

Section 5.2 Writing Linear Equations Given the Slope and a Point

Step 1: Find the y-intercept.

Substitute the slope m and the coordinates of the given point (x, y) into the slope-intercept form for $y = mx + b$. Then solve for the y-intercept, b .

Step 2: Write an equation of the line.

Substitute the slope m and the y-intercept b into the slope-intercept form, $y = mx + b$.

Examples

1. Write an equation of the line that passes through the point $(-3, 0)$ and has a slope of 2.

m	b	$y = mx + b$
$m = 2$	$0 = 2(-3) + b$ $0 = -6 + b$ $+6 \quad +6$ $6 = b$	$y = 2x + 6$

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

m	b	$y = mx + b$
$m = 3$	$-1 = 3(-2) + b$ $-1 = -6 + b$ $+6 \quad +6$ $5 = b$	$y = 3x + 5$

3. Write an equation of the line that has the following x-intercept and slope:

x-intercept = 12, $m = -\frac{1}{3}$.

$(12, 0)$

m	b	$y = mx + b$
$m = -\frac{1}{3}$	$0 = -\frac{1}{3}(12) + b$ $0 = -4 + b$ $+4 \quad +4$ $4 = b$	$y = -\frac{1}{3}x + 4$

*** Parallel lines have slope.

4. Write an equation of the line that is parallel to the line $y = -3x - 2$ through the point (3, -4).

m	b	$y = mx + b$
$m = -3$	$-4 = -3(3) + b$ $-4 = -9 + b$ $+9 \quad +9$ $5 = b$	$y = -3x + 5$

5. All the employees of a garden center are given a \$0.40 per hour raise each year. You make \$7.15 per hour after three years as an employee. Write a linear equation that models your salary per hour in terms of the number of years you have worked at the garden center. Then find your hourly salary after six years.

m	b	$y = mx + b$
.4	$7.15 = .4(3) + b$ $7.15 = 1.2 + b$ $-1.2 \quad -1.2$ $5.95 = b$	$y = .4x + 5.95$ $(.40 = m)$ $(3, 7.15)$ <i>Starting Salary</i> $(0, 5.95)$

*** Challenge ***

You are comparing the costs of car rental agencies for a one-day car rental.

Car Rental Agency A charges \$30 per day plus \$0.08 per mile.

Car Rental Agency B charges a flat fee of \$40 per day.

a. Write an equation in slope-intercept form that models the cost of renting a car from each rental agency.

$m = .08$
 $b = 30$
 $y = .08x + 30$

$m = 0$
 $b = 40$
 $y = 40$

b. Under what conditions would the cost of renting a car from either agency be the same?

$.08x + 30 = 40$
 $-30 \quad -30$
 $.08x = 10 / .08$
 $x = 125 \text{ mi.}$

c. Under what conditions would the cost of renting a car from Car Rental Agency A be the best deal?

$x < 125 \text{ miles}$