NAME _____ DATE _____ PERIOD _____

3-4 Study Guide and Intervention

Equations of Lines

Write Equations of Lines You can write an equation of a line if you are given any of the following:

- the slope and the y-intercept,
- the slope and the coordinates of a point on the line, or
- the coordinates of two points on the line.

If m is the slope of a line, b is its y-intercept, and (x_1, y_1) is a point on the line, then:

- the **slope-intercept form** of the equation is $y = mx + b$,
- the **point-slope form** of the equation is $y - y_1 = m(x - x_1)$.

Example 1 **Write an equation in slope-intercept form of the line with slope -2 and y-intercept 4.**

$y = mx + b$ Slope-intercept form

$y = -2x + 4$ $m = -2$, $b = 4$

The slope-intercept form of the equation of the line is $y = -2x + 4$.

Example 2 **Write an equation in point-slope form of the line with slope $-\frac{3}{4}$ that contains (8, 1).**

$y - y_1 = m(x - x_1)$ Point-slope form

$y - 1 = -\frac{3}{4}(x - 8)$ $m = -\frac{3}{4}$, $(x_1, y_1) = (8, 1)$

The point-slope form of the equation of the line is $y - 1 = -\frac{3}{4}(x - 8)$.

Exercises

Write an equation in slope-intercept form of the line having the given slope and y-intercept.

1. m: 2, y-intercept: -3

2. m: $-\frac{1}{2}$, y-intercept: 4

Write an equation in point-slope form of the line having the given slope that contains the given point.

7. $m = \frac{1}{2}$, $(3, -1)$

8. $m = -2$, $(4, -2)$

19. contains (2, 0) and (0, 10)

20. x-intercept is -2, y-intercept is -1

NAME _____ DATE _____ PERIOD _____

3-4 Study Guide and Intervention *(continued)*

Equations of Lines

Write Equations to Solve Problems Many real-world situations can be modeled using linear equations.

Example **Donna offers computer services to small companies in her city. She charges $55 per month for maintaining a web site and $45 per hour for each service call.**

a. Write an equation to represent the total monthly cost C for maintaining a web site and for h hours of service calls.

Rate of Change = $\frac{\Delta y}{\Delta x}$

For each hour, the cost increases $45. So the rate of change, or slope, is 45. The y-intercept is located where there are 0 hours, or $55.

$C = mh + b$

$= 45h + 55$

Graph!

b. Donna may change her costs to represent them by the equation $C = 25h + 125$, where $125 is the fixed monthly fee for a web site and the cost per hour is $25. Compare her new plan to the old one if a company has $5\frac{1}{2}$ hours of service calls. Under which plan would Donna earn more?

First plan

For $5\frac{1}{2}$ hours of service Donna would earn

$C = 45h + 55 = 45\left(5\frac{1}{2}\right) + 55$

$= 247.5 + 55$ or $302.50

Second Plan

For $5\frac{1}{2}$ hours of service Donna would earn

$C = 25h + 125 = 25(5.5) + 125$

$= 137.5 + 125$ or $262.50

Donna would earn more with the first plan.

Exercises

For Exercises 1–4, use the following information.

Jerri's current satellite television service charges a flat rate of $34.95 per month for the basic channels and an additional $10 per month for each premium channel. A competing satellite television service charges a flat rate of $39.99 per month for the basic channels and an additional $8 per month for each premium channel.

1. Write an equation in slope-intercept form that models the total monthly cost for each satellite service, where p is the number of premium channels.

2. If Jerri wants to include three premium channels in her package, which service would be less, her current service or the competing service?

3. A third satellite company charges a flat rate of $69 for all channels, including the premium channels. If Jerri wants to add a fourth premium channel, which service would be least expensive?

4. Write a description of how the fee for the number of premium channels is reflected in the equation.

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3-4 Practice

Equations of Lines

Write an equation in slope-intercept form of the line having the given slope and *y*-intercept.

1. m: $\frac{2}{3}$, y-intercept: -10

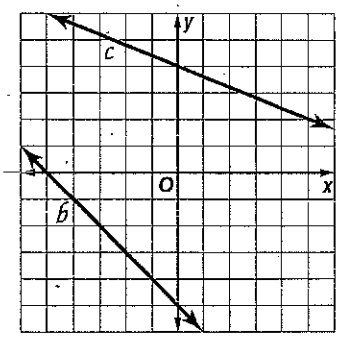
2. m: $-\frac{7}{9}$, $\left(0, -\frac{1}{2}\right)$

Write equations in point-slope form and slope-intercept form of the line having the given slope and containing the given point.

4. m: $\frac{3}{2}$, $(4, 6)$

5. m: $-\frac{6}{5}$, $(-5, -2)$

Write an equation in slope-intercept form for each line.



8. b

9. c

10. parallel to line b, contains $(3, -2)$

11. perpendicular to line c, contains $(-2, -4)$

Write an equation in slope-intercept form for the line that satisfies the given conditions.

12. $m = -\frac{4}{9}$, y-intercept $= 2$

13. $m = 3$, contains $(2, -3)$

14. x-intercept is -6, y-intercept is 2

15. x-intercept is 2, y-intercept is -5

16. passes through $(2, -4)$ and $(5, 8)$

17. contains $(-4, 2)$ and $(8, -1)$

18. COMMUNITY EDUCATION A local community center offers self-defense classes for teens. A \$25 enrollment fee covers supplies and materials and open classes cost \$10 each. Write an equation to represent the total cost of x self-defense classes at the community center.

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3-4 Study Guide and Intervention

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The point-slope form of the equation of the line is $y - 1 = -\frac{3}{4}(x - 8)$.

Exercises

Write an equation in slope-intercept form of the line having the given slope and y-intercept.

1. m: 2, y-intercept: −3

   $y = 2x - 3$

2. m: $-\frac{1}{2}$, y-intercept: 4

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

Write an equation in point-slope form of the line having the given slope that contains the given point.

7. $m = \frac{1}{2}$, (3, −1)

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

8. $m = -2$, (4, −2)

   $y + 2 = -2(x - 4)$

19. contains (2, 0) and (0, 10)

    $y = -5x + 10$

20. x-intercept is −2, y-intercept is −1

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

NAME _____ DATE _____ PERIOD ____

3-4 Study Guide and Intervention *(continued)*

Equations of Lines

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1. Write an equation in slope-intercept form that models the total monthly cost for each satellite service, where p is the number of premium channels.

   Current service: $C = 10p + 34.95$

   Competing service: $C = 8p + 39.99$

2. If Jerri wants to include three premium channels in her package, which service would be less, her current service or the competing service?

   competing service

3. A third satellite company charges a flat rate of $69 for all channels, including the premium channels. If Jerri wants to add a fourth premium channel, which service would be least expensive?

   the third company

4. Write a description of how the fee for the number of premium channels is reflected in the equation. The fee for the number of premium channels represents the rate of change, or slope, of the equation.