

1.3 Linear Equations in 2 variables

- Obj: 1. Write a linear eq.
2. Write an eq for a line \parallel or \perp .

Write an equation in slope-intercept form for the line containing

$$(\underset{x}{4}, \underset{y}{-3}) \quad (2, 1).$$

$$y = mx + b \quad m: \frac{1+3}{2-4} = \frac{4}{-2} = -2$$

$$y = -2x + b$$

$$-3 = -2(4) + b$$

$$-3 = -8 + b$$

$$b = 5$$

$$y = -2x + 5$$

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Write an eq. for the line through

$$(\underset{x}{6}, \underset{y}{9}) \quad (5, -6)$$

$$m = \frac{-6-9}{5-6} = \frac{-15}{-1} = 15$$

$$y = 15x + b$$

$$9 = 15(6) + b$$

$$9 = 90 + b$$

$$-90 \quad -90$$

$$b = -81$$

$$y = 15x - 81$$

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Point Slope Form:

$$(x_1, y_1) \quad m$$

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

Write the equation of the line through $(-8, 3)$ with slope $\frac{1}{2}$ in slope-int. form

$$y = mx + b$$

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

$$y - 3 = \frac{1}{2}(x + 8)$$

$$y - 3 = \frac{1}{2}x + 4$$

$$+3 \qquad +3$$

$$y = \frac{1}{2}x + 7$$

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(use point-slope form)

Find the eq. of the line through $(1, 2)$ with slope -4 .

$$y - 2 = -4(x - 1)$$

$$y - 2 = -4x + 4$$

$$+2 \qquad +2$$

$$y = -4x + 6$$

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Parallel Lines:

never cross
* same slope

Find an equation of the line that goes through $(-1, 3)$ and is || to $y = -2x + 4$

$$m: -2$$

$$y - 3 = -2(x + 1)$$

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

$$y = -2x + 1$$

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Find an eq. of the line through $(-3, -4)$ and || to $y = -4x - 2$.

$$m: -4$$

Point Slope * $y + 4 = -4(x + 3)$

$$y + \cancel{4} = -4x - \cancel{4}$$

Slope int. * $y = -4x - 16$

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Perpendicular Lines:

Cross at a 90° angle

* Slopes are opposite reciprocals
 change sign flip fraction

$$m: 4 \quad \perp m: -\frac{1}{4}$$

$$m: -\frac{5}{6} \quad \perp m: \frac{6}{5}$$

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Write an equation of the line through
 $(4, -3)$ and \perp to $y = \underline{4}x + 5$
 x_1, y_1

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

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

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

$$y = -\frac{1}{4}x - 2$$

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Write an eq. of the line through
 $(-1, 5)$ and \perp to $y = -4x - 2$

$$\perp m: \frac{1}{4}$$

$$y - 5 = \frac{1}{4}(x + 1)$$

$$y - 5 = \frac{1}{4}x + \frac{1}{4}$$

$$y = \frac{1}{4}x + 5 + \frac{1}{4}$$

$$\frac{20}{4} + \frac{1}{4}$$

$$y = \frac{1}{4}x + \frac{21}{4}$$

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