3.4 Writing Linear Equations (Parallel and Perpendicular)

Slope Intercept Form: $y = mx + b$

NEED TO KNOW
- slope
- y-intercept

USED MOSTLY WITH Pictures

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

Need to know
- a point
- slope

USED MOST OFTEN

Standard Form: $Ax + By = C$
- no fractions
- "A" is never negative
- X - Finishing Point

Write the standard form of the equation of the line.

1. parallel to $y = 4x + 3$ and through the point (-2, 3)

two lines are parallel
- slopes are equal

$Ax + By = C$

pt (x_1, y_1) $(-2, 3)$

$\parallel m = 4$

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

$y - 3 = 4(x - (-2))$

$y - 3 = 4(x + 2)$

$y - 3 = 4x + 8$

$-4x + y - 3 = 8$

$-4x + y = 8 + 3$

$-1(-4x + y) = (11)(-1)$

$\boxed{4x - y = -11}$

2. parallel to $2y - 3x = 6$ and through the point (0, 1)

$2y - 3x = 6$

$2y = 3x + 6$

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

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

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

pt (x_1, y_1) $(0, 1)$ y-intercept

$\parallel m = \frac{3}{2}$

$y - 1 = \frac{3}{2}(x - 0)$

$y - 1 = \frac{3}{2}x + \frac{3}{2}(0)$

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

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

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

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

$\boxed{3x - 2y = -2}$

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

$y = mx + b$

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

3. perpendicular to $y = 3x - 2$ and passes through (3, 5).

Perpendicular Slopes
- negative reciprocals

$m = 3$

pt (x_1, y_1) $(3, 5)$

$\perp m = -\frac{1}{3}$

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

$y - 5 = -\frac{1}{3}(x - 3)$

$y - 5 = -\frac{1}{3}x - \frac{1}{3}(-3)$

$y - 5 = -\frac{1}{3}x + 1$

$y = -\frac{1}{3}x + 1 + 5$

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

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

$3(\frac{1}{3}x) + 3(y) = 18$

$\boxed{x + 3y = 18}$

4. perpendicular to $4x - y = -1$ and passes through (4, 3)

$4x - y = -1$

$\frac{-y}{-1} = \frac{-4x - 1}{-1}$

$y = \frac{-4}{-1}x - \frac{1}{-1}$

$y = 4x + 1$

$m = 4$

pt (4, 3)

$\perp m = -\frac{1}{4}$

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

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

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

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

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

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

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

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

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

$\boxed{x + 4y = 16}$

HOMEWORK

Worksheet - HW 3.4 Writing Linear Equations (Parallel / Perpendicular)