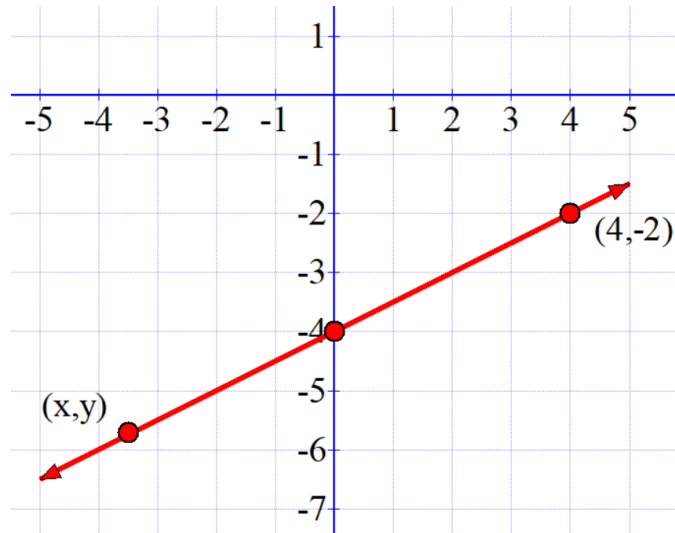


Three Forms of a Linear Equation Practice

Use the following graph to answer the first question.

One form of the equation of the line below is $y = \left(\frac{1}{2}\right)x - 4$



Consider other potential forms for this equation.

I	$x - 2y - 8 = 0$
II	$x + 2y + 8 = 0$
III	$y - 2 = \frac{1}{2}(x + 4)$
IV	$y + 2 = \frac{1}{2}(x - 4)$

1. The two correct equivalent forms for this equation are

A) I and III

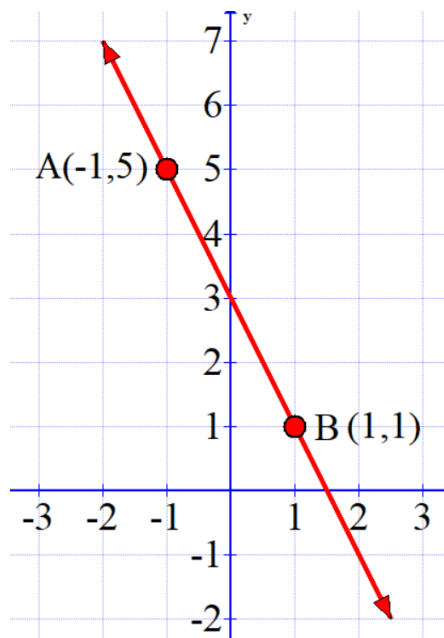
B) I and IV

C) II and III

D) II and IV

Use the following information to answer the next question.

A math teacher told her students that when determining the slope-point form, any point on the graph can be used. When she asked her class to find the equation in this form, only Point A or Point B, is possible for this specific question.



2. Which slope-point form of the equation above is correct?

- A) $y + 1 = -2(x + 1)$
- B) $y - 1 = -3(x - 1)$
- C) $y - 5 = -2(x + 1)$
- D) $y + 1 = -3(x - 5)$

Use the following information to answer the next question.

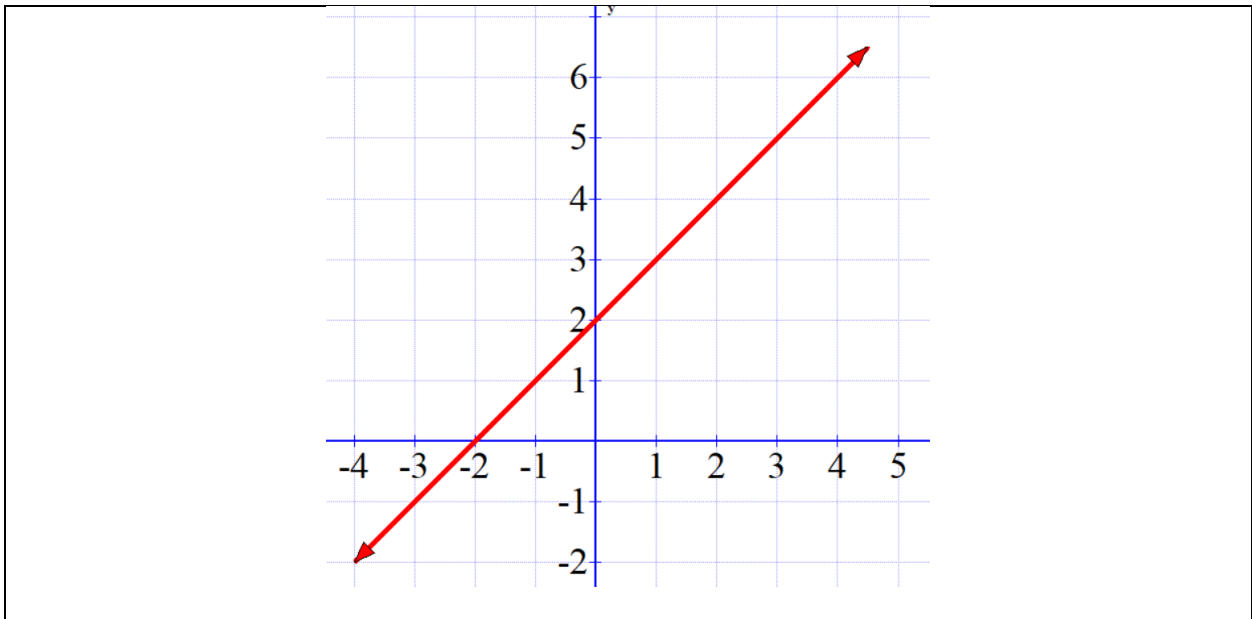
A math student was asked to convert the following equation, $12x - 4y + 8 = 0$, which is in general form to slope-y-intercept form. Analyze their work.

Step 1	$12x - 4y = -8$
Step 2	$-4y = -12x - 8$
Step 3	$y = 3x - 8$

3. Which statement below is correct?

- A) An error occurred in step 2 and the correct form is $y = 3x + 2$
- B) An error occurred in step 3 and the correct form is $y = 3x + 2$
- C) An error occurred in step 2 and the correct form is $y = 3x - 2$
- D) An error occurred in step 3 and the correct form is $y = 3x - 2$

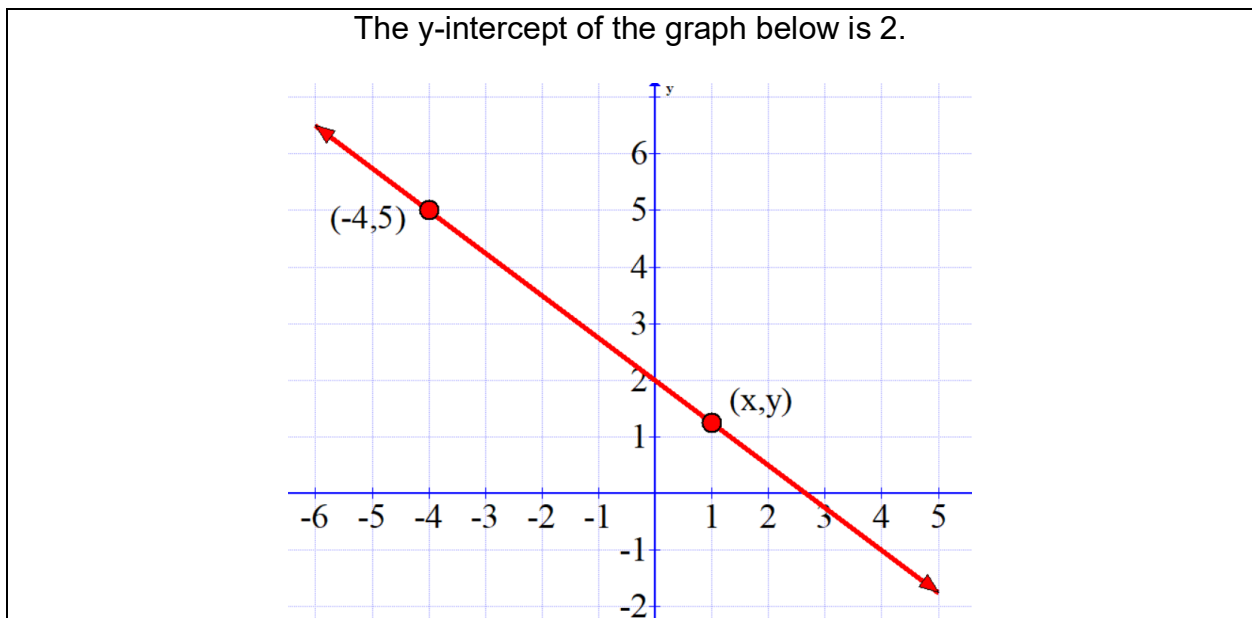
Use the graph below to answer the next question.



4. When the equation above is stated in the slope-y-intercept form of $y = mx + b$, the **sum** of m and b is _____.

5. The slope-point equation of a line is $y - 1 = m(x + 3)$. If 1 point on the line is $(-1, 9)$, then the slope is
- A) 2 B) -2 C) -4 D) 4
6. When the equation $y = \left(-\frac{3}{4}\right)x - 7$, which is written in slope-y-intercept form, is converted to the general form of $Ax + By + C = 0$, where A, B, and C are integers and $A > 0$, the value of B is
- A) 3 B) 28 C) 7 D) 4
7. A line has a slope of $\frac{1}{3}$ and passes through the point $(6,1)$. The equation of the line in the slope-y-intercept form is
- A) $x - 3y - 3 = 0$
B) $y - 1 = \left(\frac{1}{3}\right)(x - 6)$
C) $y = \left(\frac{1}{3}\right)x - 1$
D) $y = \left(\frac{1}{3}\right)x + 3$

Use the graph below to answer the next question.

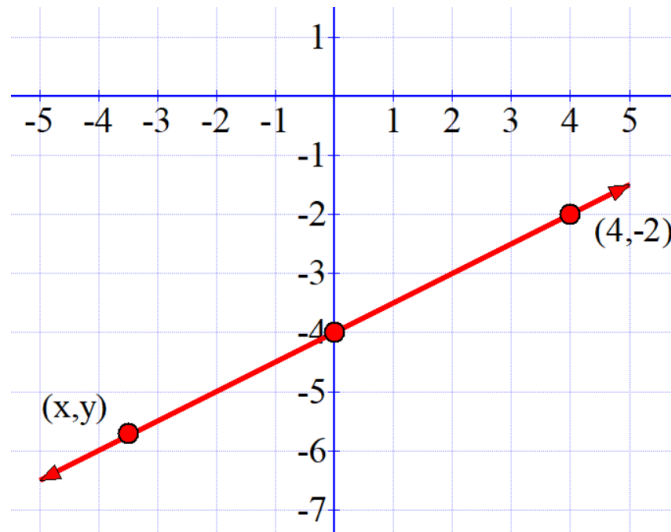


8. Write the equation of the line shown above in 3 different forms. Show all work. Explain.

Three Forms of a Linear Equation Practice Solutions

Use the following graph to answer the first question.

One form of the equation of the line below is $y = \left(\frac{1}{2}\right)x - 4$



Consider other potential forms for this equation.

I	$x - 2y - 8 = 0$
II	$x + 2y + 8 = 0$
III	$y - 2 = \frac{1}{2}(x + 4)$
IV	$y + 2 = \frac{1}{2}(x - 4)$

1. The two correct equivalent forms for this equation are

A) I and III

B) I and IV

C) II and III

D) II and IV

Solution

There are two possible equations in general form (I and II) and two possible equations in slope-point form (III and IV).

To determine the general form equivalent, clear the fraction and set the equation equal to zero (make sure the value of A, in the form $Ax + By + C = 0$, is positive)

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

$$2y = x - 8$$

$$0 = x - 2y - 8$$

Thus, one correct form is $x - 2y - 8 = 0$ (option I).

To determine the slope-point form, begin with slope = $\frac{\text{rise}}{\text{run}}$. Substitute what is known.

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

Multiply both sides of the equal sign by $(x - 4)$.

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

The equivalent is

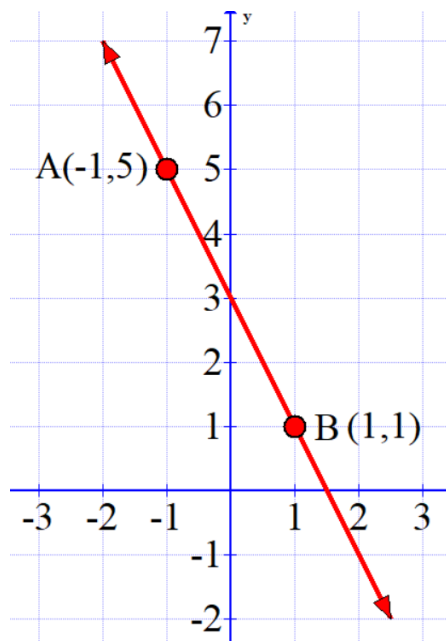
$$y + 2 = \left(\frac{1}{2} \right) (x - 4)$$

Thus, this is the second correct form (option IV).

The correct answer is B.

Use the following information to answer the next question.

A math teacher told her students that when determining the slope-point form, any point on the graph can be used. When she asked her class to find the equation in this form, only Point A or Point B, is possible for this specific question.



2. Which slope-point form of the equation above is correct?

- A) $y + 1 = -2(x + 1)$
- B) $y - 1 = -3(x - 1)$
- C) $y - 5 = -2(x + 1)$
- D) $y + 1 = -3(x - 5)$

Solution

First determine the slope.

We can either use the graph, or calculate the slope using the two given points.

From the graph, since the line rises to the left, the slope is negative.

Between the points A and B, the vertical distance (rise) is 4 units, and the horizontal distance (run) is 2 units, as determined by counting units on the graph. Dividing the rise by the run results in a value of 2. The slope is -2. From the given choices, options B and D can be eliminated, as each of these show a slope of -3.

Or, using the slope formula with the two given points, $slope = \frac{rise}{run} = \frac{5-1}{-1-1} = \frac{4}{-2} = -2$

Either of the two given points can be used to find the specific form required.

Using Point A (-1,5):

$$y - 5 = -2(x + 1)$$

Using Point B(1,1)

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

Since we narrowed the possible answers to A or C, from the work above using Points A and B, only $y - 5 = -2(x + 1)$ is correct.

The correct answer is C.

Use the following information to answer the next question.

A math student was asked to convert the following equation, $12x - 4y + 8 = 0$, which is in general form to slope-y-intercept form. Analyze their work.	
Step 1	$12x - 4y = -8$
Step 2	$-4y = -12x - 8$
Step 3	$y = 3x - 8$

3. Which statement below is correct?

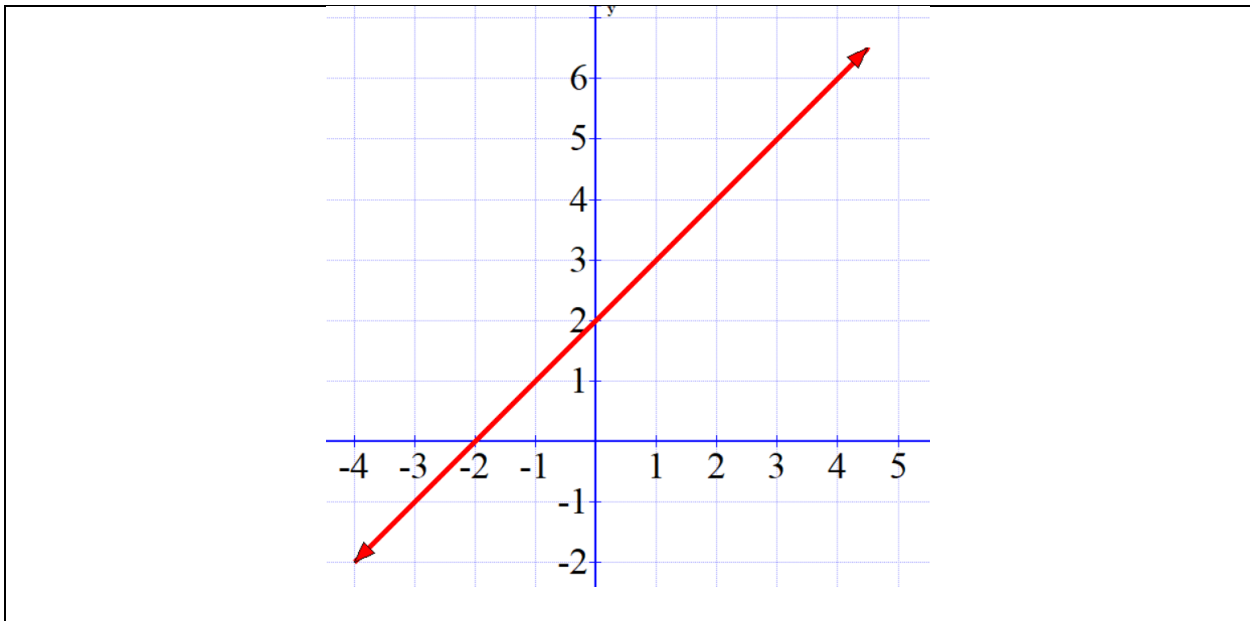
- A) An error occurred in step 2 and the correct form is $y = 3x + 2$
- B) An error occurred in step 3 and the correct form is $y = 3x + 2$**
- C) An error occurred in step 2 and the correct form is $y = 3x - 2$
- D) An error occurred in step 3 and the correct form is $y = 3x - 2$

Solution

The first two steps are good. In step 3, y was isolated by dividing by -4 . The error is in this step because -4 was not divided by every term. The constant term of -8 should have also been divided by -4 . The correct form is $y = 3x + 2$.

The correct answer is B.

Use the graph below to answer the next question.



4. When the equation above is stated in the slope-y-intercept form of $y = mx + b$, the **sum** of m and b is 3.

Solution

Between any two points on the graph, the rise is the same as the run. When anything is divided by itself, the result is always 1. Since the graph rises to the right, the slope is 1.

The y-intercept is 2.

The equation of the line in this form is $y = x + 2$. The value of m is 1 and the value of b is 2.

The sum of m and b is 3.

5. The slope-point equation of a line is $y - 1 = m(x + 3)$. If 1 point on the line is $(-1, 9)$, then the slope is

A) 2 B) -2 C) -4 D) 4

Solution

If a point is on a line, it means that when the coordinates of that point are substituted for x and y , the equation will be satisfied (i.e. a true statement is made).

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

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

$$(9) - 1 = m((-1) + 3)$$

$$8 = 2m$$

$$m = 4.$$

The correct answer is D.

6. When the equation $y = \left(-\frac{3}{4}\right)x - 7$, which is written in slope-y-intercept form, is converted to the general form of $Ax + By + C = 0$, where A, B, and C are integers and $A > 0$, the value of B is

A) 3

B) 28

C) 7

D) 4

Solution

Multiply every term by 4 to clear the fraction.

$$4 \left[y = \left(-\frac{3}{4}\right)x - 7 \right]$$

$$4y = -3x - 28$$

By convention, $A > 0$ in the final form. Since A is currently -3, we will set the right side of the equal sign equal to zero.

$$4y + 3x + 28 = -3x + 3x - 28 + 28$$

$$3x + 4y + 28 = 0$$

The value of b is 4.

The correct answer is D.

7. A line has a slope of $\frac{1}{3}$ and passes through the point $(6,1)$. The equation of the line in the slope-y-intercept form is

A) $x - 3y - 3 = 0$

B) $y - 1 = \left(\frac{1}{3}\right)(x - 6)$

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

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

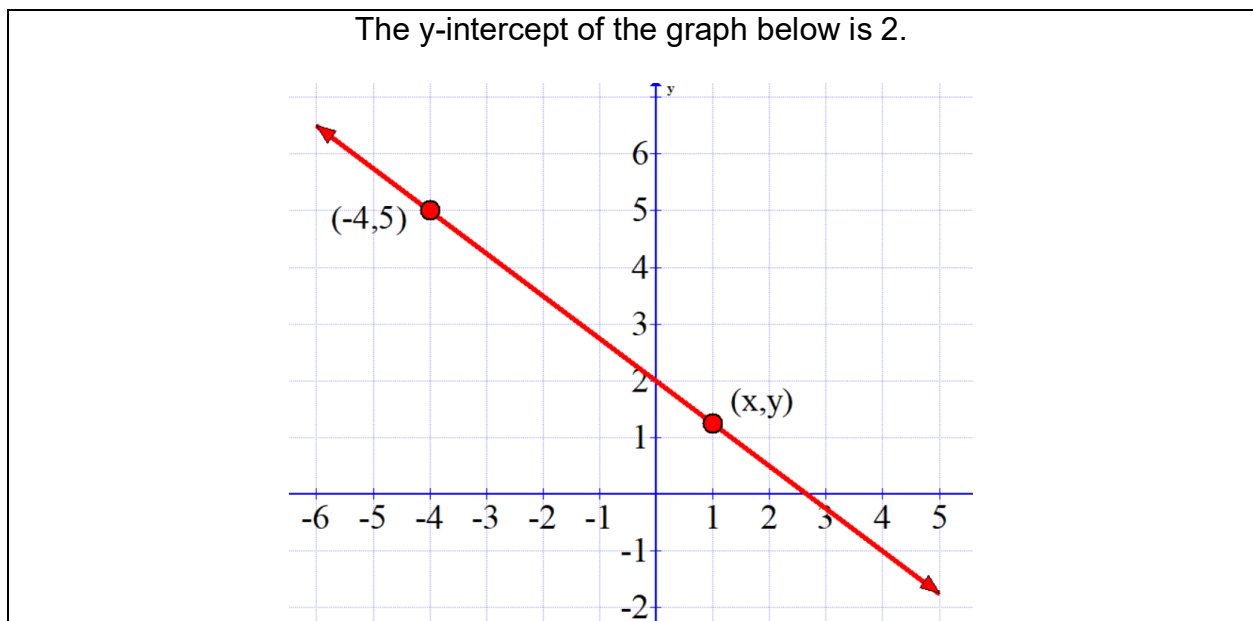
Solution

Option A is written in general form.

Options C and D are written in slope-y-intercept form.

The correct answer is B.

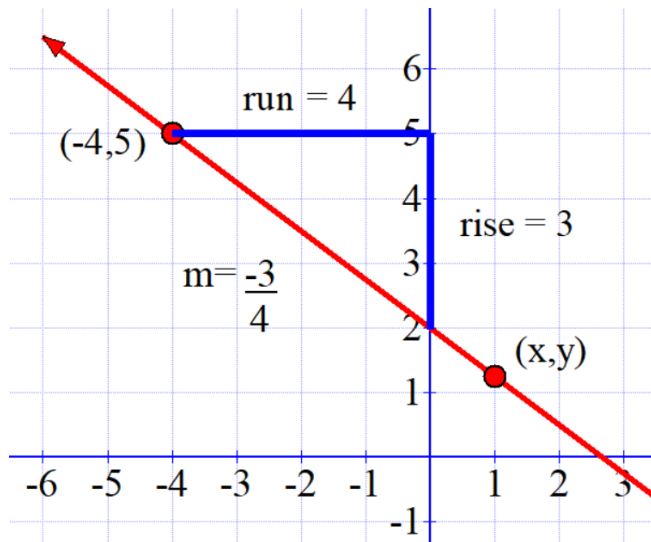
Use the graph below to answer the next question.



8. Write the equation of the line shown above in 3 different forms. Show all work. Explain.

Solution

Use the y-intercept $(0, 2)$ and the point $(-4, 5)$ to determine the slope. Since the line rises to the left, the slope is negative.



In the slope-y-intercept form, the equation is $y = -\left(\frac{3}{4}\right)x + 2$

For the slope-point form, the basic format is:

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

Use the point $(-4, 5)$ as (x_1, y_1) and the fact that the slope is $-\frac{3}{4}$.

In the slope-point form, the equation is $y - 5 = -\frac{3}{4}(x + 4)$

For the general form, we will take the slope-y-intercept form and first clear the fraction by multiplying each term by 4.

$$4\left[y = -\left(\frac{3}{4}\right)x + 2\right]$$

$$4y = -3x + 8$$

$$3x + 4y - 8 = 0$$

The general form is $3x + 4y - 8 = 0$.