

# Objective

The student will be able to:

- 1) write equations using slope-intercept form.
- 2) identify slope and y-intercept from an equation.
- 3) write equations in standard form.

**SOL: A.8**

# Important!!!

This is one of the big concepts in Algebra 1. You need to thoroughly understand this!

## Slope – Intercept Form

$$y = mx + b$$

**m** represents the slope

**b** represents the y-intercept

# Writing Equations

When asked to write an equation, you need to know two things – slope ( $m$ ) and  $y$ -intercept ( $b$ ).

There are three types of problems you will face.

# Writing Equations – Type #1

Write an equation in slope-intercept form of the line that has a slope of 2 and a y-intercept of 6.

To write an equation, you need two things:

$$\text{slope (m)} = 2$$

$$\text{y – intercept (b)} = 6$$

We have both!! Plug them into slope-intercept form

$$\begin{array}{c} y = mx + b \\ \downarrow \quad \downarrow \\ y = 2x + 6 \end{array}$$

Write the equation of a line that has a y-intercept of -3 and a slope of -4.

1.  $y = -3x - 4$

✓ 2.  $y = -4x - 3$

3.  $y = -3x + 4$

4.  $y = -4x + 3$

# Writing Equations – Type #2

Write an equation of the line that has a slope of 3 and goes through the point (2,1).

To write an equation, you need two things:

$$\text{slope (m)} = 3$$

$$\text{y – intercept (b)} = ???$$

We have to find the y-intercept!! Plug in the slope and ordered pair into

$$\begin{array}{c} y = mx + b \\ \downarrow \quad \downarrow \quad \downarrow \\ 1 = 3(2) + b \end{array}$$

# Writing Equations – Type #2

$$1 = 3(2) + b$$

Solve the equation for b

$$\begin{array}{r} 1 = 6 + b \\ -6 \quad -6 \\ \hline -5 = b \end{array}$$

To write an equation, you need two things:

$$\text{slope (m)} = 3$$

$$\text{y – intercept (b)} = -5$$

$$y = 3x - 5$$

# Writing Equations – Type #3

Write an equation of the line that goes through the points  $(-2, 1)$  and  $(4, 2)$ .

To write an equation, you need two things:

$$\text{slope } (m) = ???$$

$$y - \text{intercept } (b) = ???$$

We need both!! First, we have to find the slope.

Plug the points into the slope formula.

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

Simplify  $m = \frac{1}{6}$



# Writing Equations – Type #3

Write an equation of the line that goes through the points  $(-2, 1)$  and  $(4, 2)$ .

To write an equation, you need two things:

$$\text{slope (m)} = \frac{1}{6}$$

$$\text{y – intercept (b)} = \text{???$$

It's now a Type #2 problem. Pick one of the ordered pairs to plug into the equation. Which one looks easiest to use?

I'm using  $(4, 2)$  because both numbers are positive.

$$2 = \frac{1}{6}(4) + b$$

# Writing Equations – Type #3

$$2 = \frac{1}{6}(4) + b$$

Solve the equation for b

$$\begin{array}{r} 2 = \frac{2}{3} + b \\ -\frac{2}{3} \quad -\frac{2}{3} \\ \hline 1\frac{1}{3} = b \end{array}$$

To write an equation, you need two things:

$$\text{slope (m)} = \frac{1}{6}$$

$$\text{y – intercept (b)} = 1\frac{1}{3}$$

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

Write an equation of the line that goes through the points  $(0, 1)$  and  $(1, 4)$ .

1.  $y = 3x + 4$


✓ 2.  $y = 3x + 1$

3.  $y = -3x + 4$

4.  $y = -3x + 1$

To find the slope and y-intercept of an equation, write the equation in slope-intercept form:  $y = mx + b$ .

Find the slope and y-intercept.

$$1) y = 3x - 7$$
$$y = \mathbf{m}x + \mathbf{b}$$


$$\mathbf{m = 3, b = -7}$$

Find the slope and y-intercept.

$$2) \quad y = \frac{2}{3}x \qquad m = \frac{2}{3}$$

$$y = \mathbf{m}x + \mathbf{b}$$

$$y = \frac{2}{3}x + 0$$

$$\mathbf{b} = 0$$

$$3) \quad y = 5$$

$$y = \mathbf{m}x + \mathbf{b}$$

$$y = 0x + 5$$

$$\mathbf{m} = 0$$

$$\mathbf{b} = 5$$

Find the slope and y-intercept.

$$4) \quad 5x - 3y = 6$$

Write it in slope-intercept form. ( $y = mx + b$ )

$$5x - 3y = 6$$

$$\frac{-3y}{-3} = \frac{-5x}{-3} + \frac{6}{-3}$$

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

$$m = \frac{5}{3}$$

$$b = -2$$

Find the slope and y-intercept.

$$5) 2y + 2 = 4x$$

Write it in slope-intercept form. ( $y = mx + b$ )

$$2y + 2 = 4x$$

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

$$y = 2x - 1$$

$$m = 2$$


$$b = -1$$

Find the slope and y-intercept of

$$y = -2x + 4$$

1.  $m = 2; b = 4$

2.  $m = 4; b = 2$

 3.  $m = -2; b = 4$

4.  $m = 4; b = -2$



Write your equation in STANDARD form given  $m = -\frac{1}{3}$  and  $b = 2$ .

First, write in slope-intercept form:

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

Now, write it in standard form.

( $Ax + By = C$  where  $A$ ,  $B$ , and  $C$  are integers).

Clear the fractions - multiply everything by 3.

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

$$3y = -x + 6$$

Get the variables on the same side.

$$\mathbf{x + 3y = 6}$$

Write the standard form for a line passing through the points  $(-1, -3)$  and  $(-4, 6)$ .

Oh no! This is a Type #3 problem! Find slope...

$$m = \frac{6 - (-3)}{-4 - (-1)} = \frac{9}{-3} = -3$$

Find y-intercept. I'm choosing the point  $(-4, 6)$ .

$$6 = -3(-4) + b$$

$$6 = 12 + b$$

$$-6 = b$$

Slope-intercept form:  $y = -3x - 6$

Standard form:  $3x + y = -6$