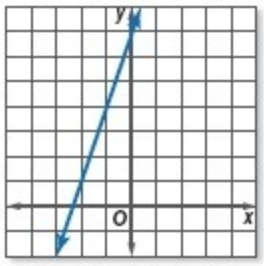
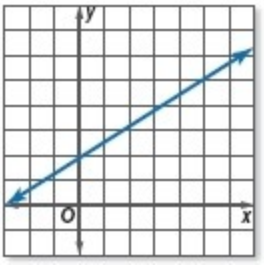
Mid-Chapter Quiz

Write an equation in slope-intercept form for each graph shown.

1. 

SOLUTION:

You need to find the slope and y-intercept to write the equation. The line crosses the y-axis at (0, 7), so the y-intercept is 7. To get from (0, 7) to (−1, 4), go down 3 units and left 1 unit. The slope is 3. The equation of the graph in slope-intercept form is $y = 3x + 7$.

2. 

SOLUTION:

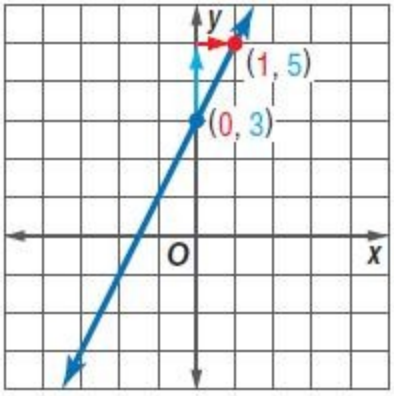
You need to find the slope and y-intercept to write the equation. The line crosses the y-axis at (0, 2), so the y-intercept is 2. To get from (0, 2) to (5, 5), go up 3 units and right 5 units. The slope is $\frac{3}{5}$. The equation of the graph in slope-intercept form is $y = \frac{3}{5}x + 2$.

Graph each equation. Then state the slope and y-intercept.

3. $y = 2x + 3$

SOLUTION:

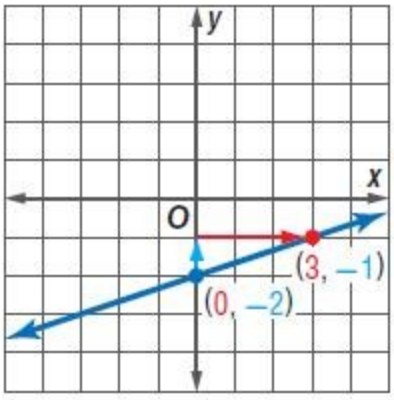
The slope is 2. To graph the equation, plot the y-intercept (0, 3). Then move up 2 units and right 1 unit. Plot the point. Draw a line through the two points.



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

SOLUTION:

The slope is $\frac{1}{3}$. To graph the equation, plot the y-intercept (0, −2). Then move up 1 unit and right 3 units. Plot the point. Draw a line through the two points.



Mid-Chapter Quiz

5. **BOATS** Write an equation in slope-intercept form for the total rental cost C for a pontoon boat used for t hours.

SOLUTION:

The rate of $75 per hour represents the rate or slope. The cleaning fee is a constant $30, no matter how many hours you rent the boat. So, the total cost C for a boat used for t hours can be written as $C = 75t + 30$.

Write an equation of the line with the given conditions.

6. (2, 5); slope 3

SOLUTION:

Find the y-intercept.

$$y = mx + b$$
$$5 = 3(2) + b$$
$$5 = 6 + b$$
$$-1 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = 3x - 1$$

7. (−3, −1), slope $\frac{1}{2}$

SOLUTION:

Find the y-intercept.

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

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = \frac{1}{2}x + \frac{1}{2}$$

8. (−3, 4), (1, 12)

SOLUTION:

Find the slope of the line containing the given points.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$= \frac{12 - 4}{1 - (-3)}$$
$$= \frac{8}{4}$$
$$= 2$$

Use the slope and either of the two points to find the y-intercept.

$$y = mx + b$$
$$12 = 2(1) + b$$
$$12 = 2 + b$$
$$10 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = 2x + 10$$

9. (−1, 6), (2, 4)

SOLUTION:

Find the slope of the line containing the given points.

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

Use the slope and either of the two points to find the y-intercept.

$$y = mx + b$$
$$4 = -\frac{2}{3}(2) + b$$
$$4 = -\frac{4}{3} + b$$
$$\frac{16}{3} = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = -\frac{2}{3}x + \frac{16}{3}$$

10. (2, 1), slope 0

SOLUTION:

Find the y-intercept.

$$y = mx + b$$
$$1 = 0(2) + b$$
$$1 = 0(2) + b$$
$$1 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = 0x + 1$$
$$y = 1$$

11. **MULTIPLE CHOICE** Write an equation of the line that passes through the point (0, 0) and has slope −4.

A $y = x - 4$
B $y = x + 4$
C $y = -4x$
D $y = 4 - x$

SOLUTION:

Find the y-intercept.

$$y = mx + b$$
$$0 = -4(0) + b$$
$$0 = 0 + b$$
$$0 = b$$

Write the equation in slope-intercept form.

$$y = mx + b$$
$$y = -4x + 0$$
$$y = -4x$$

So, the correct choice is C.

Write an equation in point-slope form for the line that passes through each point with the given slope.

12. (1, 4), $m = 6$

SOLUTION:

$$y - y_1 = m(x - x_1)$$
$$y - 4 = 6(x - 1)$$

13. (−2, −1), $m = -3$

SOLUTION:

$$y - y_1 = m(x - x_1)$$
$$y - (-1) = -3(x - (-2))$$
$$y + 1 = -3(x + 2)$$

14. Write an equation in point-slope form for the line that passes through the point (8, 3), $m = -2$.

SOLUTION:

$$y - y_1 = m(x - x_1)$$
$$y - 3 = -2(x - 8)$$

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15. Write $y+3=\frac{1}{2}(x-5)$ in standard form.

SOLUTION:

$y+3=\frac{1}{2}(x-5)$	Original equation
$2(y+3)=2\left(\frac{1}{2}\right)(x-5)$	Multiply each side by 2.
$2y+6=x-5$	Distributive Property
$-x+2y+6=x-x-5$	Subtract x from each side.
$-x+2y+6=-5$	Simplify.
$-x+2y+6-6=-5+6$	Subtract 6 from each side.
$-x+2y=-11$	Simplify.
$-1(-x+2y)=-1(-11)$	Multiply each side by -1.
$x-2y=11$	Simplify.

16. Write $y + 4 = -7(x - 3)$ in slope-intercept form.

SOLUTION:

$$y+4=-7(x-3)$$
$$y+4=-7x+21$$
$$y=-7x+17$$

Write each equation in standard form.

17. $y - 5 = -2(x - 3)$

SOLUTION:

$$y-5=-2(x-3)$$
$$y-5=-2x+6$$
$$2x+y-5=6$$
$$2x+y=11$$

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

SOLUTION:

$y+4=\frac{2}{3}(x-3)$	Original equation
$3(y+4)=3\left(\frac{2}{3}\right)(x-3)$	Multiply each side by 3.
$3y+12=2(x-3)$	Distributive Property
$3y+12=2x-6$	Distributive Property
$-2x+3y+12=2x-2x-6$	Subtract $2x$ from each side.
$-2x+3y+12=-6$	Simplify.
$-2x+3y+12-12=-18-12$	Subtract 12 from each side.
$-2x+3y=-18$	Simplify.
$-1(-2x+3y)=-1(-18)$	Multiply each side by 1.
$2x-3y=18$	Simplify.

Write each equation in slope-intercept form.

19. $y - 3 = 4(x + 3)$

SOLUTION:

$$y-3=4(x+3)$$
$$y-3=4x+12$$
$$y=4x+15$$

20. $y + 1 = \frac{1}{2}(x - 8)$

SOLUTION:

$$y+1=\frac{1}{2}(x-8)$$
$$y+1=\frac{1}{2}x-4$$
$$y=\frac{1}{2}x-5$$

21. **MULTIPLE CHOICE** Determine whether the graphs of the pair of equations are *parallel*, *perpendicular*, or *neither*.

$y = -6x + 8$

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

F parallel
G perpendicular
H neither
J not enough information

SOLUTION:

Find the slopes of each equation. The first equation has a slope of −6. Write the second equation in slope-intercept form to find the slope.

$$3x+\frac{1}{2}y=-3$$
$$2\left(3x+\frac{1}{2}y\right)=2(-3)$$
$$6x+y=-6$$
$$y=-6x-6$$

The slope of the second equation is −6. Because the two equations have the same slope, they are parallel. The correct choice is F.

Write an equation in slope-intercept form for the line that passes through the given point and is perpendicular to the graph of the equation.

22. $(3, -4)$; $y = -\frac{1}{3}x - 5$

SOLUTION:

The slope of the line with equation $y = -\frac{1}{3}x - 5$ is $-\frac{1}{3}$. The slope of the perpendicular line is the opposite reciprocal of $-\frac{1}{3}$, or 3.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-4) &= 3(x - 3) \\ y + 4 &= 3x - 9 \\ y &= 3x - 13 \end{aligned}$$

23. $(0, -3)$; $y = -2x + 4$

SOLUTION:

The slope of the line with equation $y = -2x + 4$ is -2. The slope of the perpendicular line is the opposite reciprocal of -2, or $\frac{1}{2}$.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-3) &= \frac{1}{2}(x - 0) \\ y + 3 &= \frac{1}{2}x \\ y &= \frac{1}{2}x - 3 \end{aligned}$$

24. $(-4, -5)$; $-4x + 5y = -6$

SOLUTION:

Write the equation in slope-intercept form.

$$\begin{aligned} -4x + 5y &= -6 \\ 5y &= 4x - 6 \\ y &= \frac{4}{5}x - \frac{6}{5} \end{aligned}$$

The slope of the line with equation $-4x + 5y = -6$ is $\frac{4}{5}$. The slope of the perpendicular line is the opposite reciprocal of $\frac{4}{5}$, or $-\frac{5}{4}$.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-5) &= -\frac{5}{4}(x - (-4)) \\ y + 5 &= -\frac{5}{4}x - 5 \\ y &= -\frac{5}{4}x - 10 \end{aligned}$$

25. $(-1, -4)$; $-x - 2y = 0$

SOLUTION:

Write the equation in slope-intercept form.

$$\begin{aligned} -x - 2y &= 0 \\ -2y &= x \\ y &= -\frac{1}{2}x \end{aligned}$$

The slope of the line with equation $-x - 2y = 0$ is $-\frac{1}{2}$. The slope of the perpendicular line is the opposite reciprocal of $-\frac{1}{2}$, or 2.

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-4) &= 2(x - (-1)) \\ y + 4 &= 2x + 2 \\ y &= 2x - 2 \end{aligned}$$