

Section 1.3 Equations of lines

***Standard Form** $Ax + By = C$
(general form)

A, B, and C are integers
A is positive

***Slope-intercept Form**

$$y = mx + b$$

$m = \text{slope}$ $b = \text{y-intercept}$

***Point-Slope Form**

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

***Intercept Form**

$$\frac{x}{a} + \frac{y}{b} = 1$$

$a = \text{x-intercept}$
 $b = \text{y-intercept}$

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Examples

Find an equation in standard form of the line described.

- 1) Line with slope of $\frac{5}{3}$ and y-intercept of -2 $(0, -2)$

$$y = mx + b$$

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

$$3y = 5x - 6$$

$$-5x + 3y = -6$$

* multiply everything by -1

$$\boxed{5x - 3y = 6}$$

- 2) Line that has x-intercept of -4 and y-intercept of 6

$$\frac{x}{a} + \frac{y}{b} = 1$$

Here we multiplied everything by a common denominator

* LCD = 12

$$\frac{12}{1} \left(\frac{x}{-4} + \frac{y}{6} = 1 \right)$$

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

$$-3x + 2y = 12$$

multiply all by (-1)

$$\boxed{3x - 2y = -12}$$

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3) Line with a slope of 3 and passes through (-6, 3)

$$y - y_1 = m(x - x_1) \quad x_1, y_1$$

$$y - 3 = 3(x + 6)$$

Distribute

$$y - 3 = 3x + 18$$

$$-3x + y = 21$$

multiply by (-1)

$$3x - y = -21$$

4) Line that passes through (2, 7) and is parallel to $y = \frac{1}{4}x - 6$

y-int $y = mx + b$

$$7 = \frac{1}{4}(2) + b$$

$$7 = \frac{2}{4} + b$$

$$2(7 = \frac{1}{2} + b)$$

$$14 = 1 + 2b$$

$$\frac{-1 - 1}{13 = 2b}$$

$$b = \frac{13}{2}$$

$$y = \frac{1}{4}x + \frac{13}{2}$$

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

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

$$-\frac{1}{4}(-\frac{1}{4}x + y = \frac{13}{2})$$

$$1x - 4y = 26$$

$$x - 4y = -26$$

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5) Line through (8, 3) and (2, -1)

$$m = \frac{3 - (-1)}{8 - 2} = \frac{4}{6} = \frac{2}{3}$$

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

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

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

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

$$-2x + 3y = -7$$

The 'A' value must be positive

$$2x - 3y = 7$$

6) Line that is \perp to $8x - 2y = 1$ and passes through (-4, -1)

③ $\perp m = \frac{1}{4}$

$$-\frac{8x}{-2} = \frac{-8x}{-2} = 4x$$

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

① $y = 4x + \frac{1}{2}$

② $m = \frac{1}{4}$

④ $y = mx + b$

$$-1 = \frac{1}{4}(-4) + b$$

$$-1 = -1 + b$$

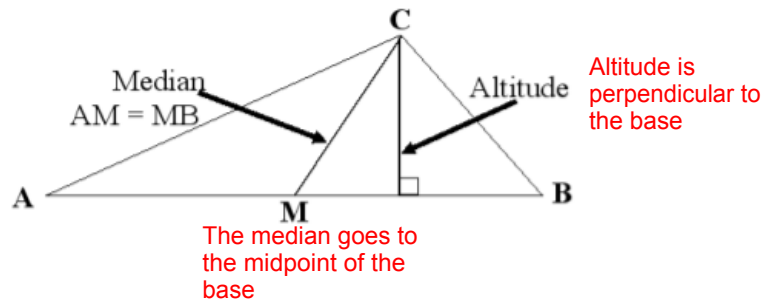
$$4y = -1x - 8$$

⑤ $-2 > b$

$$x + 4y = -8$$

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Things to remember



Homework

p16 #1-19 odd

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