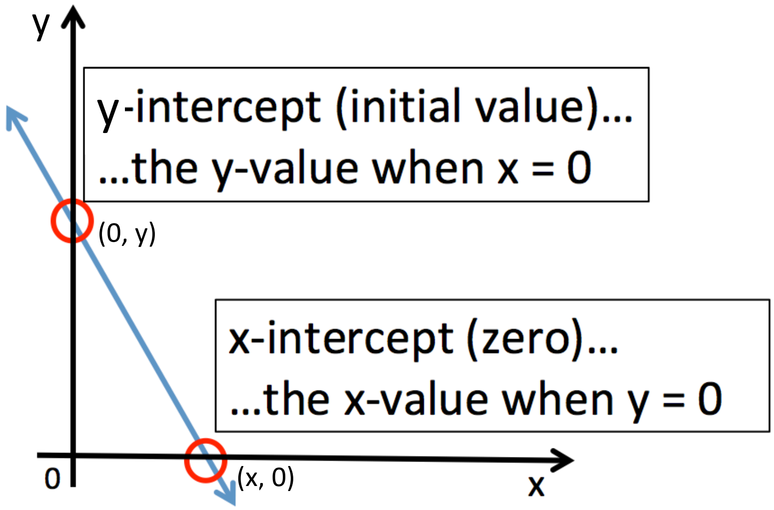
-13.5 -13.5

$$2.5 = b$$

$$\boldsymbol{y = 4.5x + 2.5}$$

NOTES/EXAMPLES/REMINDERS

X AND Y INTERCEPTS

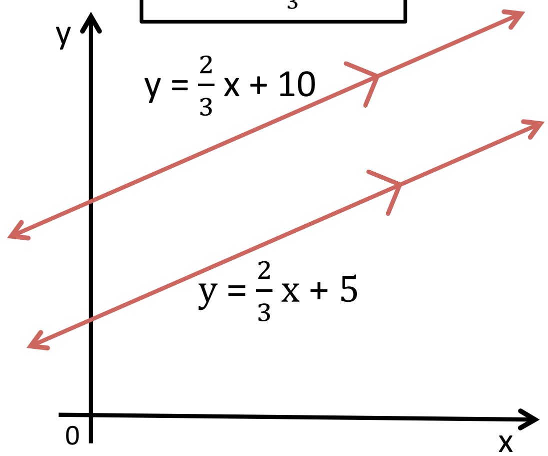


NOTES/EXAMPLES/REMINDERS

PARALLEL LINES

FOR BOTH LINES:

$a = \frac{2}{3}$



PARALLEL LINES

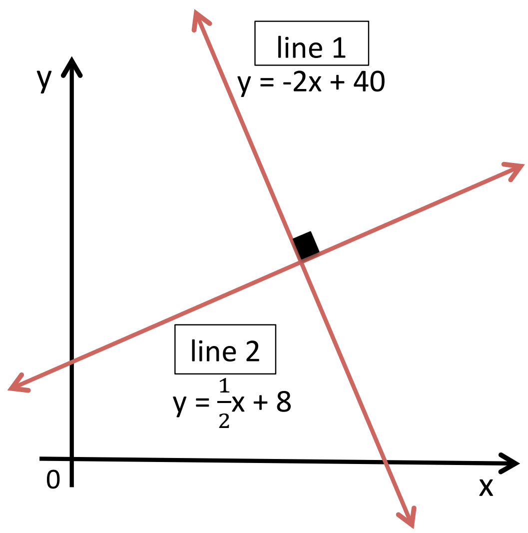
SAME SLOPE,
DIFFERENT
Y-INTERCEPT

Parallel lines that also have the same y-intercept are called coincident lines (drawn the same)

Parallel lines: *no solution (they never cross)*
Coincident lines: *infinite solutions (they touch everywhere)*

NOTES/EXAMPLES/REMINDERS

PERPENDICULAR LINES



PERPENDICULAR LINES

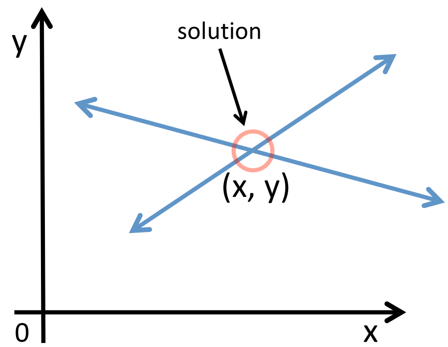
SLOPES ARE NEGATIVE RECIPROCALS

slope line 1		slope line 2
$\frac{-2}{1}$	$\rightarrow$	$\frac{1}{2}$

NOTES/EXAMPLES/REMINDERS

SOLVING SYSTEMS OF EQUATIONS

1. PUT BOTH EQUATIONS IN $y = ax + b$ FORM
2. MAKE EQUATIONS EQUAL EACH OTHER (no "y"s)
3. SOLVE FOR "x"
4. PLUG "x" INTO EITHER EQUATION AND SOLVE FOR "y"



Remember, the solution is the point where the two lines cross (x, y). In a word problem, there is an answer for "x" and "y"!

All systems of equations have one solution, *except parallel lines (no solution) and coincident lines (infinite solutions)*

NOTES/EXAMPLES/REMINDERS