Graphing Equations in Slope-Intercept Form

§4.1

Slope-Intercept Form

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

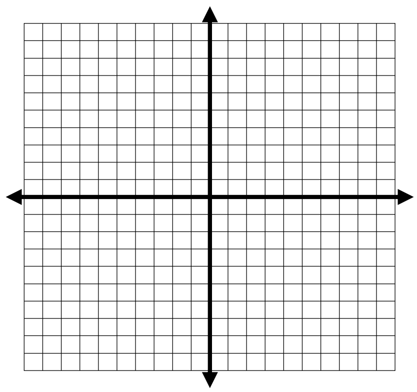
m = slope

b = y-intercept

Positive Slope Negative Slope 0 slope No Slope

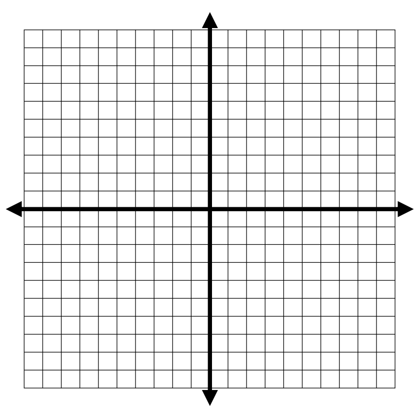
Example 1

Write an equation in slope-intercept form of the line with a slope of $\frac{2}{3}$ and a y-intercept of -4 and then graph.



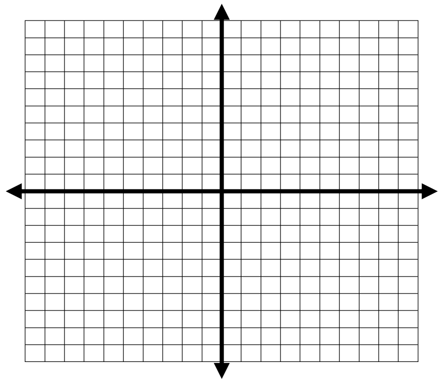
Example 2

Write an equation in slope-intercept form of the line with a slope of $-\frac{3}{5}$ and a y-intercept of 2 and then graph.



Example 3

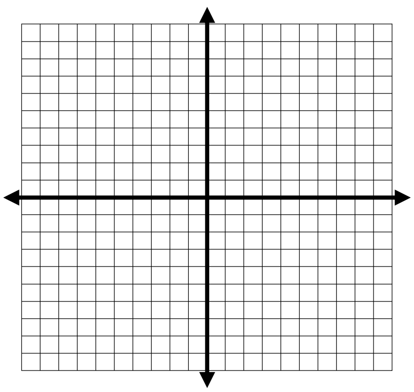
Write an equation in slope-intercept form of the line with a slope of 0 and a y-intercept of 6 and then graph.



Graph each.

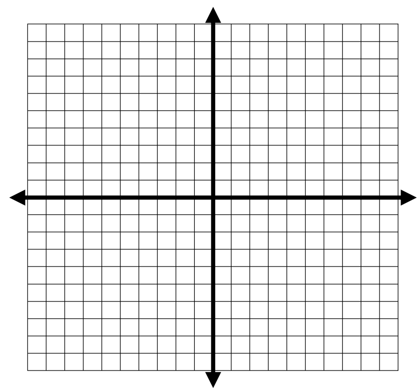
Example 4

$5x + 4y = 8$



Example 5

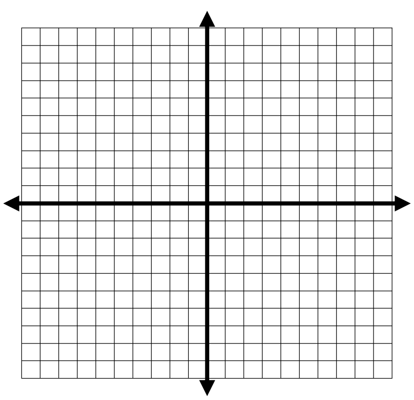
$3x - 2y = 10$



Graph each.

Example 6

$y = -3$



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Writing Equations in Slope-Intercept Form
§4.2

Example 1
Write an equation of the line that passes through (2, 5) and has a slope of -3.

Example 2
Write an equation of the line that passes through (2, -3) and has a slope of $\frac{1}{2}$.

Example 3
Write an equation of the line that passes through (-3, -4) and (-2, -8).

Example 4
Write an equation of the line that passes through (6, -2) and (3, 4).

Example 5
During one year, the average cost for gasoline was $3.20 in June and $3.42 in July.

a. Write an equation to predict the cost of any month using 1 to represent January.

b. Predict how much gas will cost in October.

Pg 227, 10-22, 25-30

Writing Equations in Point-Slope Form
§4.3

Point-Slope Form

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

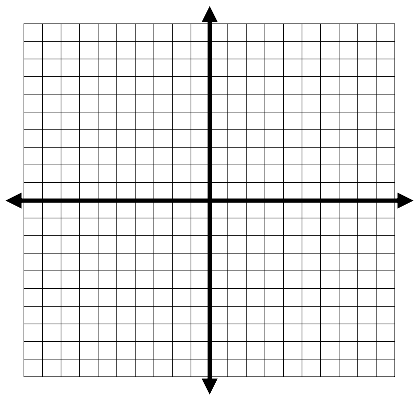
m = slope

(x_1, y_1) = point

Example 1

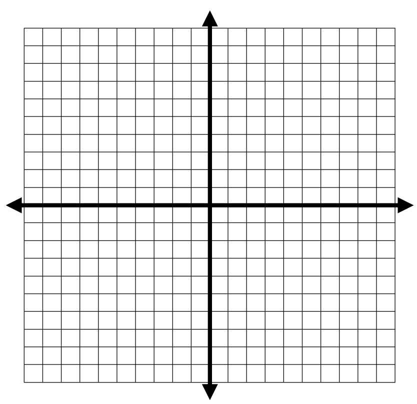
Write an equation for the line that passes through (-2, 0) with a slope of $-\frac{3}{2}$ and then graph.

(disregard directions in book to write in point-slope form)



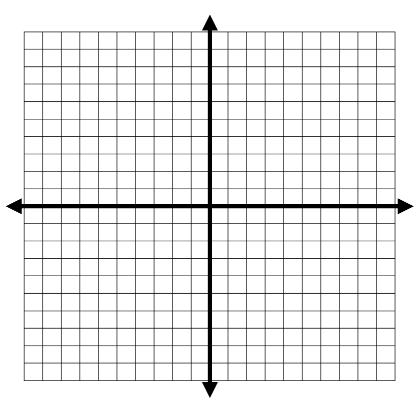
Example 2

Write an equation for the line that passes through (3, -4) with a slope of $\frac{1}{3}$ and then graph.



Example 3

Write an equation for the line that passes through (-5, -3) with a slope of $\frac{4}{5}$ and then graph.



Write each equation in standard form.

Example 4

$y - 3 = 4(x + 2)$

Example 5

$y + 2 = -3(x - 1)$

Example 4

$y + 5 = \frac{2}{3}(x + 4)$

Example 5

$y - 3 = -\frac{5}{2}(x + 6)$

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Parallel and Perpendicular Lines
§4.4

Parallel Lines – lines in the same plane that do not intersect.

What is also true about all parallel lines? (think about slope)

Example 1

Write an equation for the line that passes through (4, -2) and is parallel to $y = \frac{1}{2}x - 7$.

Example 2

Write an equation for the line that passes through (-6, -2) and is parallel to $y = \frac{2}{3}x + 11$.

Perpendicular Lines – lines in the same plane that intersect at right angles.

What is also true about all parallel lines? (think about slope)

Example 3

Write an equation for the line that passes through (4, -1) and is perpendicular to $7x - 2y = 3$.

Example 4

Write an equation for the line that passes through (-5, 3) and is perpendicular to $6x + 4y = 7$.

Determine whether the following are parallel, perpendicular, or neither.

Example 5

$2x + 3y = 8$ and $-4x - 6y = 13$

Example 6

$3x + 5y = 7$ and $6y - 10x = 12$

Example 7

$x = 4$ and $y = -3$

Example 8

$4y - 3x = 8$ and $-8x + 6y = 15$

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Scatter Plots and Lines of Fit
§4.5

Bivariate Data – data containing two variables.

Scatter Plot – shows the relationship between a set of data with two variables, graphed as an ordered pair on the coordinate plane.

positive correlation   negative correlation   no correlation

Line of Fit - a line used to approximate a linear relationship.

Example 1

Each of the seven executives oversees a varied number of salespersons. Below is a chart with the number of salespersons and total sales for one month for each. Draw the line of fit and find the equation and predict the total sales for 19 salespersons.

# of salespersons	12	33	17	22	24	8
Sales	250	699	350	460	501	102

Example 2

The table shows the growth of the world population. Identify the independent and dependent variables. Make a scatter plot and find the equation for the line of fit.

Year	1650	1850	1930	1975	2004
Population (millions)	500	1000	2000	4000	6400

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Regression and Median-Fit Lines
§4.6

Best-Fit Line – the line that approaches the data in a scatter plot (closer that line of fit).

Linear Regression – an algorithm to find a precise line of fit for a set of data.

Correlation Coefficient – a value that shows how close the points are to the line (-1 to 1).

Example 1
The table below shows Tom's hourly earnings for the years 2005-2011. Use a graphing calculator to write an equation for the best-fit line for the data.

Year	2005	2006	2007	2008	2009	2010	2011
Cost	$10.00	$10.50	$11.00	$13.00	$15.00	$15.75	$16.50

Graphing Calculator

1. Diagnostics on
   Catalog, Scroll down
   enter twice.
2. Stat, Edit
   x in L_1
   y in L_2
3. Stat, Calc, #4 (Linear Regression)
   L_1, L_2
4. y =
5. Vars, #5 (Statistics), EQ, enter
6. Graph.

b. According to the equation, what will the cost be in the year 2020?

Median-Fit Line – a type of best-fit line that is calculated using the medians of the coordinates of the data points.

Example 2 (same as above)

The table below shows Tom's hourly earnings for the years 2005-2011. Use a graphing calculator to write an equation for the best-fit line for the data.

Year	2005	2006	2007	2008	2009	2010	2011
Cost	$10.00	$10.50	$11.00	$13.00	$15.00	$15.75	$16.50

Graphing Calculator

1. Stat, Edit

   x in L_1

   y in L_2

2. Stat, Calc, #3 (Med-Med)

L_1, L_2

3. y =

4. Vars, #5 (Statistics), EQ, enter

5. Graph.

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Special Functions
§4.7

<u>Step Function</u> – a function with a graph that is a series of horizontal line segments.

<u>Piecewise-Linear Function</u> – a function written using two or more linear expressions.

<u>Greatest Integer Function</u> – a step function, written as $f(x) = \llbracket x \rrbracket$, where *f(x)* is the greatest integer less than or equal to *x*.

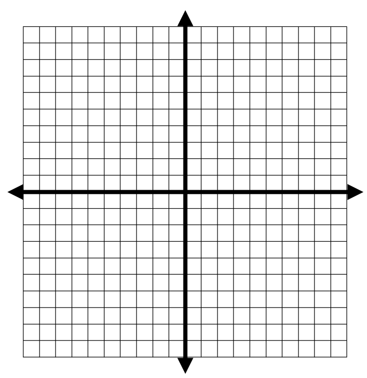
<u>Example 1</u>
$\llbracket 8.7 \rrbracket =$

<u>Example 2</u>
$\llbracket -1.6 \rrbracket =$

<u>Example 3</u>
$\llbracket 4 \rrbracket =$

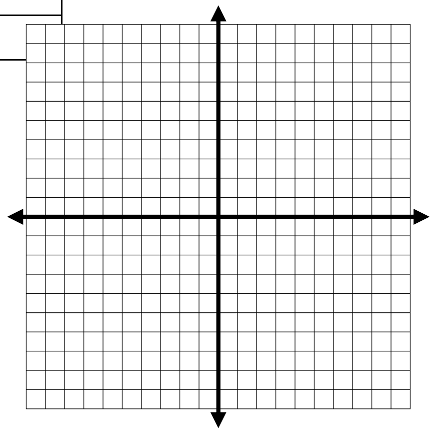
<u>Example 4</u>
Graph $y = \llbracket x+2 \rrbracket$

x	$x+2$	$\llbracket x+2 \rrbracket$



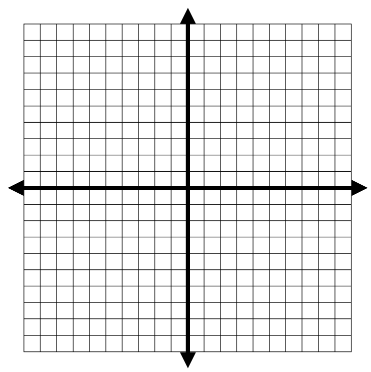
<u>Example 5</u>
Graph $y = 2\llbracket x \rrbracket$

x	$2\llbracket x \rrbracket$



<u>Example 6</u>

The price of aluminum given by a recycling center is based upon weight. If the aluminum weighs more than 0 pounds but less than or equal to 1 pound, there is no payment. If the aluminum weighs more than 1 pound and less than or equal to 2 pounds, the price is $1.00. For each additional pound, the price increases $1.00. Graph the function.



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Special Functions
§4.7(Day 2)

Absolute Value Function – a function written as $f(x) = |x|$ in which $f(x) \geq 0$ for all values of x.

Piecewise-Defined Function – a function that is written using two or more expressions.

Example 1
|-5| =

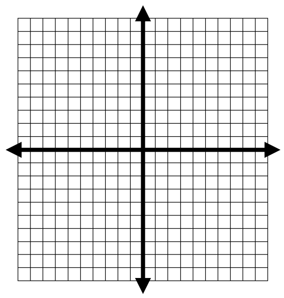
Example 2
|3| =

Example 3
|8.7| =

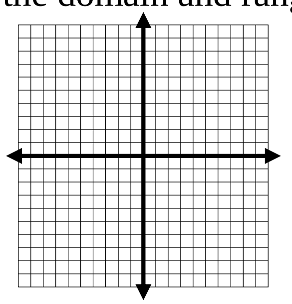
Example 4
$y = |x|$

Example 5
$y = |x| + 2$

Example 6
$y = |x + 2|$

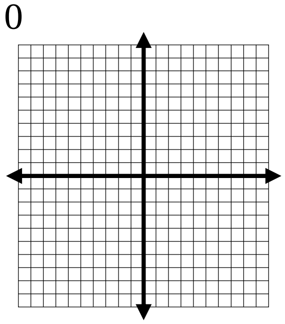


Example 7
Graph $f(x) = |2x + 2|$ and state the domain and range.



Example 8

Graph $f(x) = \begin{cases} -x \text{ if } x < 0 \\ -x + 2 \text{ if } x \geq 0 \end{cases}$ and state the domain and range.



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