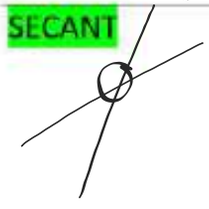
Types of Lines	Example	Notes	# of solutions
COINCIDENT 	$y=ax+b$ $y=ax+b$	→ have the same slope and y-intercept	∞ ly many infinitely
PARALLEL 	$y=ax+b$ $y=ax+c$	→ have the slope only	0
PERPENDICULAR 	$y=2x+3$ $y=\frac{-1}{2}x-4$	→ have negative Reciprocal Slopes 1: switch signs 2: flip fraction	1
SECANT 	$y=2x+5$ $y=-3x-6$	→ do not have same slope	1

Ex: Find the negative reciprocal

1) 2/5 → $-5/2$
2) -6/7 → $7/6$
3) -2 → $1/2$
4) 3 → $-1/3$
5) 1/3 → -3
6) -1/2 → 2
7) 4/5 → $-5/4$
8) -6 → $1/6$

① switch signs
② flip fraction

Ex: Determine the type of line: parallel, perp, secant, coin.

1) $y = -\frac{2}{3}x + 5$ & $y = \frac{3}{2}x - 6$ perp

2) $y = -\frac{2}{3}x + 5$ & $y = -\frac{2}{3}x - 5$ COIN

3) $y = \frac{2}{3}x + 5$ & $y = \frac{3}{2}x - 6$ secant

4) $2x + 3y = 12$ & $y = -\frac{2}{3}x + 4$

$\frac{3y}{3} = \frac{-2x}{3} + \frac{12}{3}$

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

5) $15x - 15y = 15$ & $15x - 15y = -15$

$\frac{-15y}{-15} = \frac{-15x}{-15} + \frac{15}{-15}$ | $\frac{-15y}{-15} = \frac{-15x}{-15} - \frac{15}{-15}$

$y = 1x - 1$ | $y = 1x + 1$

Parallel and Perpendicular Lines

same slopes

Find the equation of a line that is:

1) Parallel to $y = \frac{2}{3}x + 5$ and passes thru $(0, 10)$

(0,10) ✓ ?

Line 2: $y = \frac{2}{3}x + 10$

x y-int

2) Parallel to $4x - 6y = 12$ and passes thru $(0, -20)$

x

$\frac{-6y}{-6} = \frac{-4x}{-6} + \frac{12}{-6}$

Line 1 : $y = \frac{2}{3}x - 6$

Line 2: $y = \frac{2}{3}x - 20$

3) Parallel to $-20x + 40y = 80$ and passes thru $(-10, -20)$

x y

$\frac{40y}{40} = \frac{20x}{40} + \frac{80}{40}$

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

Line 2: $y = mx + b$

$-20 = \frac{1}{2}(-10) + b$ → $-20 = -5 + b$

$b = -15$

$y_2 = \frac{1}{2}x - 15$

have negative reciprocal slopes

4) Perpendicular to $y = 3x - 6$ and passes thru $(0,5)$

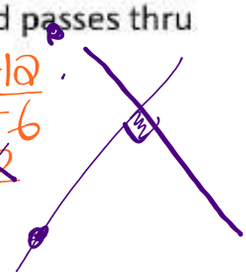
Line 2: $y = \frac{1}{3}x + 5$

5) Perpendicular to $4x - 6y = 12$ and passes thru $(0, \quad)$

$\frac{-6y}{-6} = \frac{-4x}{-6} + \frac{12}{-6}$

Line1: $y_1 = \quad x - 2$

Line2: $y_2 = \quad x - 3$



6) Perpendicular to $5x - 6y = 30$ and passing thru $(-6, 3)$

Step1: Functional (x y)

$\frac{-6y}{-6} = \frac{-5x}{-6} + \frac{30}{-6}$

$y_1 = \frac{5}{6}x - 5$

Step2: do neg. rec slopes

$y_2 = -\frac{6}{5}x + b$

Line

Step3: plug in

$3 = \frac{-6}{5}(-6) + b$

$3 = \frac{36}{5} + b$

$3 - \frac{36}{5} = b$

$b = \frac{21}{5}$

$y_2 = -\frac{6}{5}x - \frac{21}{5}$

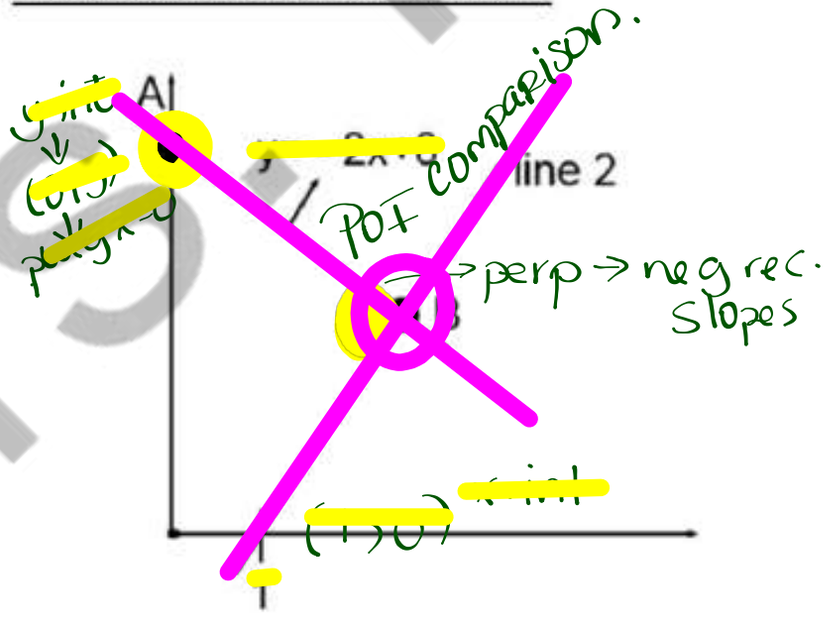
Situational Problems

In the following problems: you will be using the concepts learned so far:

- Functional form → $y=ax+b$
- Parallel lines → same slope
- Perpendicular lines → negative reciprocal slopes
- X-intercept → $(x,0)$ → plug y as 0
- Y-intercept → $(0,y)$ → plug x as 0
- Comparison Method

$$\left.\begin{aligned} y&=ax+b \\ y&=ax+b \end{aligned}\right\}$$ Make equal

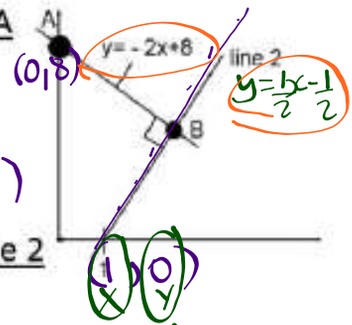
Problem 1: Determine coordinate B



Step 1: Determine coordinate A

How?

look at the equation
its the 'b' (0,8)



Step 2: Determine equation line 2

How? $-2/1 \rightarrow 1/2$

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

$0 = \frac{1}{2}(1) + b$

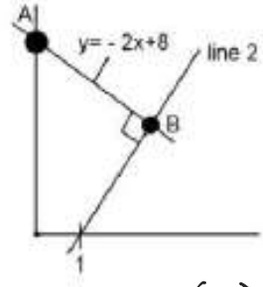
$0 = 1/2 + b$

$-1/2 = b$

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

Step 3: Determine coordinate B

How?



Line 1: $y = -2x + 8$

Line 2: $y = \frac{1}{2}x - \frac{1}{2}$

$2\left(-2x + 8 = \frac{1}{2}x - \frac{1}{2}\right)$

$-4x + 16 = 1x - 1$

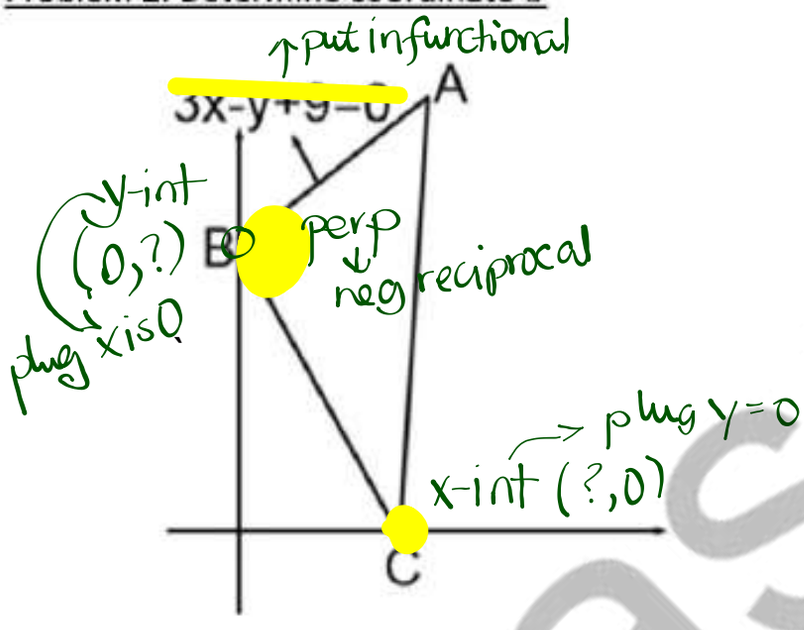
$x = 3.4$

$y = -2(3.4) + 8$

$y = 1.2$

B(3.4, 1.2)

Problem 2: Determine coordinate *C*



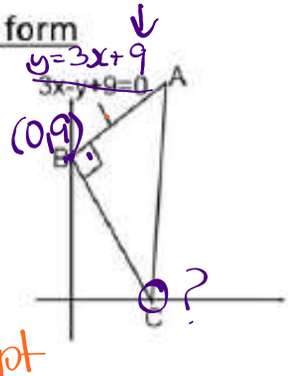
Step 1: Put equation ~~is~~ in functional form

How?

$3x+9=y$

OR

$y=3x+9$



Step 2: Determine coordinate B

How? Look at y-intercept from equation

Step 3: Determine equation $\overline{BC}$

How?

$3/1 \rightarrow -1/3$

$y = -\frac{1}{3}x + 9$

BC (0,9)

Step 4: Determine coordinate C

How?

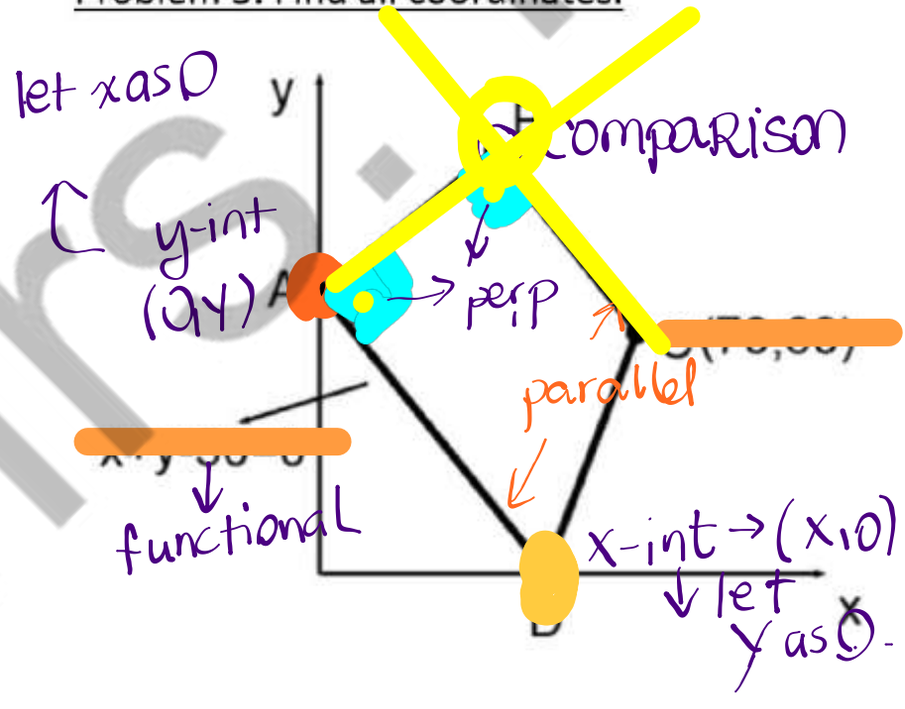
$0 = -\frac{1}{3}x + 9$

$\frac{1}{3}x = 9$

$x = 27$

$C(27, 0)$

Problem 3: Find all coordinates.



Steps

① Find coord A.

$x+y-50=0$

$y=-1x+150$

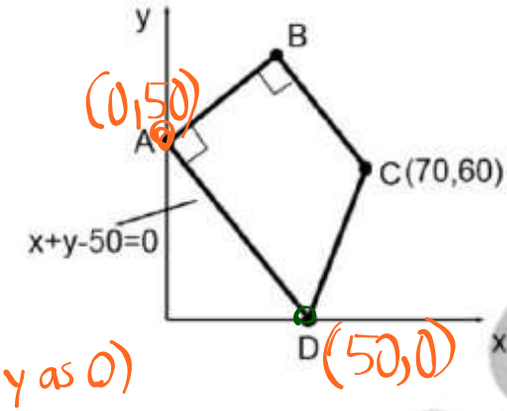
A (0,50)

② Find coord D. (put y as 0)

$0=-1x+50$

$x=50$

D (50,0)



③ Find coord B.

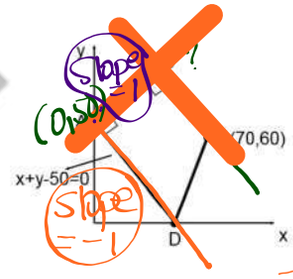
slope $\overline{BC}=-1$

$y=-1x+b$

$60=-1(70)+b$

$b=130$

$y=-1x+130$ $\overline{BC}$



Find equation $\overline{AB}$

$y=1x+50$ $\overline{AB}$

comparison

$-1x+130=1x+50$

$-2x=-80$

$x=40$ (40,90)

$y=90$