

Section 1.3: Equations of lines

Essential Question: How do you write a linear equation?

*Standard Form

$$Ax + By = C$$

A, B, C integers
A is positive

*Slope-intercept Form

$$y = mx + b$$

m = slope
b = y-intercept

*Point-Slope Form

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

*Intercept Form

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

a = x-intercept
b = y-intercept

Examples

Find an equation in standard form of the line described.

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

m

b

$$y = mx + b$$

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

$$3(y = \frac{5}{3}x + -2) \quad *A, B, C \text{ integers}$$

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

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

$$5x - 3y = 6 \quad *A \text{ positive}$$

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

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

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

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

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

$$3x - 2y = -12 \quad *A \text{ positive}$$

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

m

x_1, y_1

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

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

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

$$-3x + y = 21$$

$$3x - y = -21$$

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

x_1, y_1

same slope

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

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

$$y - 7 = \frac{1}{4}(x - 2)$$

$$y - 7 = \frac{1}{4}x - \frac{1}{2}$$

$$4(y - 7) = 4\left(\frac{1}{4}x - \frac{1}{2}\right)$$

$$4y - 28 = x - 2$$

$$-x + 4y = 26$$

$$x - 4y = -26$$

5) Line through $(8, 3)$ and $(2, -1)$ *Need slope

$$m = \frac{y_1 - y_2}{x_1 - x_2} = \frac{3 - (-1)}{8 - 2} = \frac{4}{6} = \frac{2}{3}$$

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

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

*ABC integers 3

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

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

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

$$2x - 3y = 7$$

*A positive

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

Slopes opposite reciprocals

$$-2y = -8x + 1$$

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

$$m = 4$$

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

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

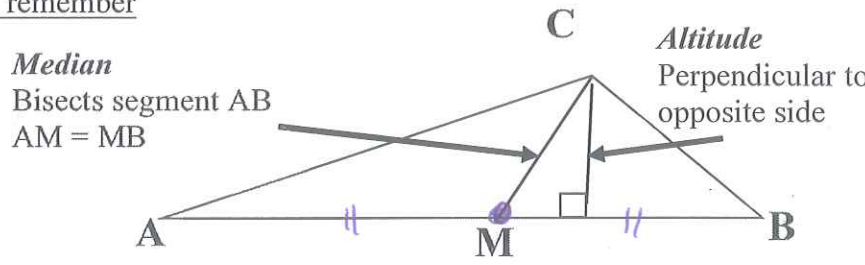
$$y + 1 = -\frac{1}{4}x - 1$$

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

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

$$x + 4y = -8$$

Things to remember



Section 1.3 Summary:

Begin with $y = mx + b$ or $y - y_1 = m(x - x_1)$
(slope-intercept) (point-slope form)

If given slope and yint use $y = mx + b$

If given $\begin{cases} A) 2 \text{ points} \\ B) \text{ slope and part} \end{cases}$ use point-slope form

must find slope using $m = \frac{y_1 - y_2}{x_1 - x_2}$

* To put in $Ax + By = C$ standard form
move x and y to same side,
multiply by common denominator,
mult. By (-1) if A is negative