Notes 2-4B Parallel & Perpendicular Lines Name _____

Algebra II Period _____

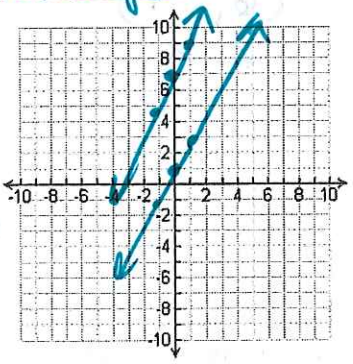
$y = mx + b$

Parallel Lines:

Have the same slope, but different y intercepts.

Ex: $y = 2x + 1$ *and* $\left[\frac{1}{2}y = x + \frac{7}{2}\right]2$

$y = 2x + 7$



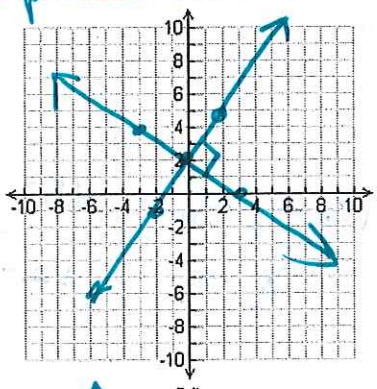
Perpendicular Lines:

Have opposite reciprocal slopes. They can have the same y intercept. Their slopes product = -1.

Ex: $y = \frac{3}{2}x + 2$ *and* $3y = -2x + 6$

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

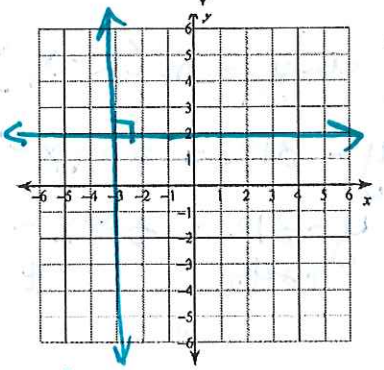
$y = -\frac{2}{3}x + 2$



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

Ex: y = 2 and x = -3

$y = 2$



$x = -3$

Write the slope-intercept equation of a line **parallel** to $y = \frac{2}{3}x + 6$ and passing through (4, 5). **Hint:** start with point slope formula.

M = $\frac{2}{3}$ x_1, y_1

$(x_1, y_1) = (4, 5)$

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

$y - 5 = \frac{2}{3}(x - 4)$

$y - 5 = \frac{2}{3}x - \frac{8}{3}$

$+5 \qquad +5$

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

$-\frac{8}{3} + 5 = -\frac{8}{3} + \frac{15}{3} = \frac{7}{3}$

m = opposite sign & reciprocal

Write the slope-intercept equation of a line that is **perpendicular** to $y = -\frac{3}{4}x + 2$ and passes through $(6, -4)$.

$M = \frac{4}{3}$

$(x_1, y_1) = (6, -4)$; x_1 y_1

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

$y - (-4) = \frac{4}{3}(x - 6)$

$y + 4 = \frac{4}{3}x - 8$

$-4 \quad -4$

$y = \frac{4}{3}x - 12$

$y = \frac{4}{3}x - 12$

Samantha owns her own jewelry-making business. At the beginning of her 7th week of business, she had \$312 in her business account. At the beginning of her 12th week of business, she had \$487 in her business account. Write a function for the amount of money in Samantha's business account in terms of time (in weeks) since the start of her business.

Name two points on the graph from the given information. (7, 312)
(12, 487)

What is the slope of the function and what does it mean in the context of the problem?

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{487 - 312}{12 - 7} = \frac{175}{5} = 35$ Samantha is making \$35 per week.

What is the y-intercept of the function and what does it mean in the context of the problem?

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

$y - 312 = 35(x - 7)$

$y - 312 = 35x - 245$

$+312 \quad +312$

$y = 35x + 67$

y intercept = 67 \$ means she had \$67 in her acct. before she began her business.

When will Samantha have earned the \$836 she needs to buy a plane ticket to France for a well-deserved vacation?

$y = 35x + 67$

$836 = 35x + 67$

$-67 \quad -67$

$\frac{769}{35} = \frac{35x}{35}$

$x = 21.97$ weeks

after 22 weeks, she will have enough money.