Parallel & Perpendicular Lines in Coordinate Plane

- Slope $= \frac{\text{"rise"}}{\text{"run"}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$

EX → A(2,3)
B(4,7)

$m = \frac{7-3}{4-2} = \frac{4}{2} = 2$

EX → A(5,4)
B(6,6)

$m = \frac{6-4}{6-5} = \frac{2}{1} = 2$

EX → A(2,4)
B(-5,7)

$m = \frac{7-4}{-5-2} = \frac{3}{-7} = -\frac{3}{7}$

- Equations of Lines

→ Slope-Intercept Form

$y = mx + b$

slope, y-int.

EX → A(3,3), B(6,-1)

$m = \frac{-1-3}{6-3} = \frac{-4}{3}$

$3 = -\frac{4}{3}(3) + b$

$3 = -4 + b$

$b = 7$

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

EX → A(-1,-1), B(2,3)

$m = \frac{3-(-1)}{2-(-1)} = \frac{4}{3}$

$3 = \frac{4}{3}(2) + b$

$3 = \frac{8}{3} + b$

$\frac{9}{3} - \frac{8}{3} = b$ $b = \frac{1}{3}$

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

→ Point-Slope Form

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

slope, point

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

OR

$y - (-1) = -\frac{4}{3}(x-6)$

$y + 1 = -\frac{4}{3}(x-6)$

$y - (-1) = \frac{4}{3}(x - (-1))$

$y + 1 = \frac{4}{3}(x+1)$

OR

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

- Parallel vs. Perpendicular

→ Lines are parallel if slopes are equal

→ Lines are perpendicular if slopes are opposite reciprocals (multiply to get -1)

EX → A(1,3), B(2,6)
C(0,0), D(-3, 1)

$m_{AB} = \frac{6-3}{2-1} = \frac{3}{1} = 3$

$m_{CD} = \frac{1-0}{-3-0} = \frac{1}{-3} = -\frac{1}{3}$

→ 1

EX → A(4,7), B(2,5)
C(-1, 8), D(3, 12)

$m_{AB} = \frac{5-7}{2-4} = \frac{-2}{-2} = 1$

$m_{CD} = \frac{12-8}{3-(-1)} = \frac{4}{4} = 1$

→ ||

EX → A(1,5), B(-1, 3)
C(1,4), D(0, 1)

$m_{AB} = \frac{3-5}{-1-1} = \frac{-2}{-2} = 1$

$m_{CD} = \frac{1-4}{0-1} = \frac{-3}{-1} = 3$

→ 2 lines that intersect

- Horizontal & Vertical Lines

→ Horizontal Lines ⇒ y = #

→ Vertical Lines ⇒ x = #

EX → (3, -7) H ⇒ y = -7
V ⇒ x = 3

HW : p. 194 → 8 - 44 mult. 4

p. 201 → 8 - 26 even