NAME _____ DATE _____ PERIOD _____

3-1 Notes & Practice

Graphing Linear Equations

Identify Linear Equations and Intercepts A **linear equation** is an equation that can be written in the form $Ax + By = C$. This is called the **standard form** of a linear equation.

Standard Form of a Linear Equation	$Ax + By = C$, where $A \geq 0$, A and B are not both zero, and A, B, and C are integers with GCF of 1.

Example 1 **Determine whether $y = 6 - 3x$ is a linear equation. Write the equation in standard form.**

First rewrite the equation so both variables are on the same side of the equation.

$y = 6 - 3x$	Original equation.
$y + 3x = 6 - 3x + 3x$	Add $3x$ to each side.
$3x + y = 6$	Simplify.

The equation is now in standard form, with $A = 3$, $B = 1$ and $C = 6$. This is a linear equation.

Example 2 **Determine whether $3xy + y = 4 + 2x$ is a linear equation. Write the equation in standard form.**

Since the term $3xy$ has two variables, the equation cannot be written in the form $Ax + By = C$. Therefore, this is not a linear equation.

Lesson 3-1

Exercises

Determine whether each equation is a linear equation. Write *yes* or *no*. If yes, write the equation in standard form.

1. $2x = 4y$

2. $6 + y = 8$

3. $4x - 2y = -1$

4. $y - 4x = 9$

5. $x + 8 = 0$

6. $-2x + 3 = 4y$

7. $6x + 4y - 3 = 0$

8. $yx - 2 = 8$

9. $6x - 2y = 8 + y$

NAME _____ DATE _____ PERIOD _____

3-1 Notes & Practice Continued...

Graphing Linear Equations

Graph Linear Equations The graph of a linear equations represents all the solutions of the equation. An x-coordinate of the point at which a graph of an equation crosses the x-axis in an ***x*-intercept.** A y-coordinate of the point at which a graph crosses the y-axis is called a ***y*-intercept.**

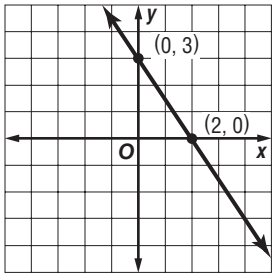
Example 1 **Graph the equation $3x + 2y = 6$ by using the x and y-intercepts.**

To find the x-intercept, let $y = 0$ and solve for x. The x-intercept is 2. The graph intersects the x-axis at (2, 0).

To find the y-intercept, let $x = 0$ and solve for y.

The y-intercept is 3. The graph intersects the y-axis at (0, 3).

Plot the points (2, 0) and (0, 3) and draw the line through them.



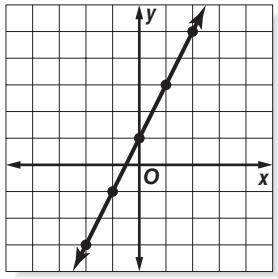
Example 2 **Graph the equation $y - 2x = 1$ by making a table.**

Solve the equation for y.

$y - 2x = 1$	Original equation.
$y - 2x + 2x = 1 + 2x$	Add $2x$ to each side.
$y = 2x + 1$	Simplify.

Select five values for the domain and make a table. Then graph the ordered pairs and draw a line through the points.

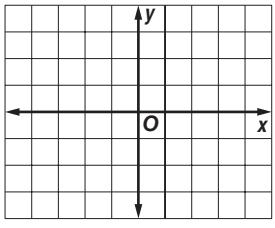
x	$2x + 1$	y	(x, y)
-2	$2(-2) + 1$	-3	$(-2, -3)$
-1	$2(-1) + 1$	-1	$(-1, -1)$
0	$2(0) + 1$	1	(0, 1)
1	$2(1) + 1$	3	(1, 3)
2	$2(2) + 1$	5	(2, 5)



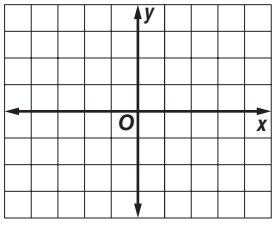
Exercises

Graph each equation by using the x- and y-intercepts.

1. $2x + y = -2$

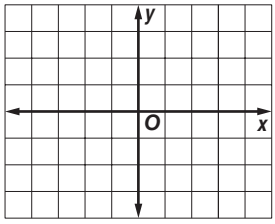


2. $-2x + y = -2$

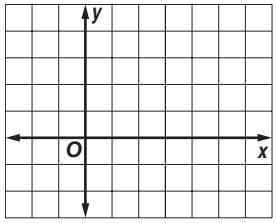


Graph each equation by making a table.

3. $y = 2x$



4. $x + 2y = 4$



NAME _____ DATE _____ PERIOD _____

3-1 Assignment 1

Graphing Linear Equations

Determine whether each equation is a linear equation. Write *yes* or *no*. If yes, write the equation in standard form.

1. $xy = 6$

2. $y = 2 - 3x$

3. $5x = y - 4$

4. $y = 2x + 5$

5. $y = -7 + 6x$

6. $y = 3x^2 + 1$

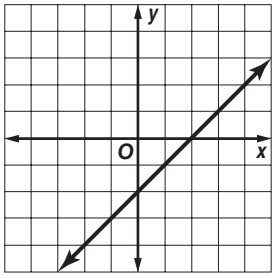
7. $y - 4 = 0$

8. $5x + 6y = 3x + 2$

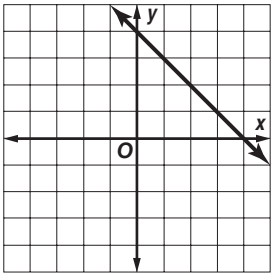
9. $\frac{1}{2}y = 1$

Find the *x*- and *y*-intercepts of each linear function.

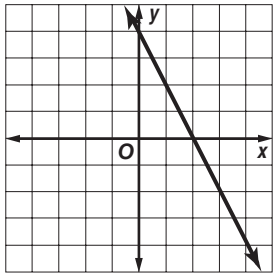
10.



11.

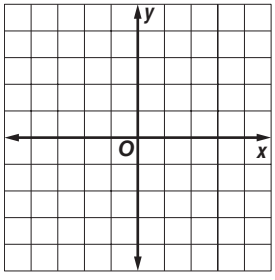


12.

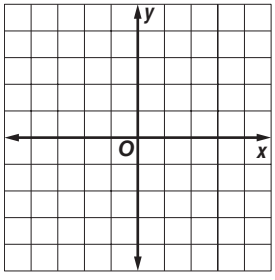


Graph each equation by making a table.

13. $y = 4$

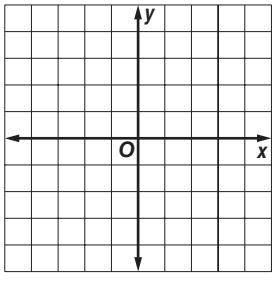


14. $y = x + 4$

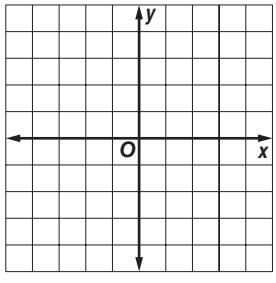


Graph each equation by using the *x*- and *y*-intercepts.

15. $x - y = 3$



16. $4x = 2y + 6$



Lesson 3-1

NAME _____ DATE _____ PERIOD _____

3-1 Assignment 2

Graphing Linear Equations

Determine whether each equation is a linear equation. Write *yes* or *no*. If yes, write the equation in standard form and determine the *x*- and *y*-intercepts.

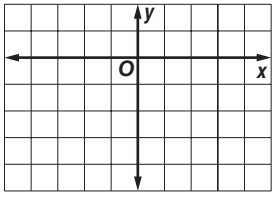
1. $4xy + 2y = 9$

2. $8x - 3y = 6 - 4x$

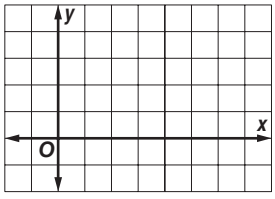
3. $7x + y + 3 = y$

Graph each equation.

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



5. $5x + 3y = 9$

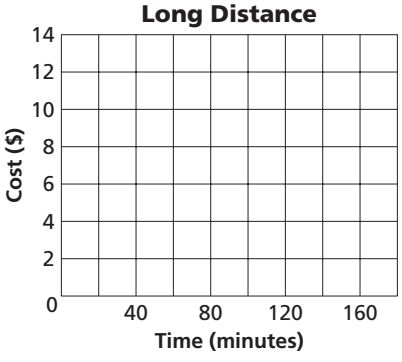


6. **COMMUNICATIONS** A telephone company charges \$4.95 per month for long distance calls plus \$0.05 per minute. The monthly cost c of long distance calls can be described by the equation $c = 0.05m + 4.95$, where m is the number of minutes.

   a. Find the y-intercept of the graph of the equation.

   b. Graph the equation.

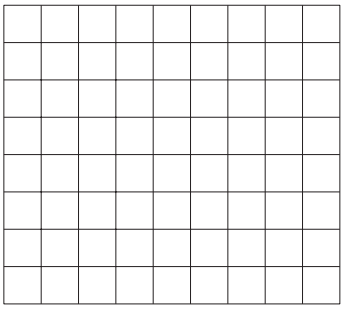
   c. If you talk 140 minutes, what is the monthly cost?



7. **MARINE BIOLOGY** Killer whales usually swim at a rate of 3.2–9.7 kilometers per hour, though they can travel up to 48.4 kilometers per hour. Suppose a migrating killer whale is swimming at an average rate of 4.5 kilometers per hour. The distance d the whale has traveled in t hours can be predicted by the equation $d = 4.5t$.

   a. Graph the equation.

   b. Use the graph to predict the time it takes the killer whale to travel 30 kilometers.



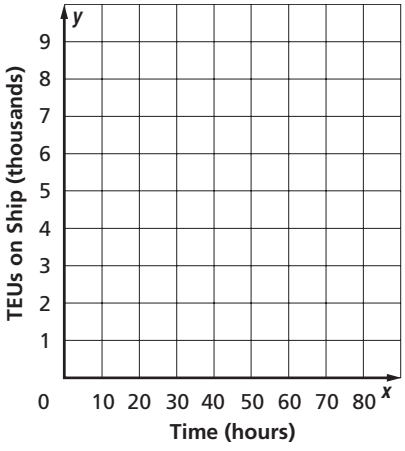
NAME _____ DATE _____ PERIOD _____

3-1 Word Problem Practice (Extra Credit)

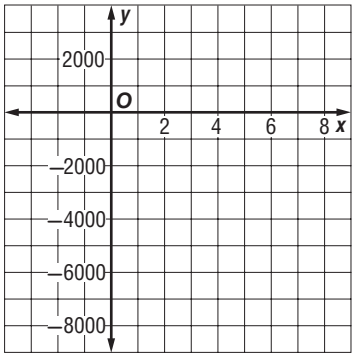
Graphing Linear Equations

1. FOOTBALL One football season, the Carolina Panthers won 4 more games than they lost. This can be represented by $y = x + 4$, where x is the number of games lost and y is the number of games won. Write this linear equation in standard form.

2. **SHIPPING** The *OOCL Shenzhen,* one of the world's largest container ships, carries 8063 TEUs (1280 cubic feet containers). Workers can unload a ship at a rate of a TEU every minute. Using this rate, write and graph an equation to determine how many hours it will take the workers to unload half of the containers from the *Shenzhen*.



3. **BUSINESS** The equation $y = 1000x - 5000$ represents the monthly profits of a start-up dry cleaning company. Time in months is x and profit in dollars is y. The first date of operation is when time is zero. However, preparation for opening the business began 3 months earlier with the purchase of equipment and supplies. Graph the linear function for x-values from -3 to 8.



4. **BONE GROWTH** The height of a woman can be predicted by the equation $h = 81.2 + 3.34r$, where h is her height in centimeters and r is the length of her radius bone in centimeters.

a. Is this is a linear function? Explain.

b. What are the r- and h-intercepts of the equation? Do they make sense in the situation? Explain.

c. Use the function to find the approximate height of a woman whose radius bone is 25 centimeters long.

Lesson 3-1