# Intro to Linear Equations

**Linear Equations:**

$$y = 2x - 7 \qquad\qquad y = \frac{1}{2}x - 5 \qquad\qquad 2x - 3y = 12$$

**Linear Equations** generally contain two variables:  x and y.
In a linear equation,
**y is called the dependent variable** and
**x is the independent variable.**
This is because y is dependent on what you plug-in for x.
The **domain** of a linear equation is the set of all x-coordinates and the
**range** is the set of all y-coordinates.

**Examples:**
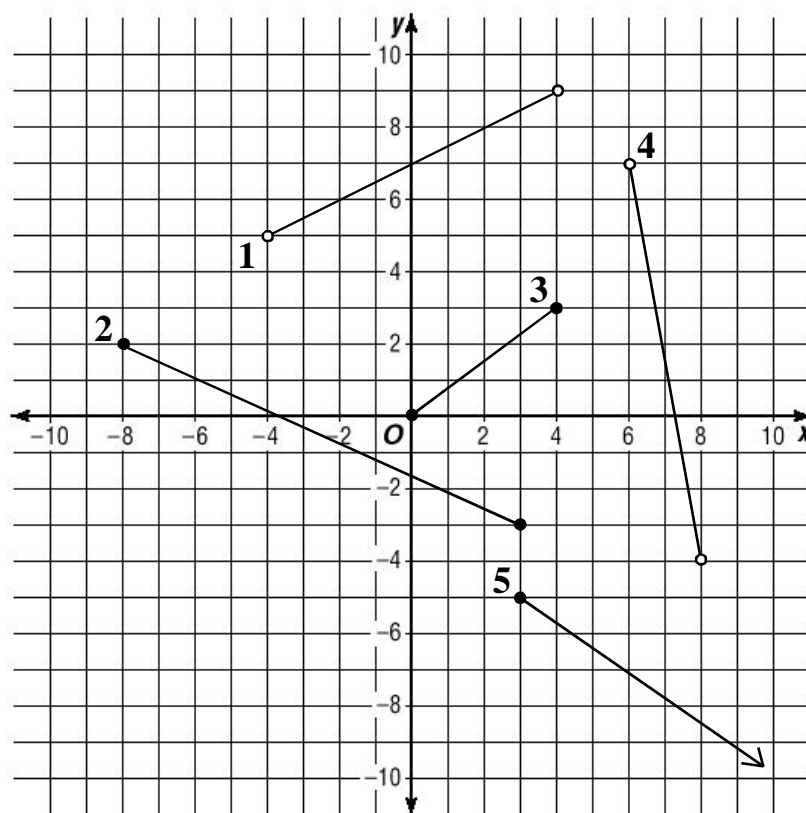State the range and the domain for each set of points below.

**1.** (-3, -3)  (-1, 1)  (1, 5)  (3, 9)  (5, 13)

**2.** (-5, 8)  (-2, 5)  (1, 5)  (4, 9)  (7, 13)

**Practice:**
State the range and domain for each set of points graphed below as an
inequality:
**Ex.  #1**  <u>Domain  -4 < x < 4   Range: 5 < y < 9</u>

# Intro to Linear Equations

Given a **domain**, it is easy to find the **range** for any linear equation.

**Examples:**
Find the range for the given domain:

**1.**  $y = 2x - 3$   {D: -3, -2, -1, 0}

**2.**  $y = 2x - 3$   {D: 6, 1, -4, -9}

**Practice:**
Find the range for the given domain:

**1.**  $y = -3x - 7$       {D: -3, -2, -1, 0}

**2.**  $y = \dfrac{2}{3}x - 1$  {D: 6, 3, 0, -3,  -6}

**3.**  $2y = 6x - 10$    {D: -1, 1, 3, 5}

In problems like #3 above, it helps a lot to solve for y before plugging in values for the domain.

**Practice:**
Find the range for the given domain.  Begin by solving for y.
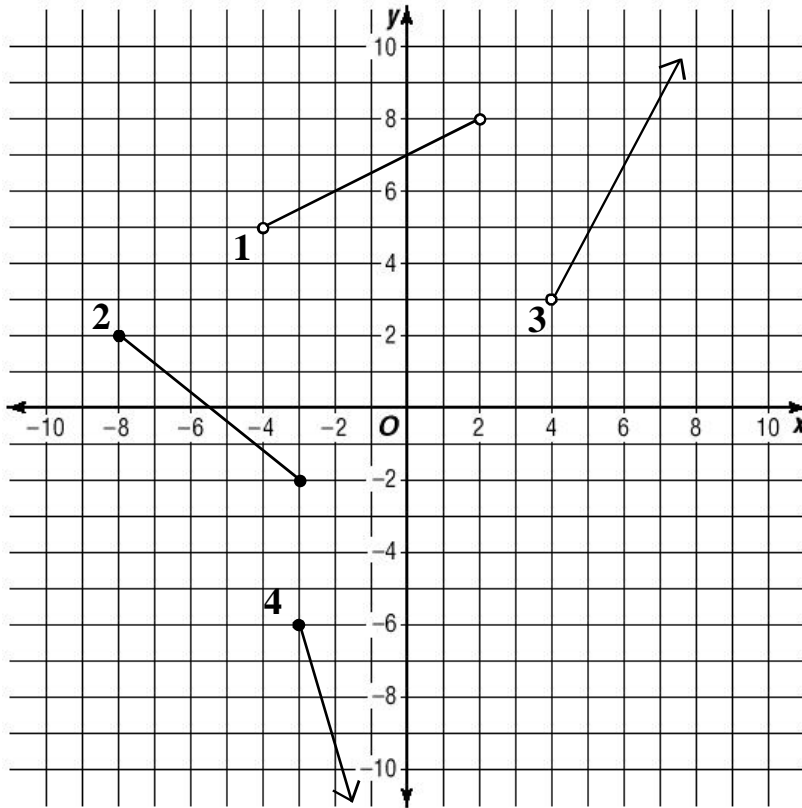
**1.**  $2y - 7 = 4x - 5$   {D: -3, -2, -1, 0}

**2.**  $3y - 6 = -9x$     {D: 6, 3, 0, -3}

**3.**  $5y = 3x - 10$    {D: x>5 }

# Intro to Linear Equations

**Math 3     6.0**

For each graph below, state the domain and range using an inequality:



1.  Domain:  _____

    Range:  _____

2.  Domain:  _____

    Range:  _____

3.  Domain:  _____

    Range:  _____

4.  Domain:  _____

    Range:  _____

List the Domain and Range for each set of points listed below:

5.  (9,1)  (8,2)  (7, 3)  (6, 4)  (5, 5)

5.  Domain:  _____

    Range:  _____

6.  (-3, -3)  (-3, -4)  (-3, -5)  (-3, -6)

6.  Domain:  _____

    Range:  _____

7.  $y = x - 3$  for x = -3, -4, 5, and 6

7.  Domain:  _____

    Range:  _____

8.  $y = 2x + 5$  for x > 3

8.  Domain:  {D:  x > 3}_____

    Range:  _____

# Intro to Linear Equations

Given each domain below, find the range for each equation.  Solve for y where necessary.

9.  $y = -2x + 3$  {D: -1, 0, 1, 2}

**9.** Range:  _____

10.  $y = \dfrac{1}{2}x - 5$  {D: -4, -2, 0, 2}

**10.** Range:  _____

11.  $3y = -6x + 12$  {D: -5, -3, 1, 5}

**11.** Range:  _____

12.  $x - y = 4$  {D: 4, 1, -1, -9}

**12.** Range:  _____

13.  $3y = x + 6$  {D: -3, 0, 3, 9}

**13.** Range:  _____

14.  $5y - 3x = 10$  {D: -15, -10, -5, 0}

**14.** Range:  _____

15.  $2x + y = 3x - 7$  {D: -4, 4, 12, 20}

**15.** Range:  _____

# Graphing A Linear Equation

**To graph a Linear Equation:**
1. Solve for y.
2. Setup a table of x and y values.
3. Plot at least three coordinates and connect them.
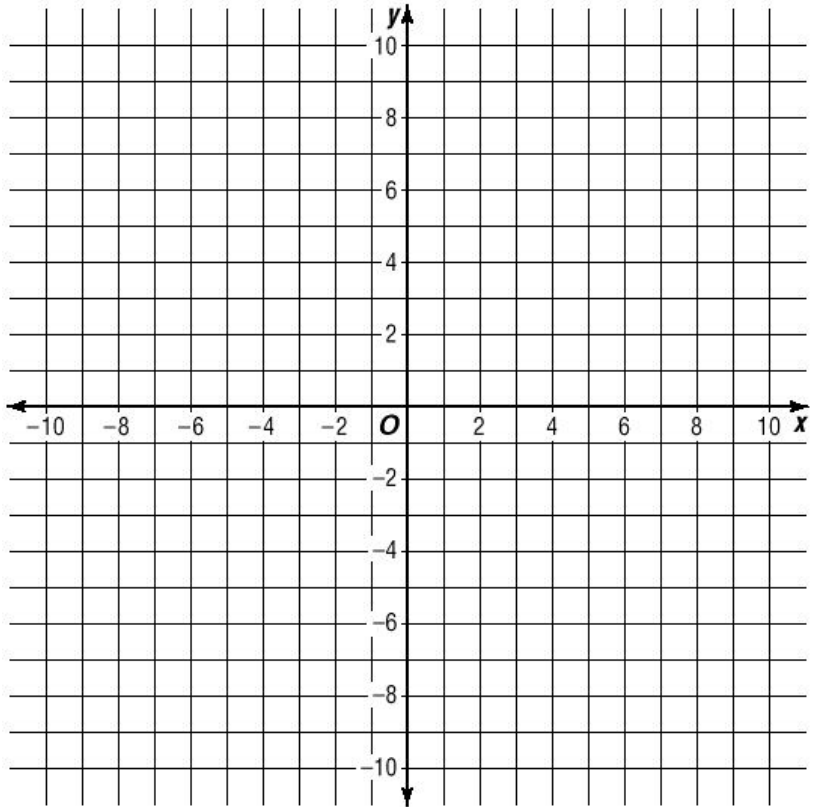
**Ex.**
Graph

$$y = 2x - 7$$

Graph
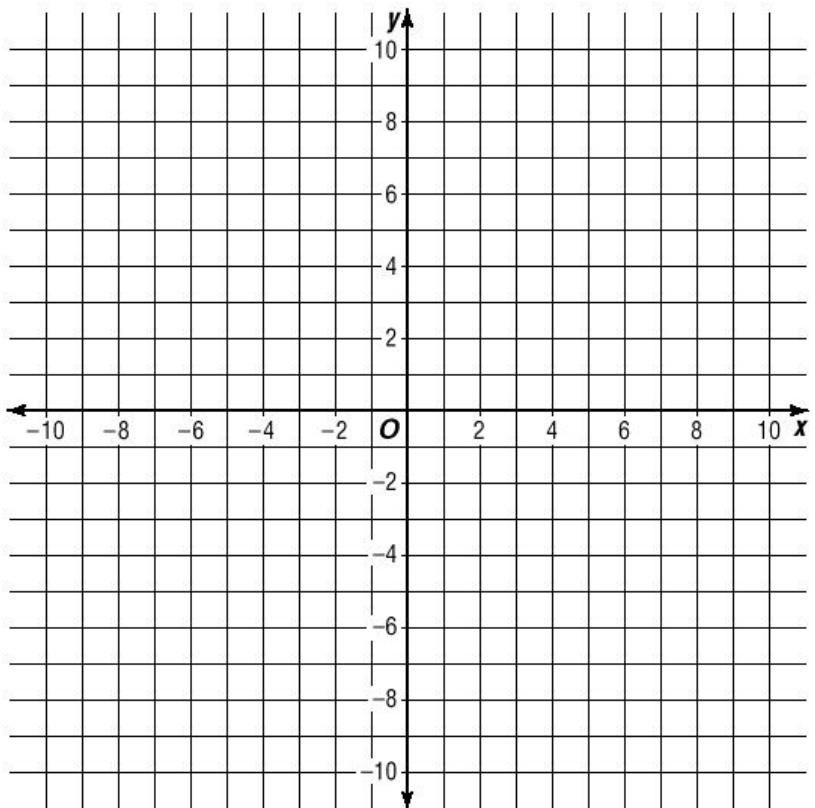
$$y = \frac{2}{3}x + 2$$

**Practice**
Plot each of the following equations on the same graph.

1. $y = -3x + 4$

2. $y = \frac{3}{4}x - 5$

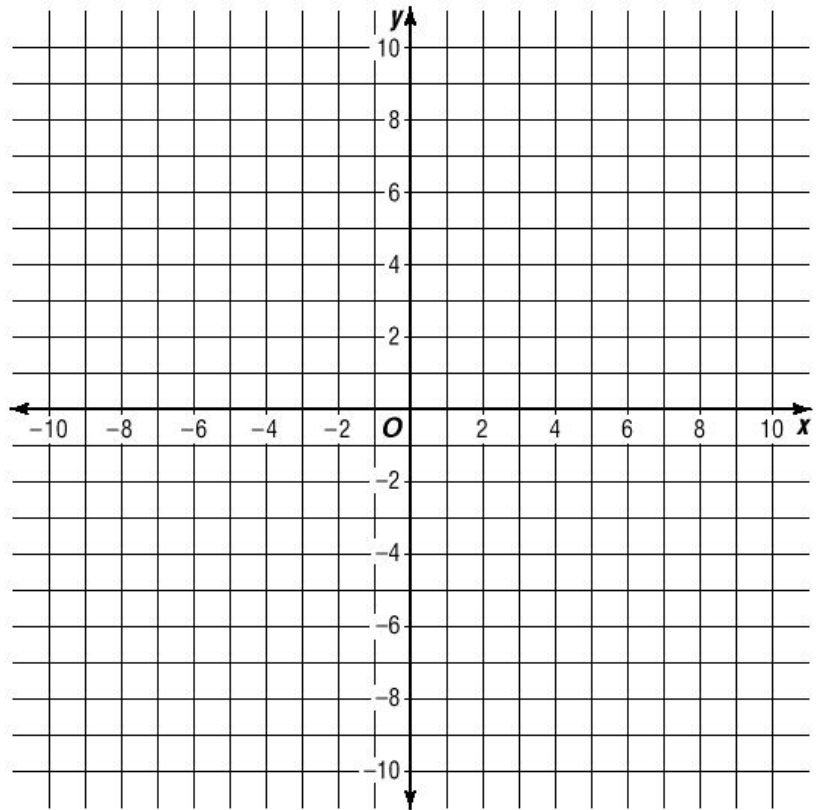3. $y + 3x = 9$

# Graphing A Linear Equation

**Practice**

Plot each of the following equations on the same graph.

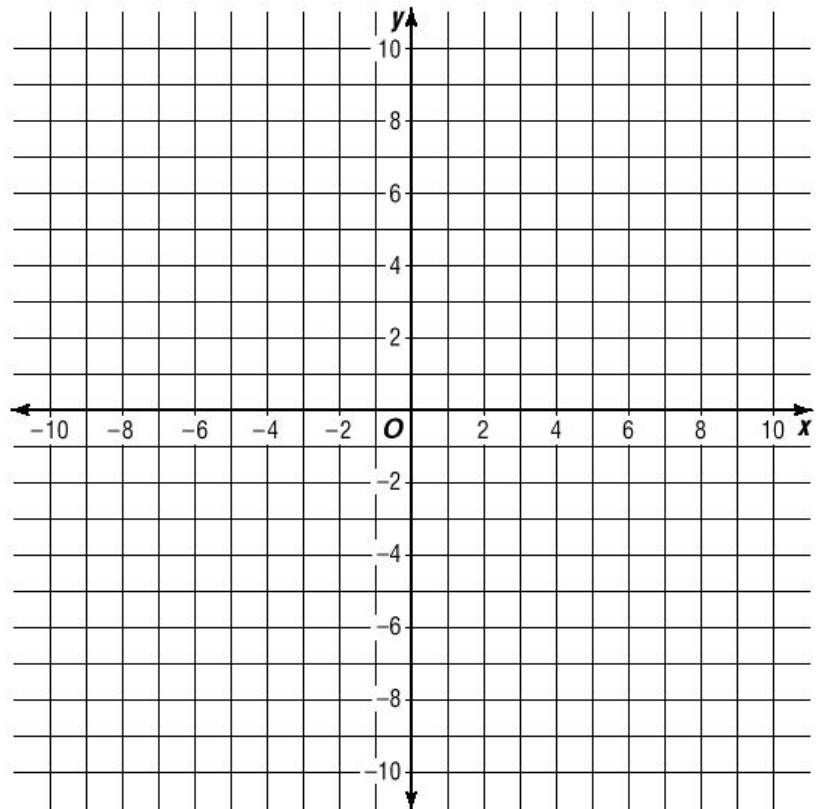1. $x - y = 5$

2. $3y = 2x - 9$

3. $3y - 12 = 2x$

**Practice**

Plot each of the following equations on the same graph.

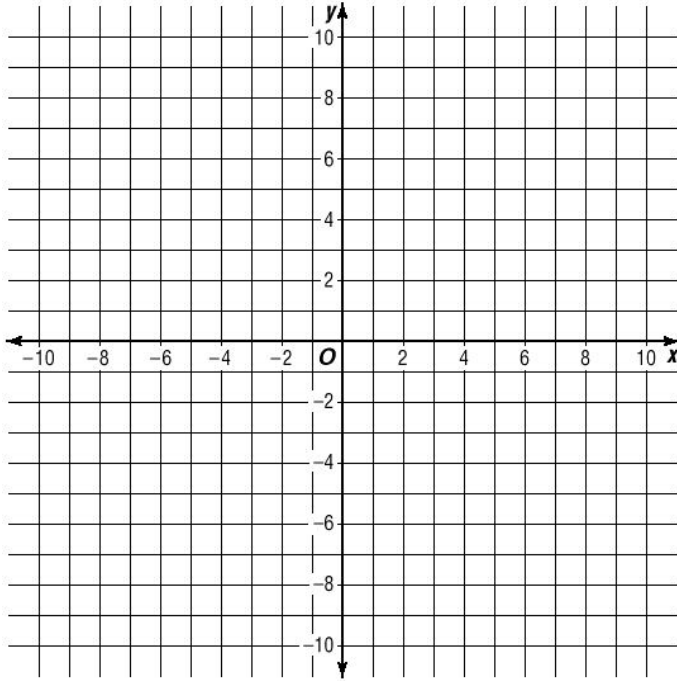1. $-3x = y - 5$

2. $3 = 4x - y$

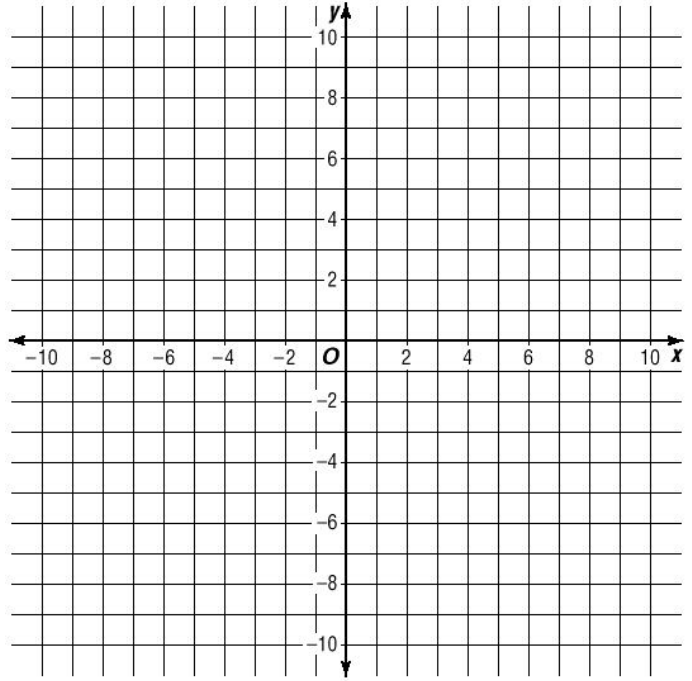3. $y - 5 = \frac{2}{3}(x + 3)$

# Graphing Linear Equations
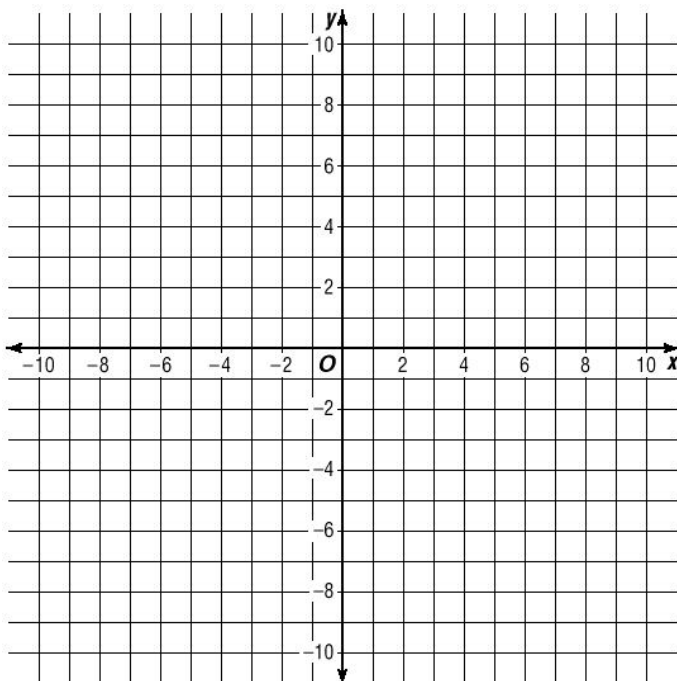
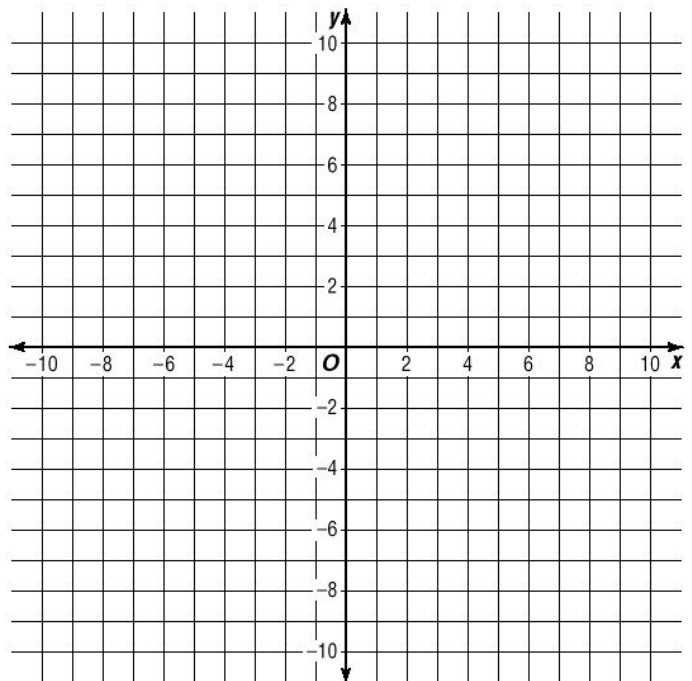Graph each equation below on the graphs provided.

**1.** $y = x - 9$

**2.** $3y = 2x - 12$
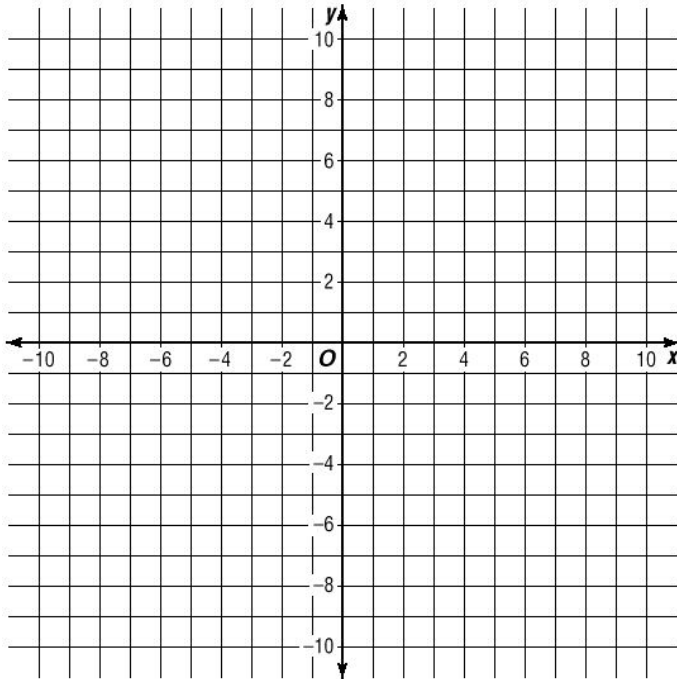
**3.** $6x - 2y = 4$

**4.** $y - 3 = \dfrac{1}{2}x - 6$
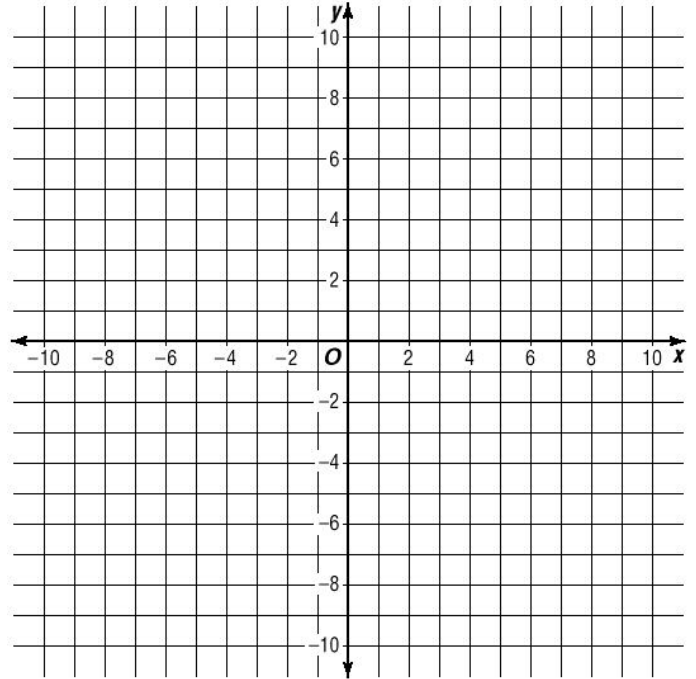
# Graphing Linear Equations
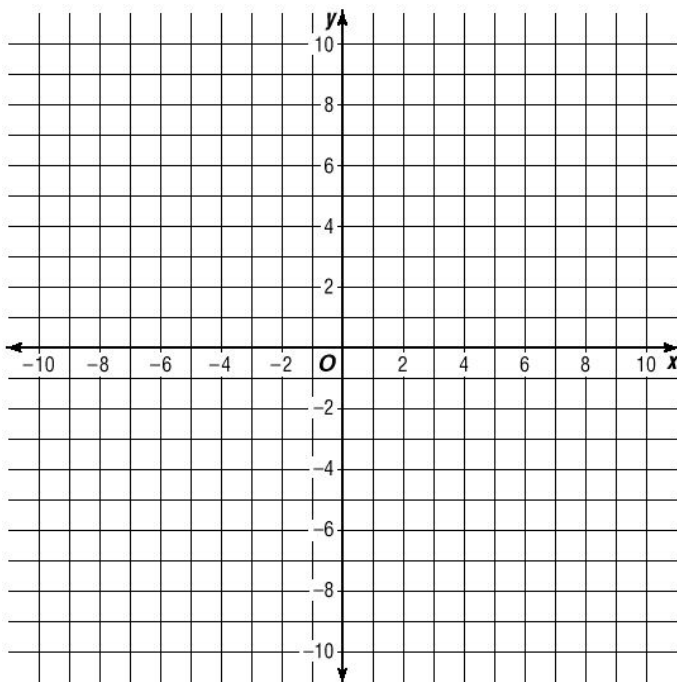
Graph each equation below on the graphs provided.

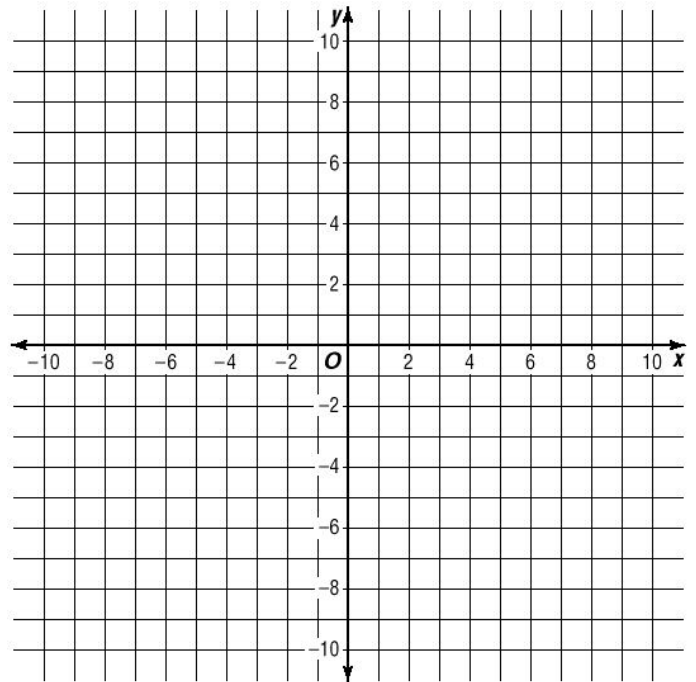**5.** $4y + 11 = 3x - 1$

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



**7.** $\dfrac{3}{4}x = y + 1$

**8.** $y = 5$  (this is the same as y=0x+5)

# Standard Form

**Standard Form of** a linear equation:

$$2x - y = 6 \qquad 3x - 7y = 21 \qquad 2x - 6y = 1$$

Examples above are **Linear Equations written in Standard Form.**
Here is **Standard Form. MEMORIZE THIS.**

$$Ax + By = C$$

1. No absolute value, exponents, square roots, etc.
2. 1 or 2 variables (A and B cannot both be zero).
3. All linear equations can be written in Standard Form.
4. A, B, and C are Integers (not fractions). A should be positive.

**Practice:**
Label the values for A, B, and C in each linear equation below.

1. $2x - y = 6$    2. $3x - 7y = 21$    3. $x = 7$

**Examples:**
Convert each equation below into Standard Form if possible.
**Get both variables ON THE SAME SIDE OF THE EQUATION.**

1. $y = 3x - 5$    2. $\dfrac{1}{2}y = \dfrac{2}{3}x - \dfrac{3}{4}$    3. $\dfrac{x}{3} = \dfrac{5}{y}$

**Practice:**
Convert each equation below into Standard Form if possible.

1. $y - 5 = x$    2. $\dfrac{3}{5}y = \dfrac{1}{4}x$    3. $x(x + 1) = y$

# Standard Form

Convert each equation below into Standard Form.
Remember to remove all fractional coefficients.

**1.** $x = y - 3$

**2.** $-3y = 7 - 2x$

**3.** $\dfrac{7 - x}{4} = y$

**4.** $2(x - 2) = 10y$

**5.** $x = 7$

**6.** $-2y = 12$

**7.** $x = 4y$

**8.** $5y = 2x$

**9.** $y = \dfrac{2}{3}x - 4$

**10.** $2 + \dfrac{2}{5}x = \dfrac{4}{5}y$

**11.** $x = \dfrac{1}{2}y - 3$

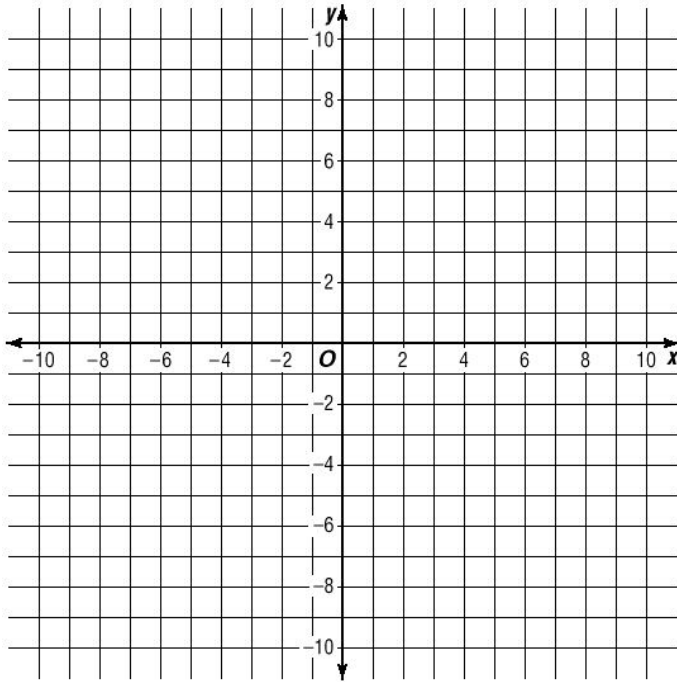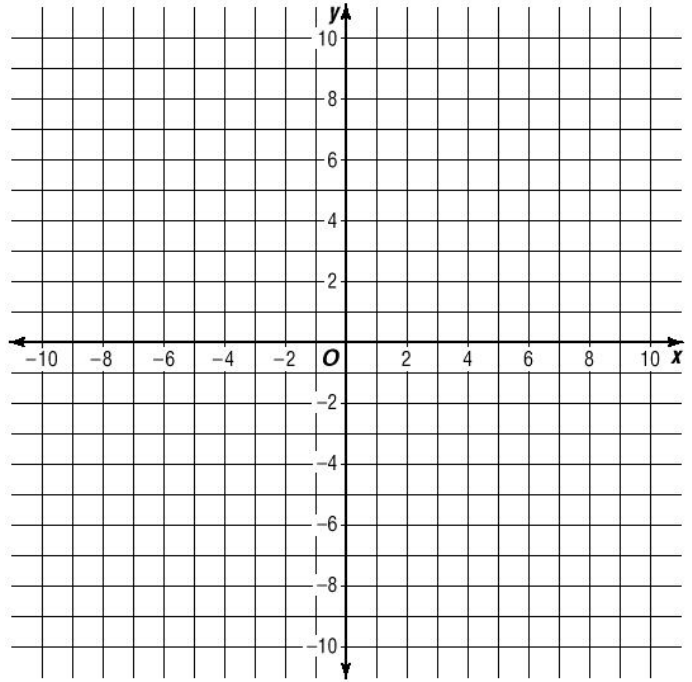**12.** $\dfrac{2}{9}x = y - 1$

# Standard Form

Each Equation below is written in Standard Form.
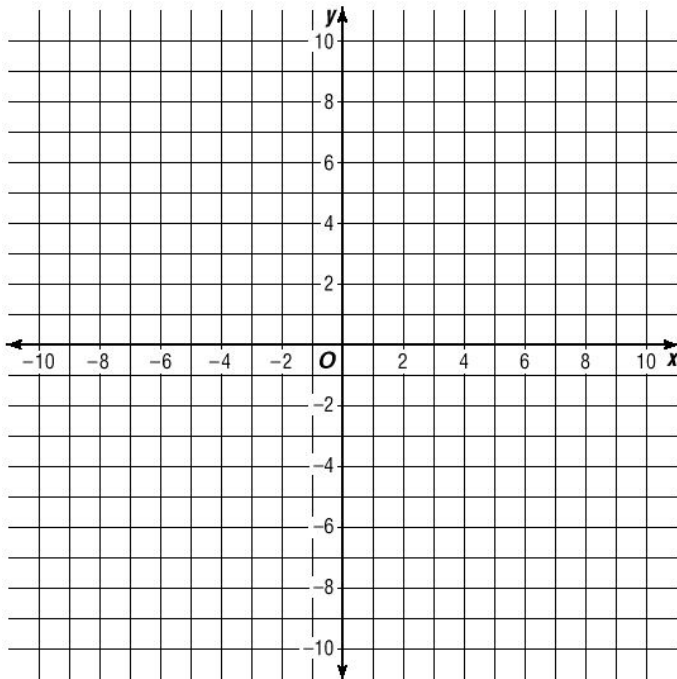Solve each for y, create a table of values, and graph each.

**13.** $x - y = -3$



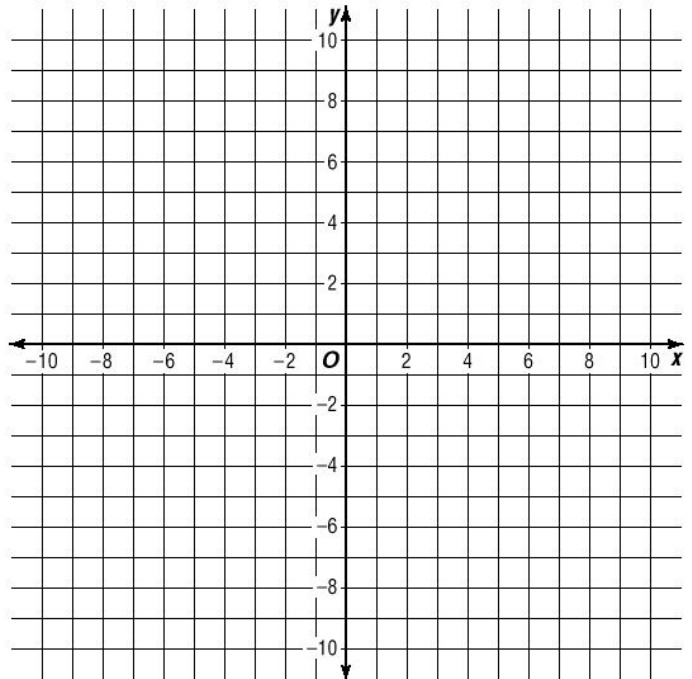**14.** $6x - 3y = -12$



**15.** $3x + y = 6$



**16.** $x + 2y = 6$

# Standard Form and Intercepts   Math 3    6.0

On a graph, the **x-intercept** is where the line crosses the x-axis.
The **y-intercept** is where a line crosses the y-axis.

**Practice:**
Look at the graphs below and give the coordinates of
the x and y-intercepts.

1.
x-int. _____

y-int. _____

2.
x-int. _____

y-int. _____

3.
x-int. _____

y-int. _____
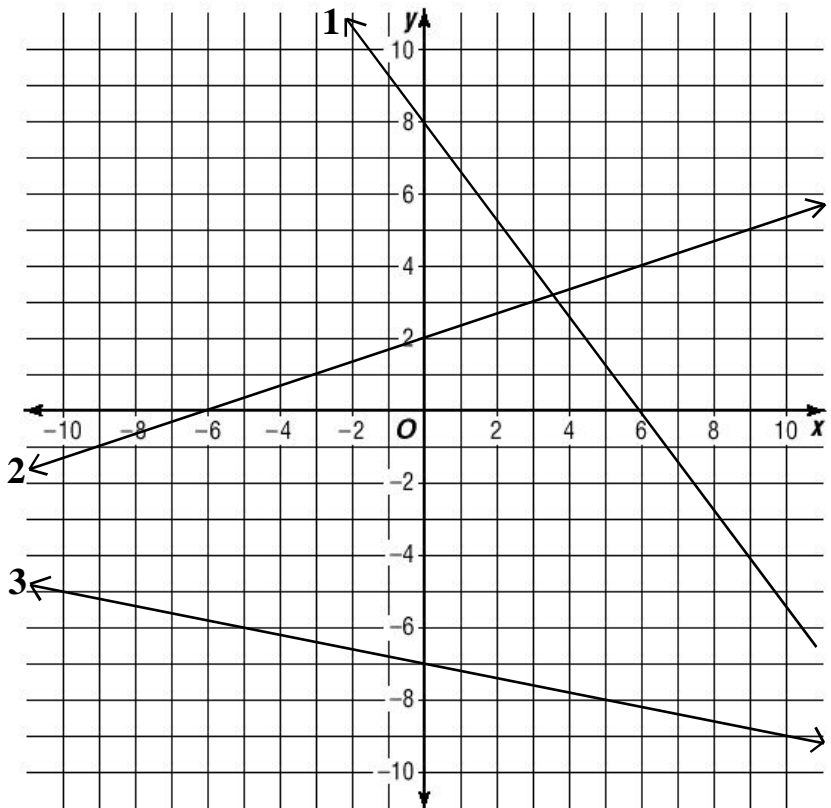
**notes:**
The x-intercept always occurs where y equals _____.
The y-intercepts always occurs where x equals _____.

**Set y=0 to find the x-intercept.**
**Set x=0 to find the y-intercept.**

**Examples:**  Find the x and y-intercepts of each.
**We will call this the coverup method.**

1. $3x - y = 12$        2. $2x - 5y = 4$        3. $2x - 3y = 8$

**Practice:**  Find the x and y-intercepts of each.

1. $5x + 3y = 30$        2. $x - 7y = 11$        3. $\dfrac{3}{4}x - \dfrac{2}{3}y = 7$

# Standard Form and Intercepts    Math 3    6.0

**Practice:**
Each line below goes with one of the linear equations on the left.
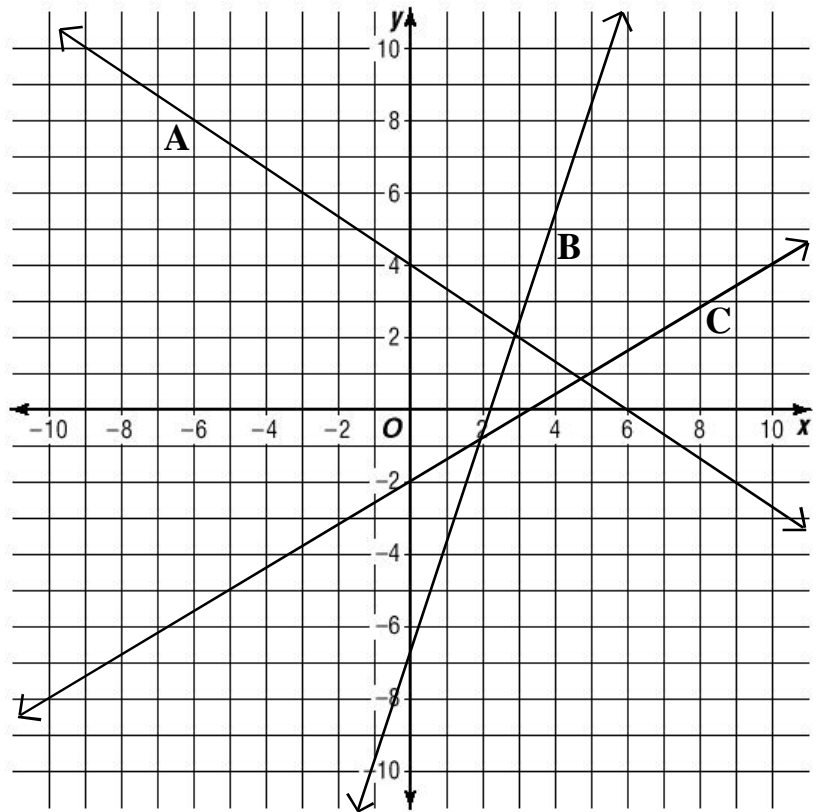Match each equation with its graph by finding the intercepts.
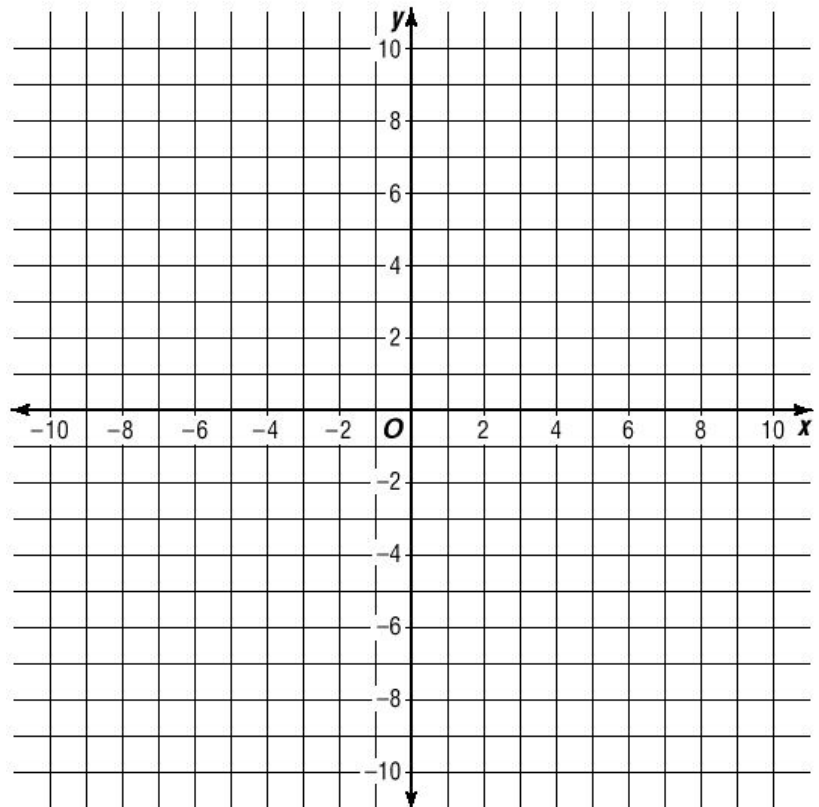
**1.** $2x + 3y = 12$

**2.** $3x - 5y = 10$

**3.** $3x - y = 7$



**Practice:** Graph each of the following using the intercepts:

**1.** $5x - 3y = 15$

**2.** $2x - y = 8$

**3.** $x - 3y = 9$

# Standard Form and Intercepts

**Determine the x and y-intercepts for each equation below.**
**Convert to Standard Form where necessary.**

1. $x - 3y = -9$

    x-int.: _____

    y-int. _____

2. $5x - 2y = 10$

    x-int.: _____

    y-int. _____

3. $x - 9y = 7$

    x-int.: _____

    y-int. _____

4. $2x - 7y = 3$

    x-int.: _____

    y-int. _____

5. $x + 9 = 3y$

    x-int.: _____

    y-int. _____

6. $3y = 2x - 5$

    x-int.: _____

    y-int. _____

7. $y = 2x - 3$

    x-int.: _____

    y-int. _____

8. $2x - 12 = 4y$

    x-int.: _____

    y-int. _____

9. $\dfrac{y - 2}{3} = x$

    x-int.: _____

    y-int. _____

10. $\dfrac{3}{4} y = x - 5$

    x-int.: _____

    y-int. _____

11. $y = \dfrac{x - 9}{5}$

    x-int.: _____

    y-int. _____

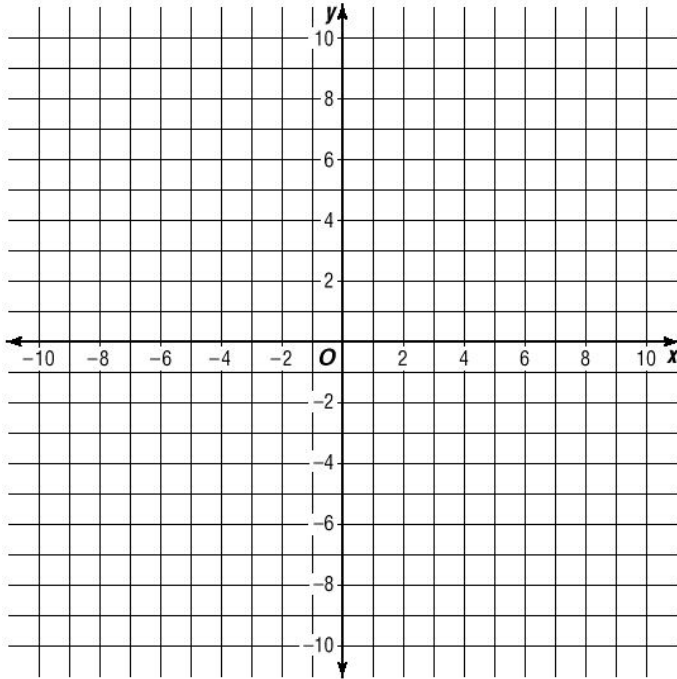12. $\dfrac{1}{2} y = \dfrac{2}{9} x - \dfrac{1}{3}$

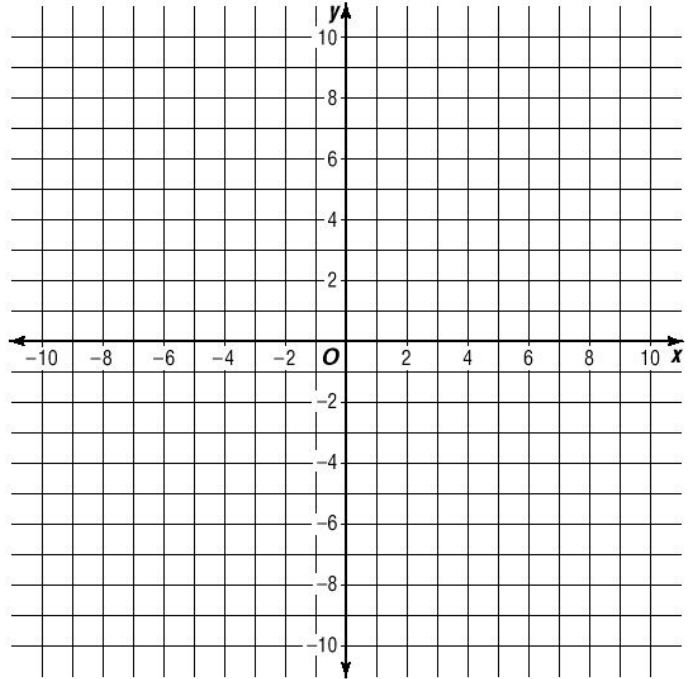    x-int.: _____

    y-int. _____

# Standard Form

Graph each equation below using the intercepts.
Connect the intercepts.  Intercepts are all whole numbers.

**13.** $x + 2y = 6$

**14.** $6x - 3y = -12$

**15.** $3x - y = 6$
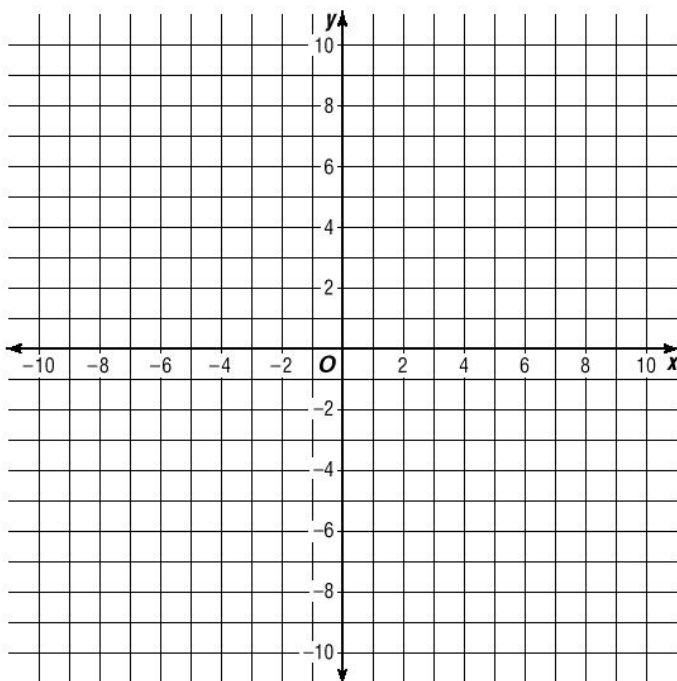
**16.** $x - 2y = -10$
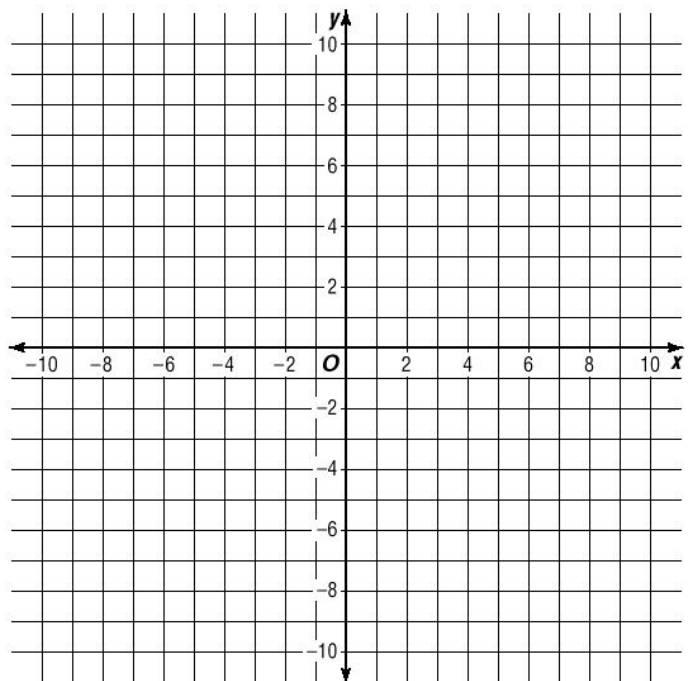
# Practice: Graphing Equations

**Math 3**

**Graph each. Remember to extend your lines to the edge of the graphs.**
**Method 1: Find both intercepts with the cover-up method. Connect them and extend the lines.**
**Method 2: Solve for y. Plug-in values for x to get at least three points plotted, then extend the line.**
**Clearly label each graph with a 1, 2, or 3.**

1. $2x - 5y = 10$

2. $2x + y = 3$

3. $x - 6 = 2y$
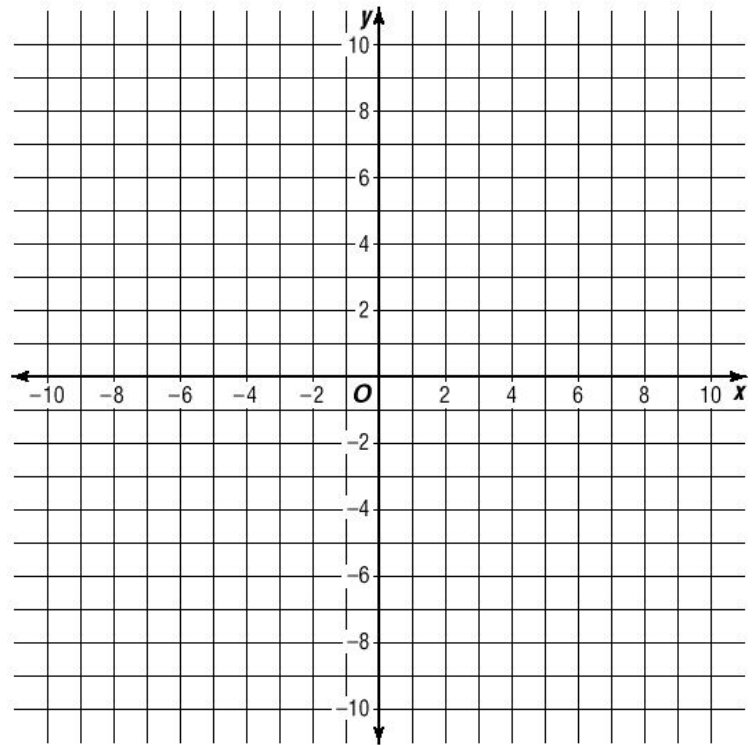
**Graph each. Remember to extend your lines to the edge of the graphs.**
**Clearly label each graph with a 4, 5, or 6.**

4. $y - 2x = -9$

5. $2x - 7y = 14$

6. $y = -\dfrac{2}{3}x + 5$

# Practice: Graphing Equations

**Graph each. Remember to extend your lines to the edge of the graphs. Clearly label each graph.**

7. $x - 2y = 6$

8. $y = -4x + 7$

9. $\dfrac{1}{2}x + 2 = \dfrac{2}{3}y$
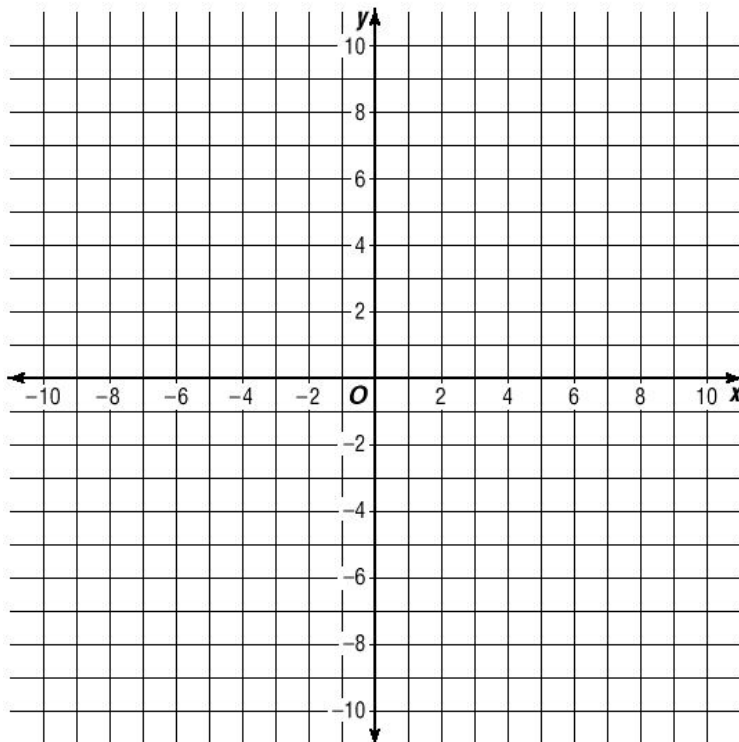
**Graph each. Remember to extend your lines to the edge of the graphs. Clearly label each graph.**

10. $y = -x + 7$

11. $3x - 5y = 15$

12. $y = -\dfrac{1}{2}x - 8$
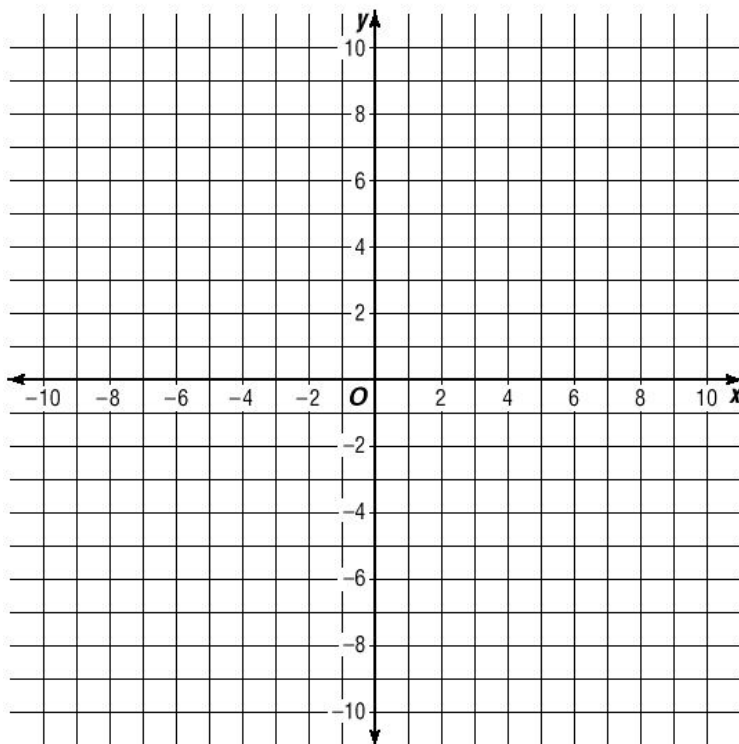
# Self-Check: Linear Equations

**Graph each. Remember to extend your lines to the edge of the graphs.**
**Label each graph with a 1, 2, or 3.**

1. $y = 2x - 9$

2. $3x - y = 6$
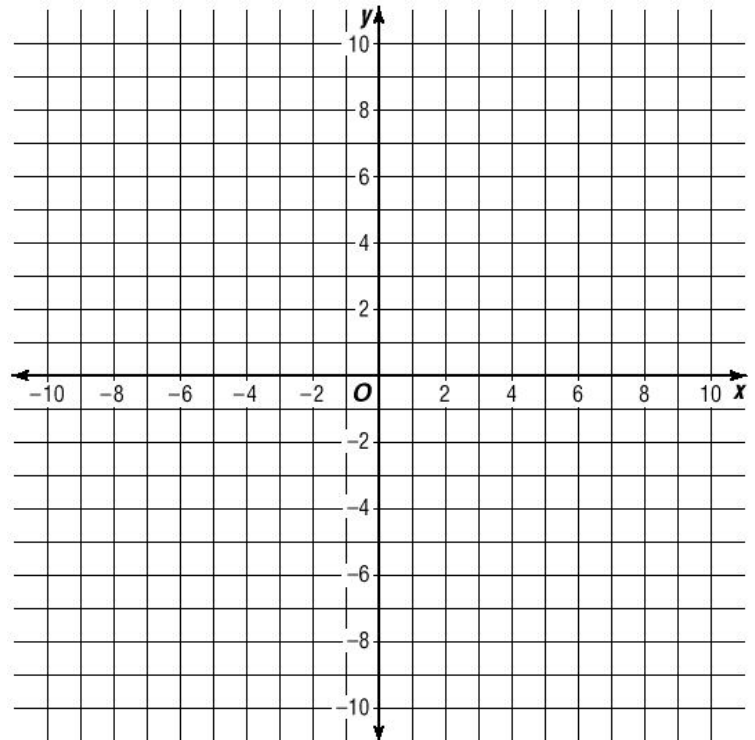
3. $y = \dfrac{2}{3}x - 6$
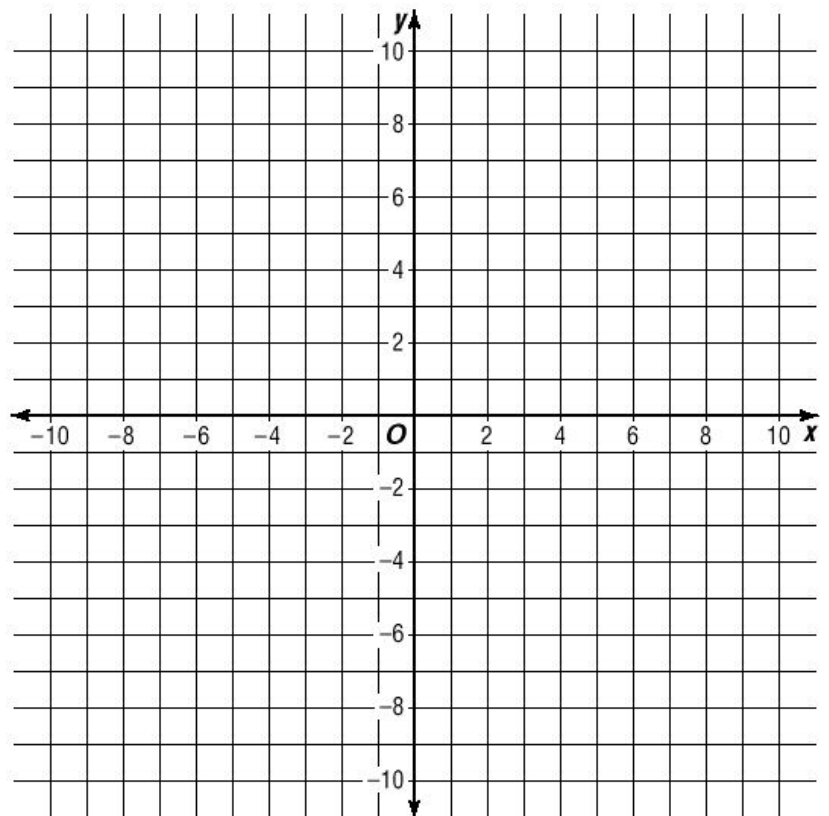
# Slope

The **Slope** of a line is its **RISE over RUN.**
1.  Read graphs **left to right**, just like sentences.
2.  Find a point on the graph of a line.
3.  Count how far you must go UP AND OVER to get to the next point.
4.  Write this as a fraction: Ex.

$$Slope = \frac{up\ 2}{over\ 3} = \frac{2}{3}$$

**Examples:** State the slope of each line:
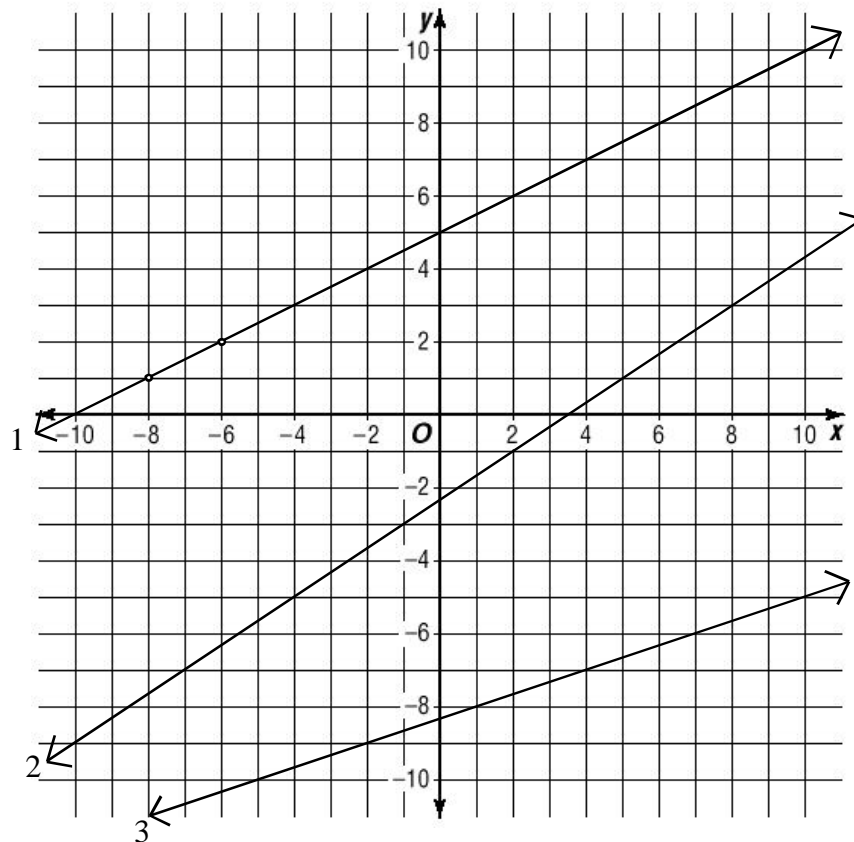
# Slope

Slope is not always positive.  Working from left to right, if you go **down and over**, this is negative slope.

**Examples:**  State the slope of each line:
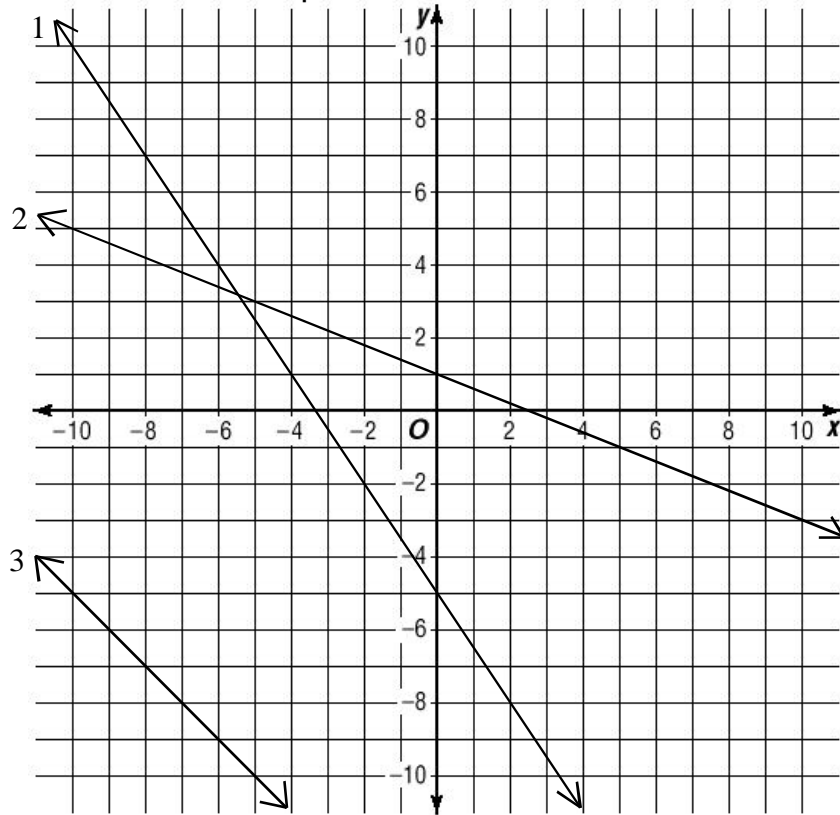


**Practice:**  State the slope of each line:
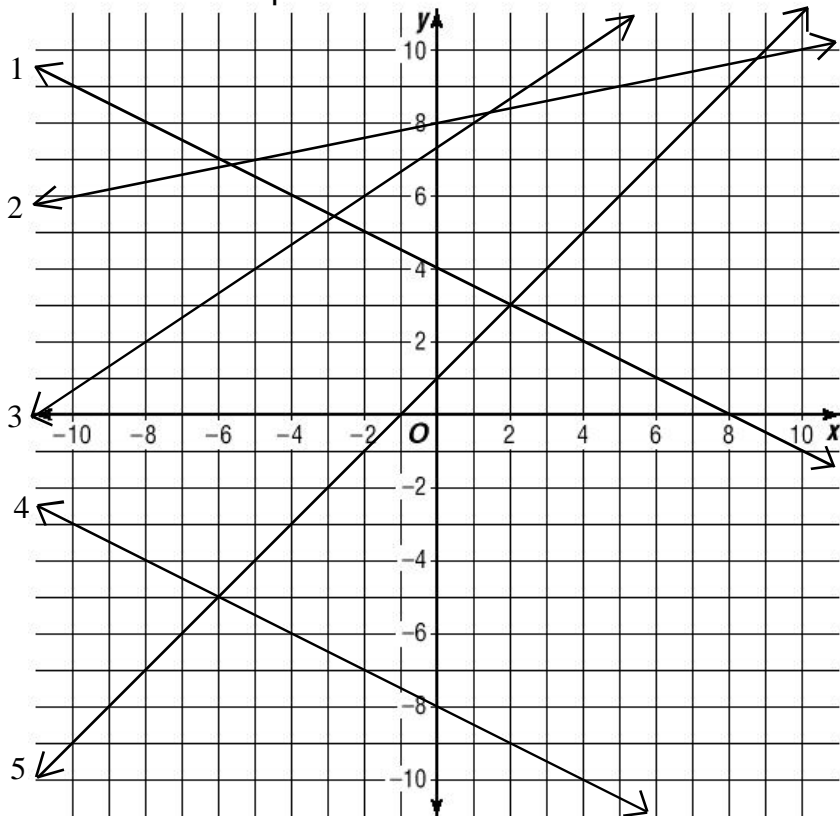
# Slope

**You do not need a graph to find the slope of a line.**
How could you find the RISE given two coordinates?  **ex.** (4, 2) and (8, 10)
How could you find the RUN given two coordinates?
**Example:**
Find the slope of the line passing through (3, 5) and (7, 7).
How far UP?
How far OVER?

**notes:**

Given two coordinates:  $(x_1, y_1)$ and $(x_2, y_2)$

Slope Formula:   $m = \dfrac{y_2 - y_1}{x_2 - x_1}$   **memorize this!**

To find the slope you must divide the y's and the x's.
y minus y over x minus x.
Rise over run.
That's how you find the slope.

**Examples:**
Find the slope of a line passing through each given pair of points:

**1.** (9, 4)  (7, 10)                     **2.** (-2, -5)  (4, 1)

**Practice:**
Find the slope of a line passing through each given pair of points.
Simplify all slopes and LEAVE IMPROPER FRACTIONS:

**1.** (-3, 0)  (1, 2)                     **2.** (3, 4)   (4, -1)

**3.** (6, -2)  (7, -7)                    **4.** (1, -5)  (-9, 1)

**5.** (8, 4)  (-5, 15)                    **6.** (-1, -5)  (4, -10)

# Slope-Intercept Form

**Graphing a Linear Equation:**
**Method 1:** x/y Chart
**Method 2:** Intercepts (from Standard Form)

Use one of the methods above to graph each of the following equations. Then, list the slope and the y-intercept of each equation.

$$y = \frac{1}{2}x - 5$$

slope: _____

y-int: _____

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

slope: _____

y-int: _____
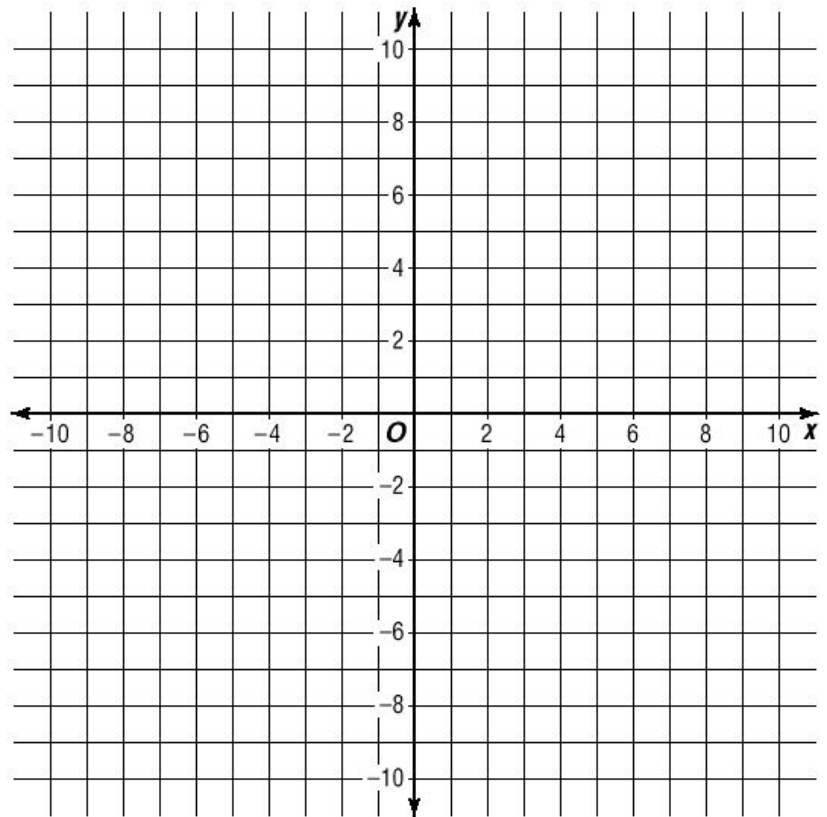
Guess what form we are going to learn next....

**Slope-Intercept Form**
**MEMORIZE THIS:**

$$y = mx + b$$  Where m is the slope and b is the y-intercept.

This is the most useful form of a linear equation, especially for graphing.

**Glad You Asked...**

**Slope-intercept form is great for graphing linear equations.
After students learn it they often ask "Why did you make us do it so
many times the hard way?"**

The "hard way" helps you understand equations as relationships between variables. All slope-intercept form gives us is a quick way to visualize a graph using two values (slope and intercept) associated with the equation.

Here are three graphing questions that you cannot answer just by learning slope-intercept form, but can be easily answered by someone who has a better understanding graphing equations the "hard" way:

**1.** What does the graph of the equation $y = |x - 5|$ look like?

**2.** Where does the graph of $3x - y = 120$ cross the x-axis?

**3.** What happens to the $y$ value in the equation $y = 2x - 3$ when
   the $x$ value is increased by 5?
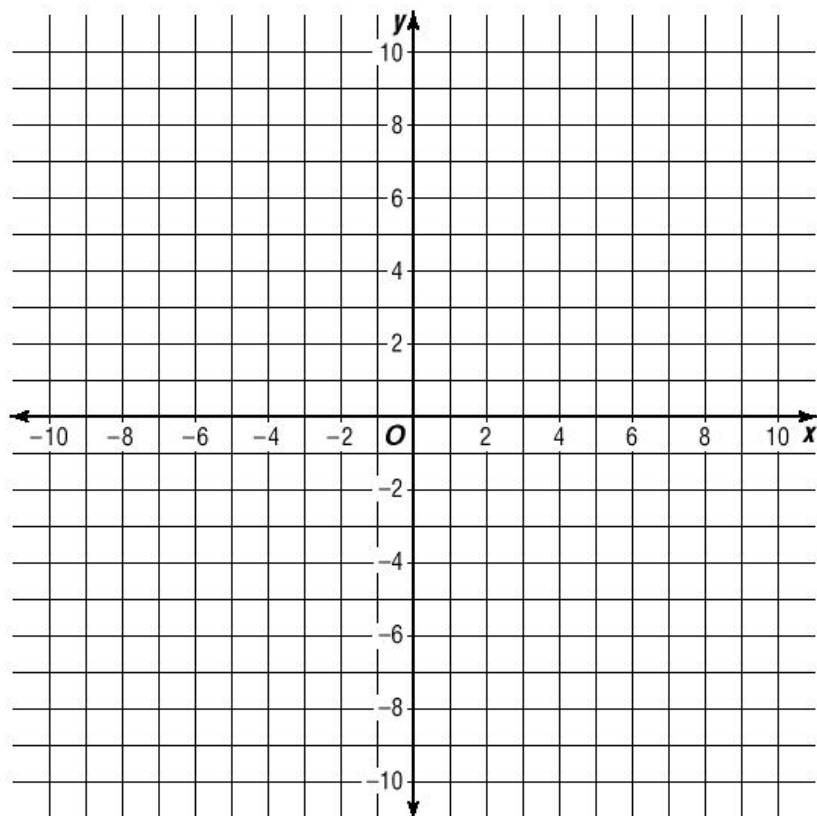
# Slope-Intercept Form

**Practice:** Graph each using Slope-Intercept Form.

1. $y=-\dfrac{2}{3}x+5$       2. $y=-2x-5$       3. $3y=5x-12$

**Practice:** Convert each into Slope-Intercept Form, then graph.

1. $x-7y=-21$       2. $x+3y=30$       3. $x+5y=-25$

(Why is Standard Form less useful for graphing these equations?)

**Practice:** Write an equation for each line graphed below in Slope-Intercept Form.
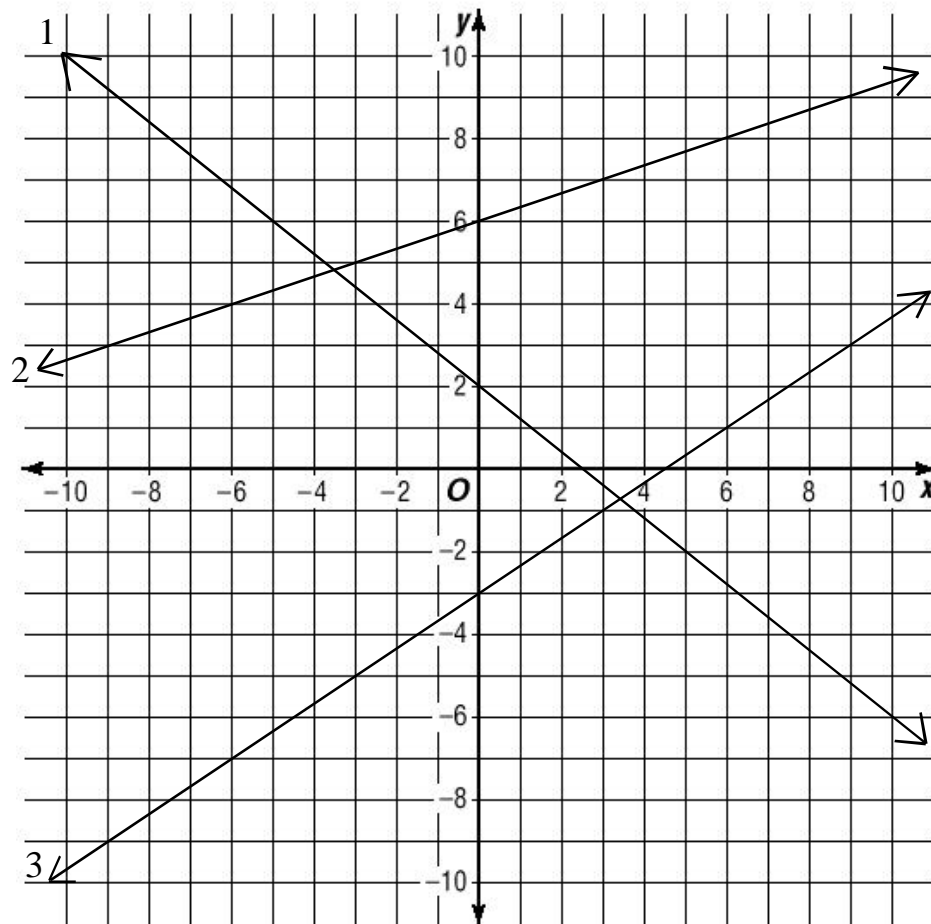


**Practice:** Convert these answers to Standard Form.

1. $y=-\dfrac{4}{5}x+2$       2. $y=\dfrac{1}{3}x+6$       3. $y=\dfrac{2}{3}x-3$

# Slope-Intercept Form

**Math 3      6.2**

**Convert Each into Slope-Intercept Form**

1. $x - 3y = -9$

   slope: _____

   y-int. _____

2. $5x - 2y = 10$

   slope: _____

   y-int. _____

3. $x - 9y = 18$

   slope: _____

   y-int. _____

4. $2x - 7y = 21$

   slope: _____

   y-int. _____

5. $x + 9 = 3y$

   slope: _____

   y-int. _____

6. $3y = 2x - 15$

   slope: _____

   y-int. _____

7. $5y - 2x = -30$

   slope: _____

   y-int. _____

8. $2x - 12 = 4y$

   slope: _____

   y-int. _____

9. $\dfrac{y - 2}{3} = x$

   slope: _____

   y-int. _____

10. $\dfrac{3}{4} y = x - 6$

    slope: _____

    y-int. _____

11. $y = \dfrac{x - 9}{5}$

    slope: _____

    y-int. _____

12. $\dfrac{1}{2} y = \dfrac{2}{9} x - \dfrac{1}{3}$

    slope: _____

    y-int. _____

# Slope-Intercept Form

Graph each equation below using slope-intercept form.

**13.** $y = -\dfrac{2}{3}x - 5$
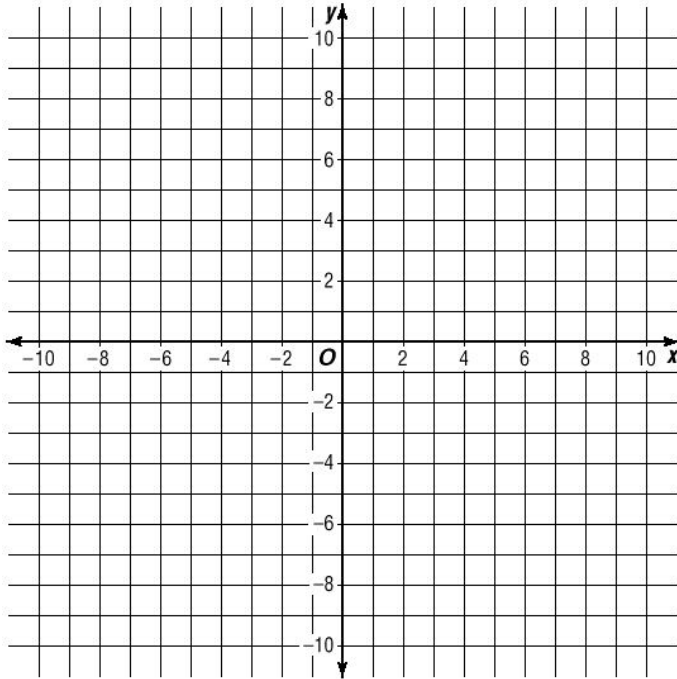
**14.** $5x - 3y = 18$
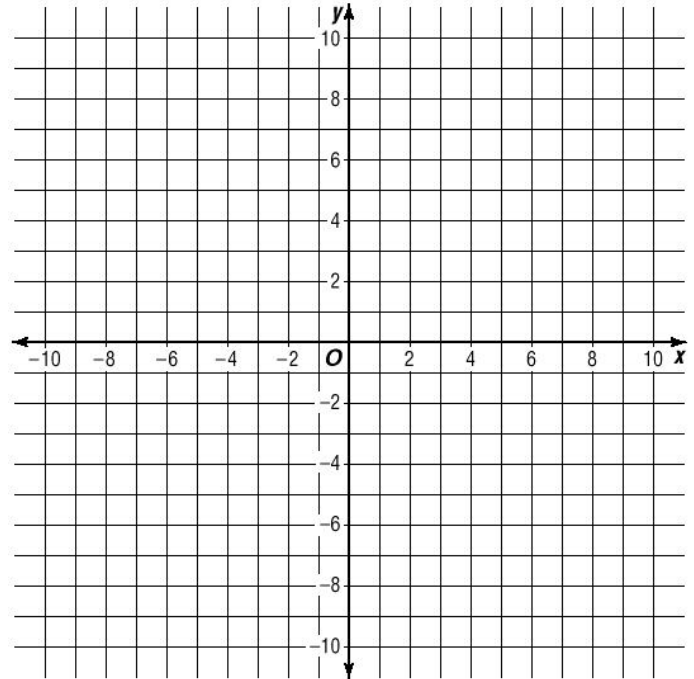


**15.** $2x - y = 6$
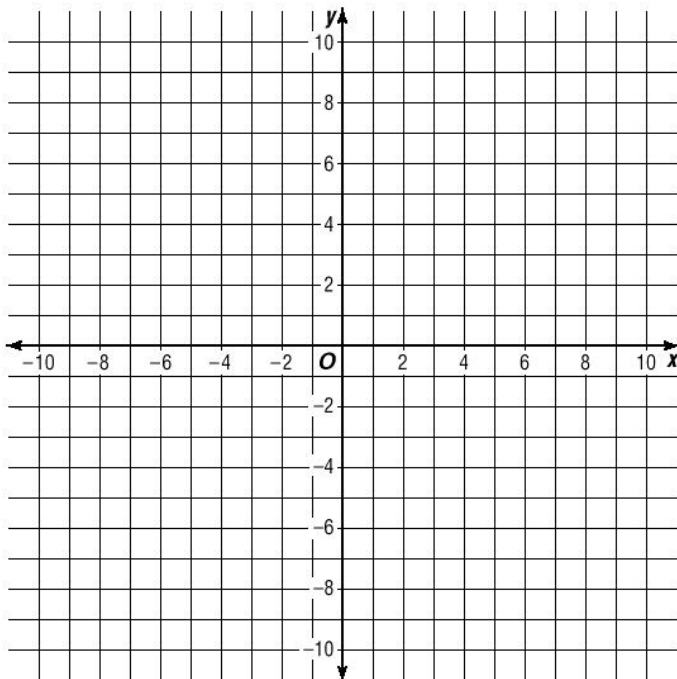
**16.** $\dfrac{1}{2}x - \dfrac{3}{4}y = 6$
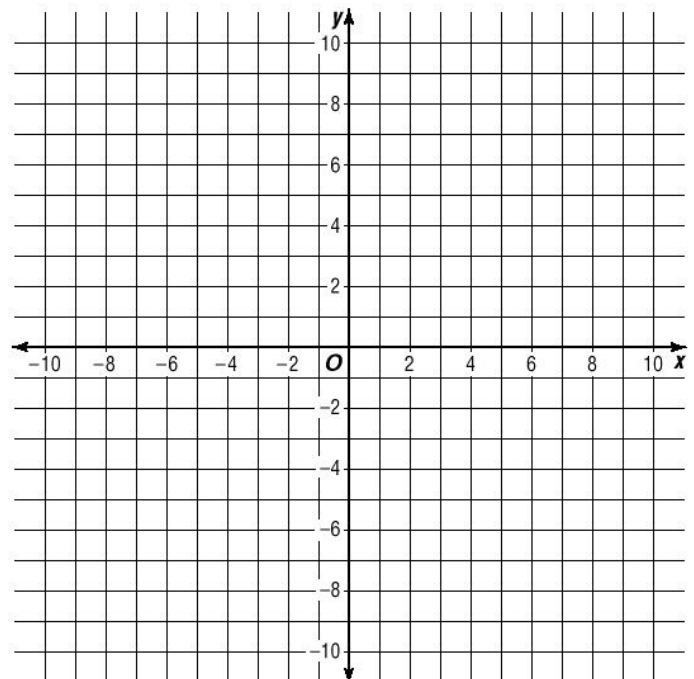
**Slope:**

**100.** $y = -\dfrac{2}{3}x - 5$

**200.** $5x - 3y = 18$

**300.** $(1, 3)$ and $(5, 13)$

**400.** $(2, -5)$ and $(-3, 4)$

**500.** $\dfrac{5}{9}x - \dfrac{3}{4}y = 2$

**600.** $y = \dfrac{7(x-3)}{3} + x$

**Intercepts:**

**100.** $2x - 3y = 6$

**200.** $5x - 4y = 15$

**300.** $3y = 8x - 7$

**400.** $\dfrac{1}{2}x = \dfrac{3}{4}y - 5$

**500.** $2(x - y) = y - 5x$

**600.** $\dfrac{1}{2}x - \dfrac{3}{11}y = \dfrac{2}{7}$

# Quiz Review

**Slope-Intercept Form:**

**100.** $y - 3 = x$

**200.** $-\dfrac{3}{4}y = x + 1$

**300.** $\dfrac{1}{2}y - \dfrac{1}{3}x = 2$

**400.** $y - 3 = \dfrac{4}{5}(x - 5)$

**500.** $2x - \dfrac{1}{5}y = \dfrac{1}{3}$

**600.** $2 = \dfrac{x - 3}{y - 2}$

**Standard Form:**

**100.** $y = x - 5$

**200.** $\dfrac{1}{2}y - x = 5$

**300.** $y - 3 = \dfrac{2}{5}x$

**400.** $-2x = \dfrac{y - 5}{3}$

**500.** $\dfrac{x}{2} + \dfrac{y}{5} = \dfrac{3}{10}$

**600.** $\dfrac{1}{2}(x - y) = \dfrac{2}{7}(x + y)$

# Practice Quiz: Linear Equations

**Convert Each to Standard Form and list values for A, B, and C.**

1. $y - x = 6$

    1.  A=____B=____C=____

2. $y - 2 = 7x$

    2.  A=____B=____C=____

3. $-\dfrac{1}{2}x + \dfrac{2}{5} = y$

    3.  A=____B=____C=____

4. $2 = \dfrac{1}{4}y$

    4.  A=____B=____C=____

5. $\dfrac{x+3}{2} = y$

    5.  A=____B=____C=____

**State the y-intercept of each equation below:**

6. $x - y = 4$

    6. y-int. _____

7. $y = \dfrac{1}{4}x + 3$

    7. y-int. _____

8. $x - 3 = \dfrac{1}{2}y$

    8. y-int. _____

9. $2x - 5y = 3$

    9. y-int. _____

10. $5 - x = y$

    10. y-int. _____

# Practice Quiz: Linear Equations     Math 3     6.2

**Write an equation in _slope-intercept form_ for each:**
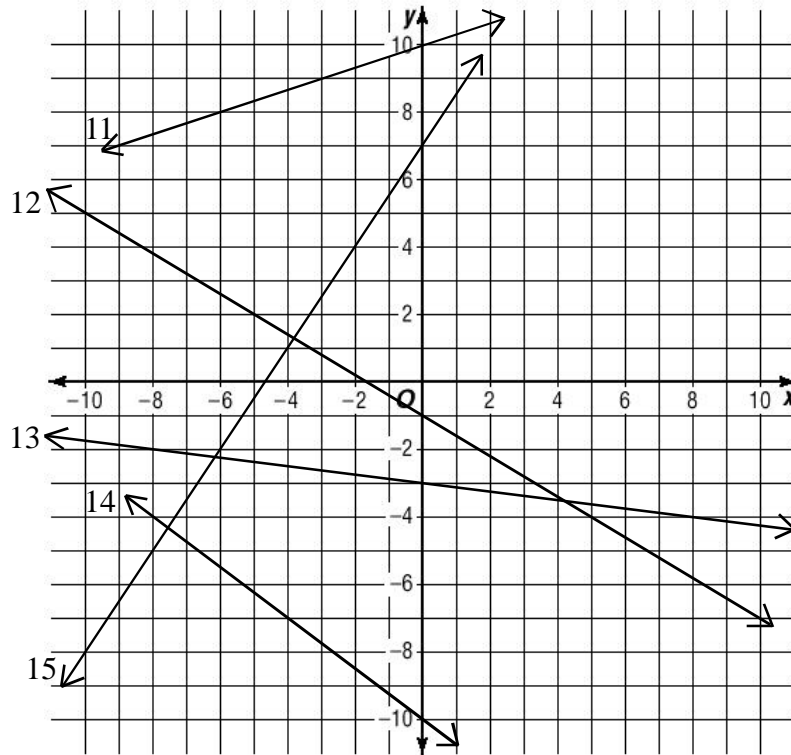


11. y=_____

12. y=_____

13. y=_____

14. y=_____

15. y=_____

**State the slope for each equation or pair of points:**

16. $2x-5y=10$

16. m=_____

17. $\dfrac{2}{3}y = x$

17. m=_____

18. $(9,10)$ and $(-1,-5)$

18. m=_____

19. $(-3,-1)$ and $(4,5)$

19. m=_____

20. $(4,-12)$ and $(-4,12)$

20. m=_____

# Self-Check: Linear Equations          Math 3

**Graph each. Remember to extend your lines to the edge of the graphs.**
**Label each graph with a 1, 2, or 3.**

1.  $y = 2x - 9$

2.  $3x - y = 6$

3.  $2x - 3y = 18$



---

# Self-Check: Linear Equations

**Graph each. Remember to extend your lines to the edge of the graphs.**
**Label each graph with a 1, 2, or 3.**

4.  $x = 4y - 8$ (careful!)

5.  $2x - 7y = 6$ (think!)

6.  $x - 4y = 3$ (think!)
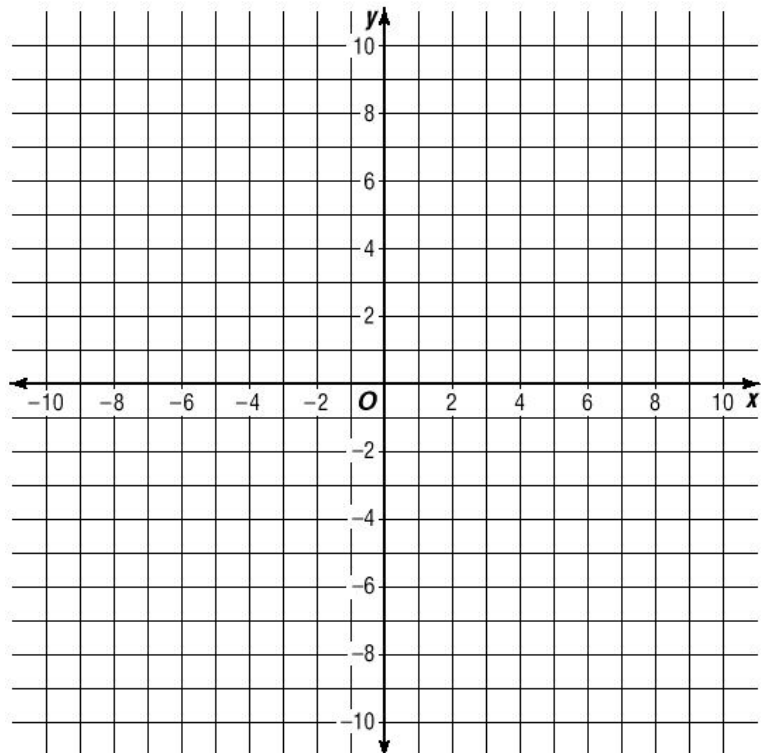
# Slope and Standard Form

**Practice:** Convert each of the following Standard-Form equations into Slope-Intercept Form. State the slope of each.

1. $2x + y = -2$     2. $4x + 3y = 12$     3. $2x + 5y = -8$
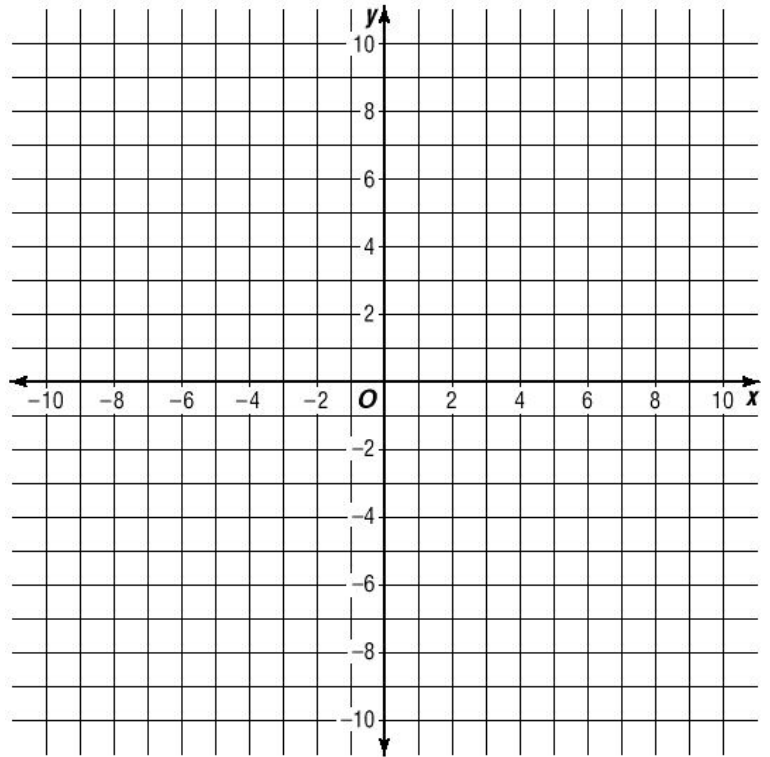
There is a simple formula that can be used to find the slope of any Standard Form equation. Try to find it be solving Standard Form for Slope-Intercept Form:

$Ax + By = C$  becomes  $y = -x + -$

**Examples:** State the slope of each equation:

1. $2x - 3y = 4$     2. $x - y = 5$        3. $7x - y = 3$

**Practice:** State the slope of each equation:

1. $3x - 5y = 9$     2. $3x - y = 1$       3. $2x - 5y = 3$

4. $8x - 13y = 41$   5. $9x - 9y = 7$      6. $x - 4y = 35$

**Practice:** For each of the following, find the slope and one intercept without converting. Graph each:

1. $2x - 5y = 8$     2. $x - 3y = 6$       3. $2x - 7y = -2$

# Slope and Standard Form

**Graph each. Remember to extend your lines to the edge of the graphs.**
**Clearly label each graph with a 1, 2, 3, or 4.**

1. $2x - 3y = 10$

m=

2. $3x + 2y = 10$

m=

3. $x - 4y = 3$

m=

4. $2x - 7y = 2$

m=
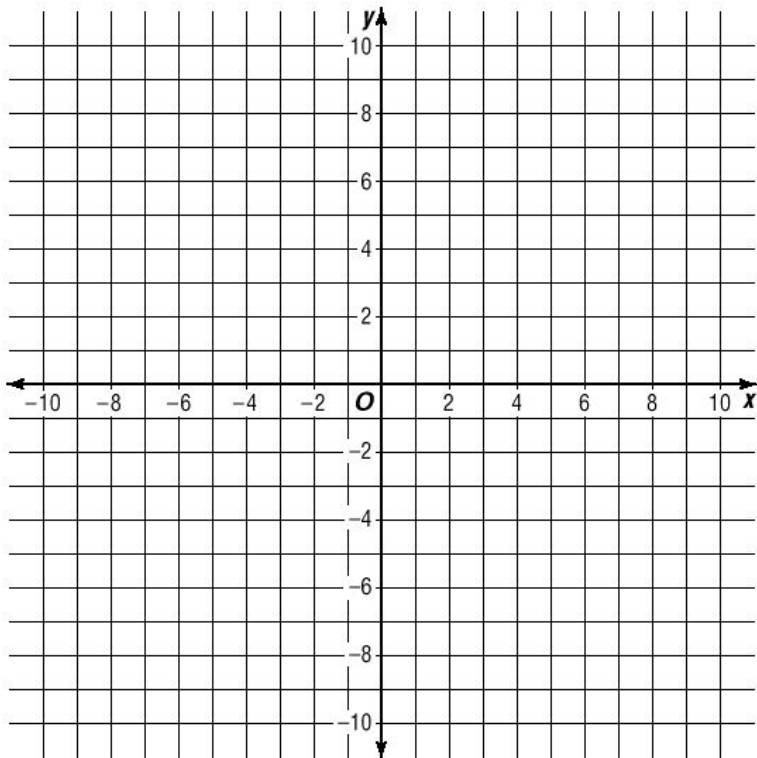
**Graph each. Remember to extend your lines to the edge of the graphs.**
**Clearly label each graph with a 5, 6, 7, or 8.**

5. $x - 2y = 7$

m=

6. $4x + 3y = 8$

m=

7. $9x - 2y = 27$

m=

8. $8x - 9y = -24$

m=
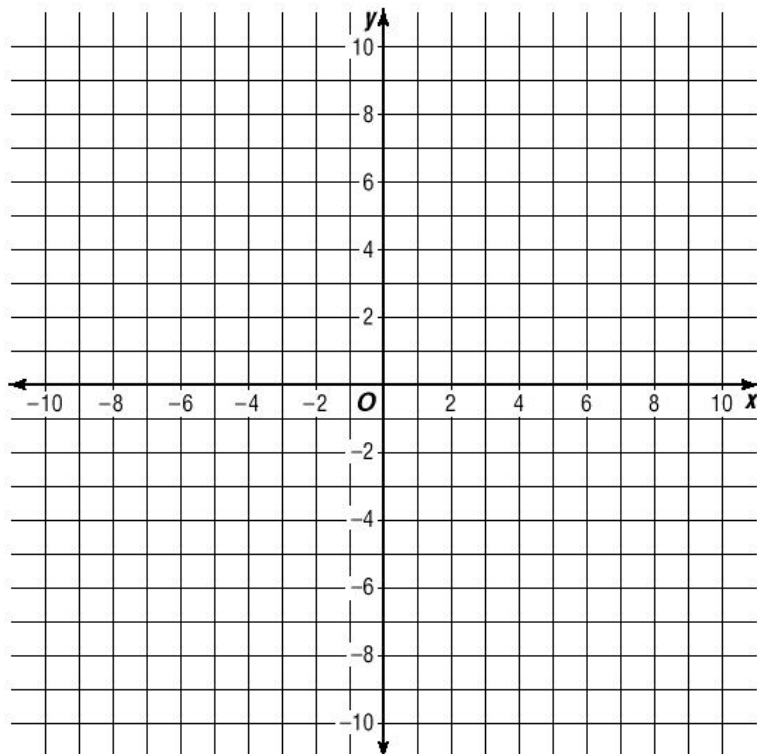
# Point-Slope Form

**Practice:** Write an equation for each in Slope-Intercept Form:
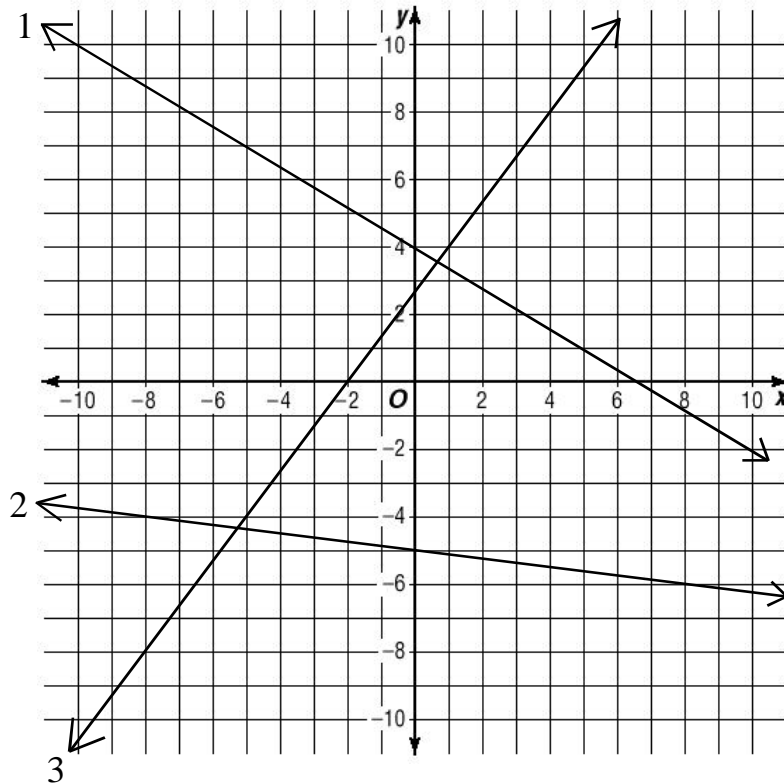


We need a new form!
**POINT-SLOPE FORM**

Given any point on the line $(x_1, y_1)$

and the slope of the line $m$

$$y - y_1 = m(x - x_1)$$   **MEMORIZE THIS!**

**Examples:**
Write an equation in Point-Slope Form using the information given.

1. $(-5, 3)$ $m = \dfrac{1}{2}$          2. $(5, -9)$ $m = -\dfrac{2}{5}$

**Practice:**
Write an equation in Point-Slope Form using the information given.

1. $(4, -1)$ $m = -\dfrac{1}{8}$          2. $(-6, -3)$ $m = -2$

# Point-Slope Form

**You can write a Point-Slope equation given any two points.**

**Try it on your own:** Write a Point-Slope equation
for the line that passes through $(-1,7)$ and $(2,-5)$.

**Practice:**
Write an equation in Point-Slope Form using the information given.

1. $(6,2)$  $(-1,-3)$                    2. $(14,-11)$  $(-6,5)$

**Practice:**
Write an equation in Point-Slope Form for each graph.
Use the darkened point.
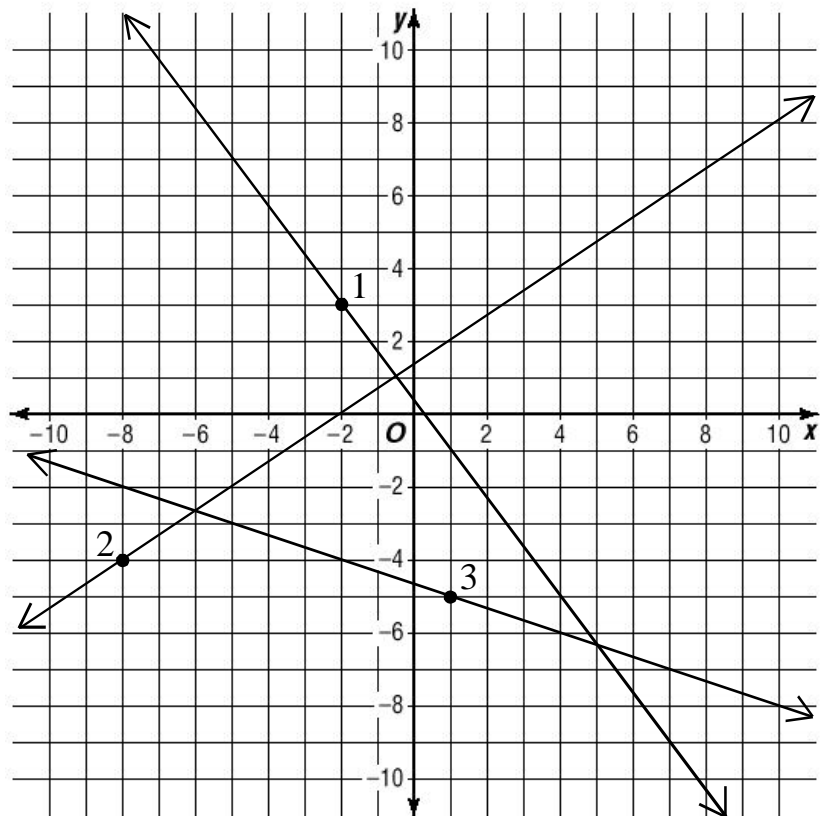


**Practice:**
Convert each equation you got for the lines above into Standard Form:

1. $y - 3 = -\dfrac{4}{3}(x+2)$     2. $y + 5 = -\dfrac{1}{3}(x-1)$    3. $y - 2 = \dfrac{2}{3}(x+7)$

# Self Check: Four Formulas

**Review:**
**Write each of the four formulas listed below in the blank provided:**

**Slope:** _____

**Slope-Intercept Form:** _____

**Standard Form:** _____

**Point-Slope Form:** _____

# Self Check: Four Formulas

**Write an equation for each in**
**Standard Form:**

**1.** _____

**2.** _____

**3.** _____
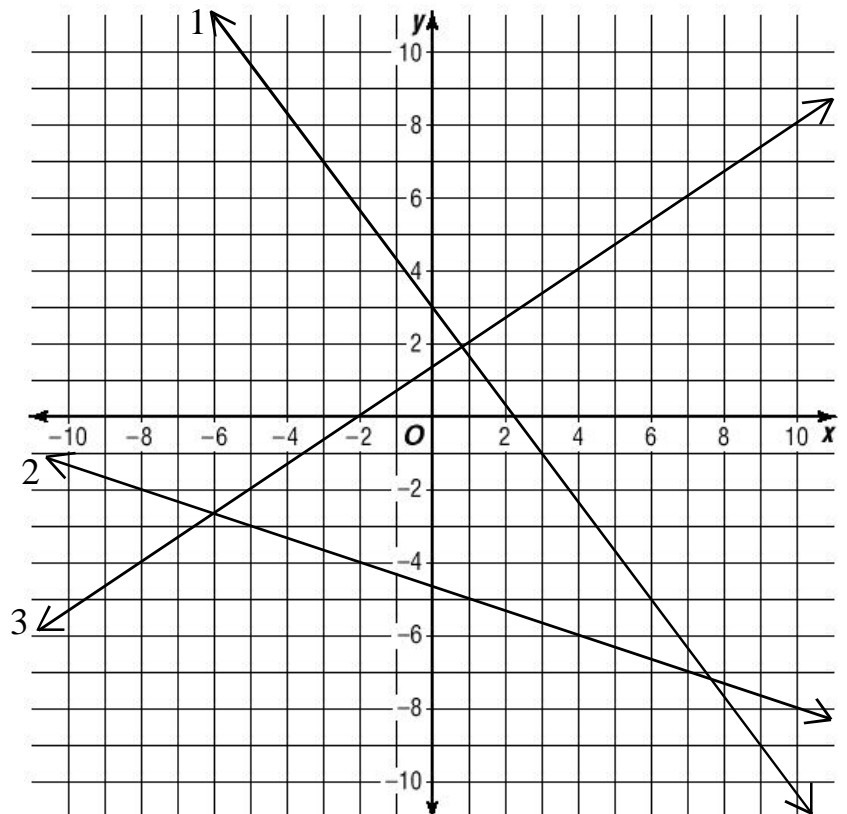
# Review

**Practice:**

Write an equation for each line graphed below in the form listed.

**1.** Slope-Intercept:

_____

**2.** Point-Slope Form:

_____

**3.** Standard Form:

_____
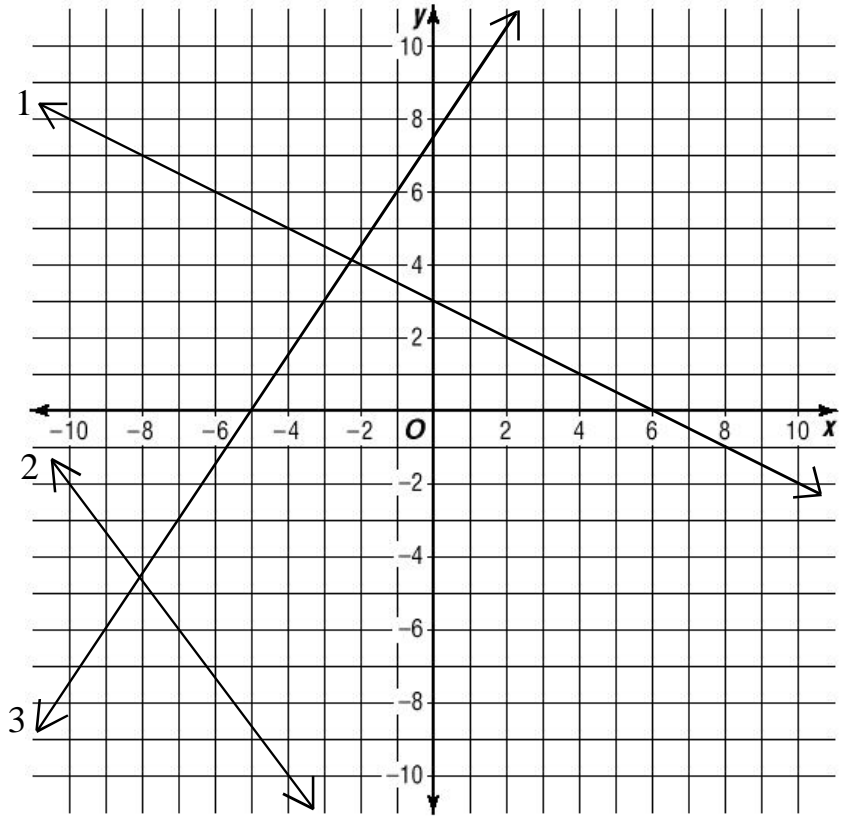


**Practice:** Write an equation for each line graphed below in all three forms:

**4.** _____

_____

_____

**5.** _____

_____

_____

**6.** _____

_____

_____
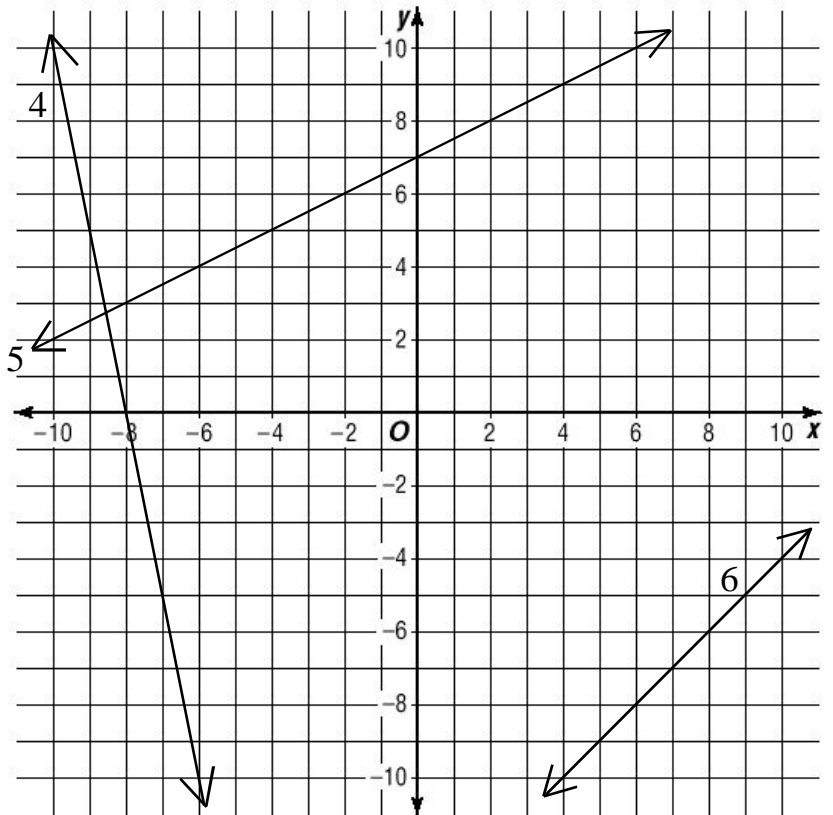
# Review: Four Formulas

**Find the slope between each pair of points:**

**1.** $(-4,-3)$  $(5,-7)$

**2.** $(9,-1)$  $(-2,0)$

**3.** $(6,-7)$  $(-3,-7)$

**4.** $(-8,4)$  $(-8,-10)$

**5.** $(7,-1)$  $(-11,2)$

**6.** $(2,-3)$  $(-2,3)$

**Write an equation for each pair of points below in Point-Slope Form, then convert it into both Standard and Slope-Intercept Forms:**

**7.** $(1,-1)$  $(6,-11)$

**8.** $(5,-3)$  $(-2,4)$

Point-Slope: _____

Standard: _____

Slope-Intercept: _____

Point-Slope: _____

Standard: _____

Slope-Intercept: _____

**9.** $(7,-2)$  $(-3,-7)$

**10.** $(-2,5)$  $(-9,15)$

Point-Slope: _____

Standard: _____

Slope-Intercept: _____

Point-Slope: _____

Standard: _____

Slope-Intercept: _____

# Review: Four Formulas

**Write an equation for each in the form listed:**

11. Standard

12. Slope-Intercept

13. Standard

14. Point-Slope
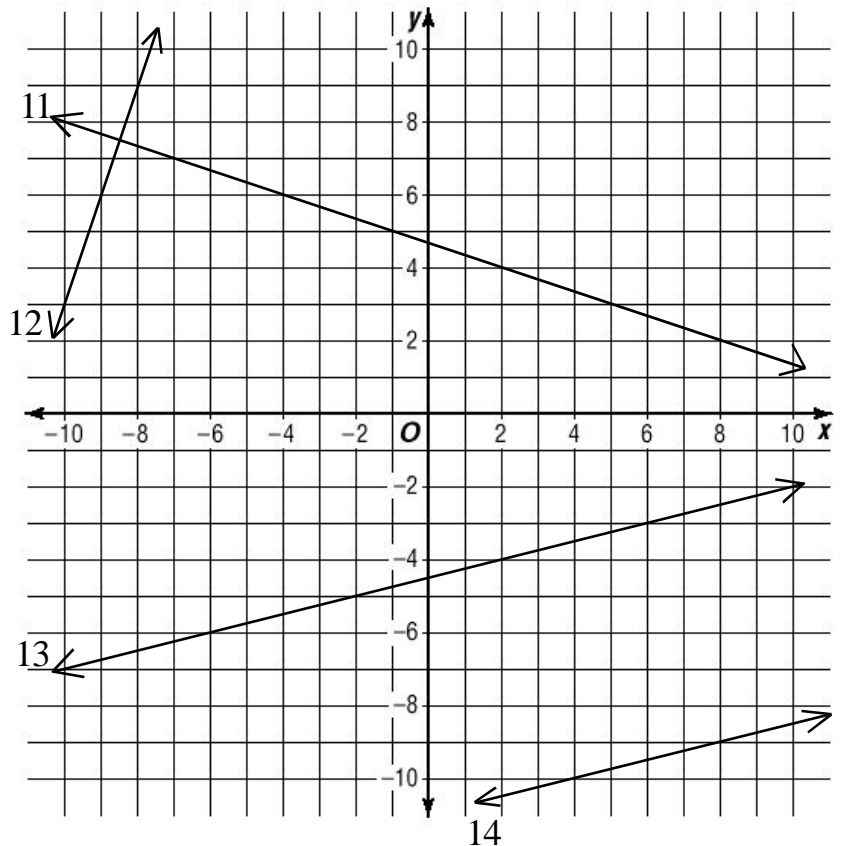
**Name both Intercepts for each equation:**

15. $2x - 5y = 40$

    x-int.: _____

    y-int. _____

16. $7x - 3y = 10$

    x-int.: _____

    y-int. _____

17. $x - 7y = 11$

    x-int.: _____

    y-int. _____

18. $20x - 17y = 34$

    x-int.: _____

    y-int. _____

19. $x + 15 = 5y$

    x-int.: _____

    y-int. _____

20. $y = 2x - 5$

    x-int.: _____

    y-int. _____

# Practice Quiz: Linear Equations 3      Math 3

**State the y-intercept of each equation below:**

1. $y = 3x - 5$

    1. y-int. _____

2. $4y = \dfrac{1}{2}x - 8$

    2. y-int. _____

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

    3. y-int. _____

4. $2x - 3y = 6$

    4. y-int. _____

5. $3x - 2 = 5y$

    5. y-int. _____

**State the slope for each equation or pair of points:**

6. $3x - 5y = 2$

    6. m=_____

7. $\dfrac{2}{3}x = \dfrac{1}{2}y + 7$

    7. m=_____

8. $(6, -1)$ and $(4, -3)$

    8. m=_____

9. $(-2, 1)$ and $(5, -4)$

    9. m=_____

10. $(5, -2)$ and $(7, -3)$

    10. m=_____

# Practice Quiz: Linear Equations 3

## Math 3

**Find the slope of each line:**
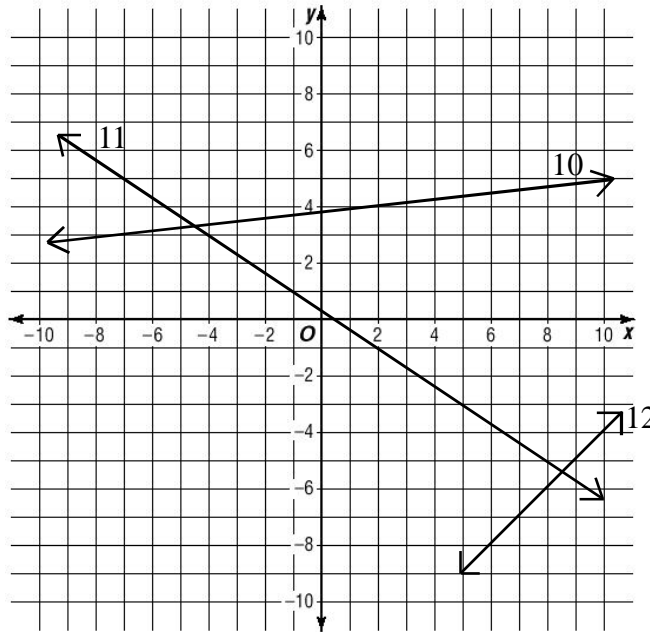


10. slope: _____

11. slope: _____

12. slope: _____

**Write an equation for each line in the form listed:**



13. Slope-Intercept: _____

14. Standard: _____

15. Standard: _____
    (hint: start with point-slope)

**Write a Point-Slope equation for each, then convert to the form listed:**

16-17.   $(-3,5)$  $(4,-2)$

16. Point-Slope Form: _____

17. Standard Form: _____

# Parallel/Perpendicular Lines

**Graph the following linear equations on the SAME GRAPH:**

**A.** $y = \dfrac{3}{4}x + 5$

**B.** $3x - 4y = 16$

**C.** $y = -\dfrac{4}{3}x + 1$

**D.** $y + 6 = \dfrac{4}{3}(x + 9)$
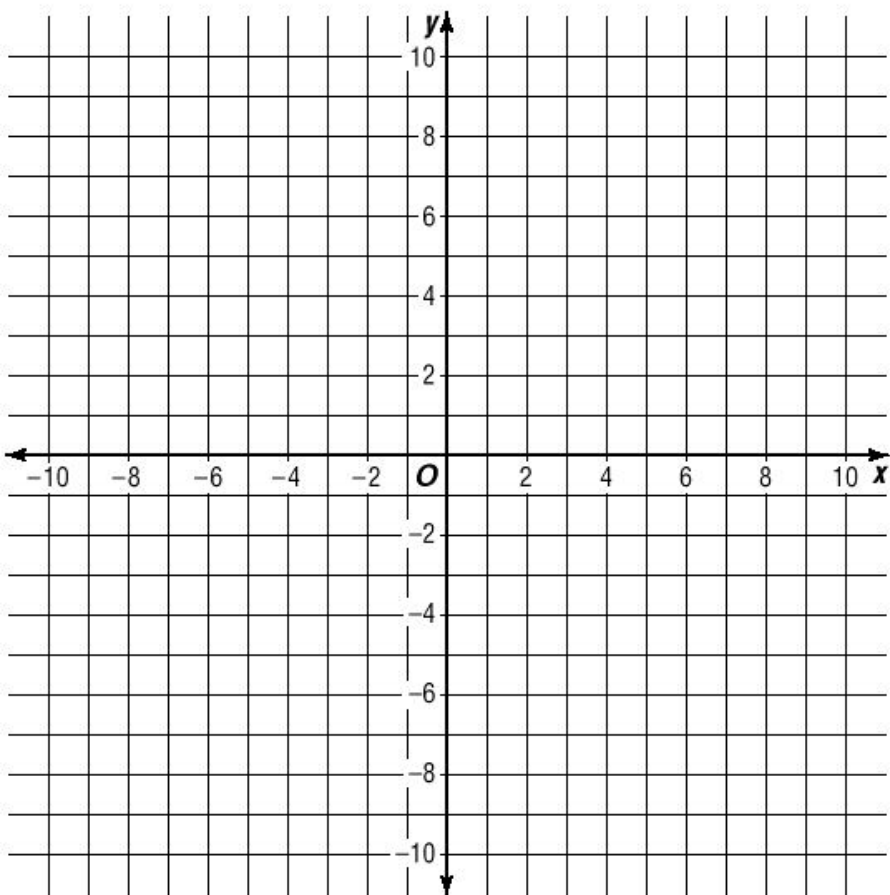
The slopes of lines that are **<u>parallel</u>** are _____.

The slopes of lines that are **<u>perpendicular</u>** are _____.
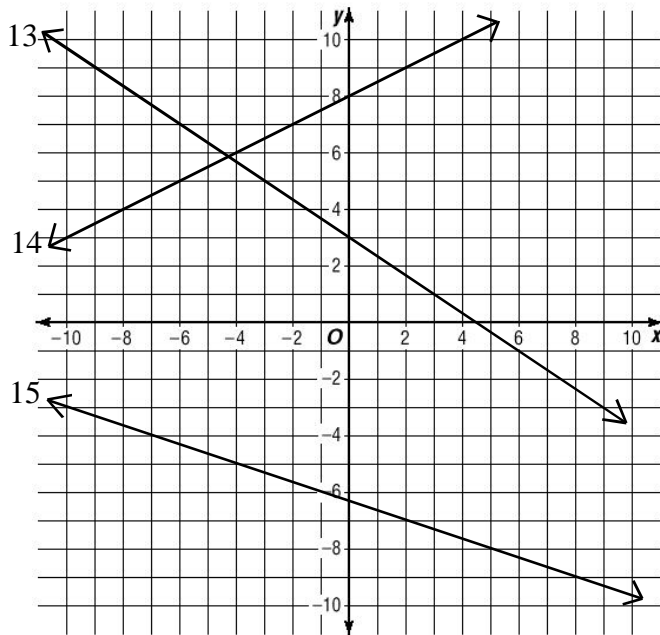
**Examples:**
Find the <u>parallel AND perpendicular</u> slopes for each:

1. $m = \dfrac{1}{2}$          2. $(5, -9)\ (-4, 6)$          3. $3x - y = 5$

**Practice:**
Find the <u>parallel AND perpendicular</u> slope for each:

1. $m = -3$          2. $(-2, 7)\ (8, 2)$          3. $2x - 7y = 14$

# Parallel/Perpendicular Lines

**Examples:**

Write the equation for each of the following:

**1.** Parallel to $y = \dfrac{1}{2}x - 3$  through $(-5,2)$ in Point-Slope Form:

**2.** Perpendicular to $x - 2y = 3$  through $(-3,-7)$ in Standard Form:

**Practice:**

Write the equation for each of the following:

**1.** Parallel to $y - 2 = \dfrac{2}{5}(x-3)$  through $(-3,-5)$ in Point-Slope Form:

**2.** Perpendicular to $3x - y = 5$  through $(-2,4)$ in Standard Form:

**3.** Perpendicular to $y - 3 = 5(x+1)$  through $(1,8)$ in Slope-Intercept Form:

**Practice:**

1. Write the Point- Slope equation for the line passing through both points to the right.

2. Write the equation for a perpendicular line passing through point A in Point-Slope Form.

3. Write the equation for a perpendicular line passing through point B in Standard Form.
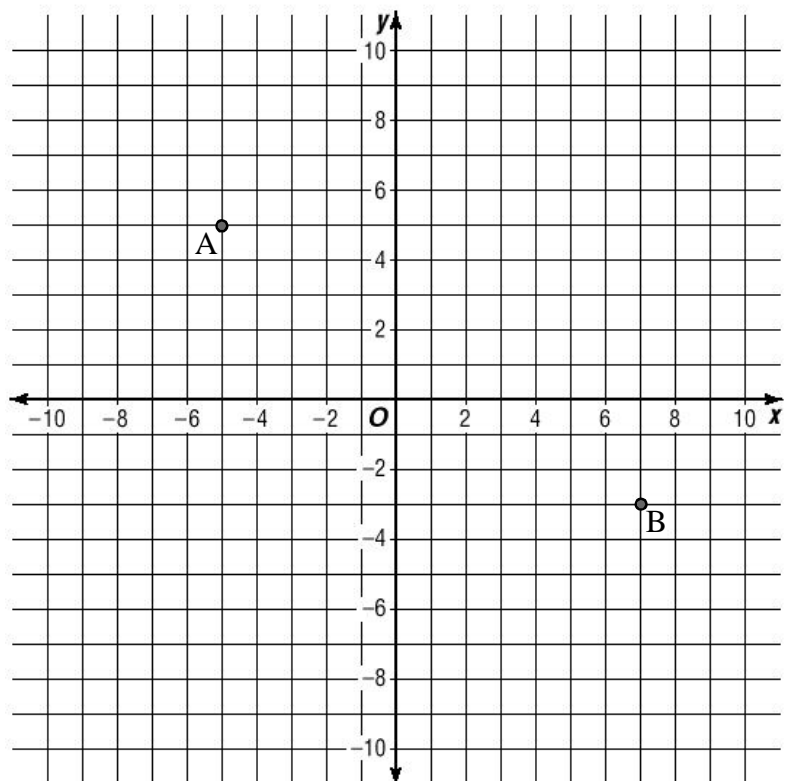
# Linear Modeling (Word Problems)     Math 3

## Writing Linear Equations in Slope-Intercept Form

**It is important to remember:** $y$ is the dependent variable, $x$ is the independent variable, $y$ always depends on $x$.

**Slope** is the rate of change and the $y$-intercept is the original amount.

**Examples:**  Label your variables, then write an equation for each:

1.  A bear cub weighs 8kg at birth and gains 3/4 kilogram per week.

2.  It costs $75 to rent the space and $15 per guest.

3.  It costs $5 to go to the fair and each ride costs $1.


**Practice:**  Write a linear equation for each:

1.  Mailing a medium-sized package costs $5 plus $1.50 a pound. Use $c$ for cost and $p$ for pounds.

2.  A baby weighs 7 pounds at birth and gains a pound a month. Use $w$ for weight and $m$ for months.


**More Practice:**  Write an equation for each:

1.  A restaurant delivers pizzas for $8.95 each plus a $4 delivery charge.

2.  A cell-phone plan charges a $0.50 connection fee and then $.05 a minute for each call.

3.  A taxi ride costs $4.50 plus $7.25 per mile.

4.  A test has 18 questions.  Students get 100 points and the teacher takes off 4 points for every incorrect or blank answer.

# Linear Modeling (Word Problems) <span style="background:gray;color:white;">Math 3   6.6</span>

**Point-Slope Form** is more difficult:

**Remember:** $y$ is the dependent variable, $x$ is the independent variable, $y$ always depends on $x$.

**Begin with two points, then write a point-slope equation.**

**Examples:**  Label your variables, then write an equation for each:

   **1.**  A chef can make 9 batches of cookies in 4 hours, and 15 batches in 6 hours.  Points should be in the form $(h, b)$.  The number of $b$atches depends on the number of $h$ours.

   **2.**  In the same taxi, you went 5 miles for $13, while a 13-mile trip cost $29.  Points should be in the form $(m, c)$.  The $c$ost depends on the number of $m$iles.

**Practice:**  Label your variables, then write an equation for each:

   **1.**  A baby weighs 14 pounds at 5 months and 21 pounds at 10 months.  Points should be in the form $(m, w)$.  The $w$eight depends on the age in $m$onths.

   **2.**  At Guisseppe's Pizza, to have four pizzas delivered costs $28, while nine pizzas costs $53.  Points should be in the form  (____, ____).  The _____ depends on the _____ .

**Practice:**  Write a point-slope equation, then convert it to slope-intercept form to answer the question that follows:

   **1.**  At Guisseppe's Pizza, to have four pizzas delivered costs $28, while to have nine pizzas delivered costs $53.  There is a charge for delivery and a price per pizza.  What is the delivery charge?

   **2.**  With an AT&T cell-phone plan, you pay $0.74 for a 7-minute call, and $3.05 for 40 minutes.  What is the connection fee for AT&T?

# Word Problems

**Write an equation to represent each situation given below in the form listed. Convert each to the form listed.**

**1.** Mario's Pizza charges $7 for a medium pizza plus $0.75 per additional topping.

Slope-Intercept Form:  (use $c$ for charge and $t$ for toppings)

_____

Standard Form:

_____

**2.** A taxi ride in Boston costs $11 for 2 miles, and $18 for 4 miles.

Point-Slope Form:  (use $c$ for cost and $m$ for miles)

_____

Slope-Intercept Form:

_____

**3.** A long distance company charges a $1 connection fee, plus $0.10 a minute.

Slope-Intercept Form:  (use $m$ for minutes and $c$ for charge)

_____

Standard Form:

_____

**4.** It costs 85 cents for a 12-ounce beverage, and $1.25 for a 20-ounce beverage:

Point-Slope Form:    (Use $n$ for ounces and $c$ for cost)

_____

Slope-Intercept Form:

_____

# Word Problems

**Write an equation to represent each situation given below in the form listed. Convert each to the form listed.**

**5.** A calf weighs 18 lbs when it is 2 months old, and after 8 months weighs 36 lbs.

Point-Slope Form:  (use $w$ for weight and $m$ for months)

_____

Slope-Intercept Form:

_____

**6.** Shipping an internet purchase costs $3 plus $0.50 a pound.

Slope-Intercept Form:  (use $p$ for pounds and $c$ for charge)

_____

Standard Form:

_____

**7.** An automotive factory makes 17 cars in 5 hours and in 8 hours can make 29 cars.

Point-Slope Form:  (use $h$ for hours and $c$ for cars produced)

_____

Slope-Intercept Form:

_____

**8.** A rental car charges $29 to rent the car plus $45 a day:

Slope Intercept Form:    (Use $d$ for days and $r$ for the rental fee)

_____

Standard Form:

_____

# Graphing Inequalities

## Math 3

**Graphing Inequalities in Slope-Intercept Form**
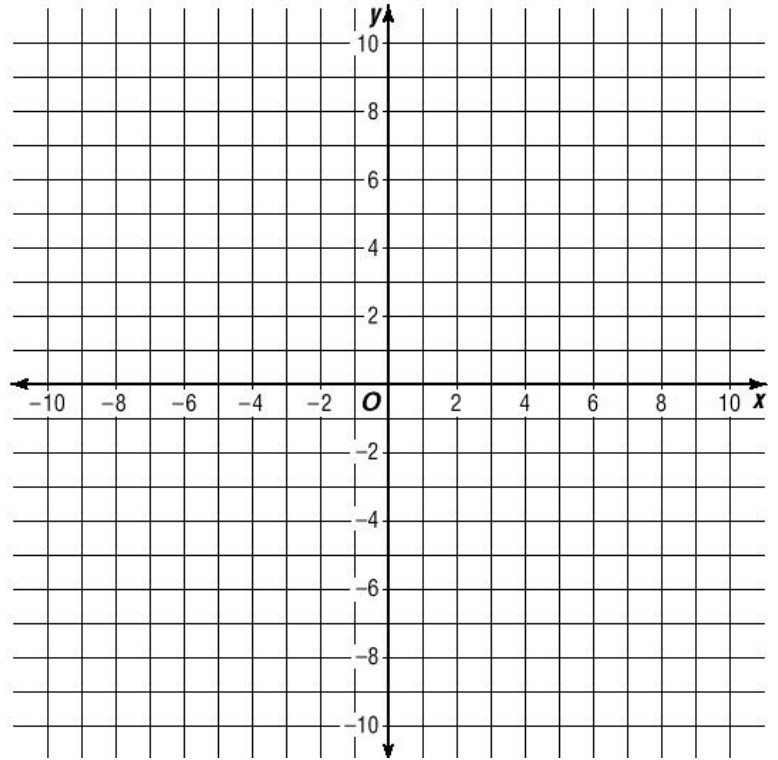Works the same as graphing equations except:
Dash the line for < or >
Shade above if y >
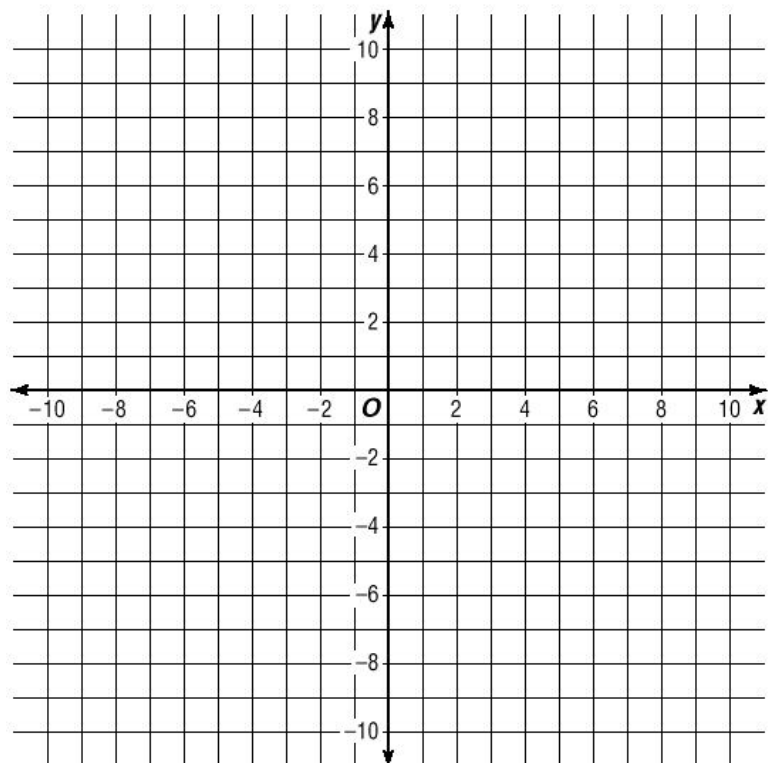Shade below if y <

**Examples:**

1. $y \leq 2x - 5$

2. $y > -\dfrac{1}{3}x - 6$

**Practice:**

1. $y < \dfrac{1}{2}x + 4$

2. $y \geq 5x + 1$

# Graphing Inequalities

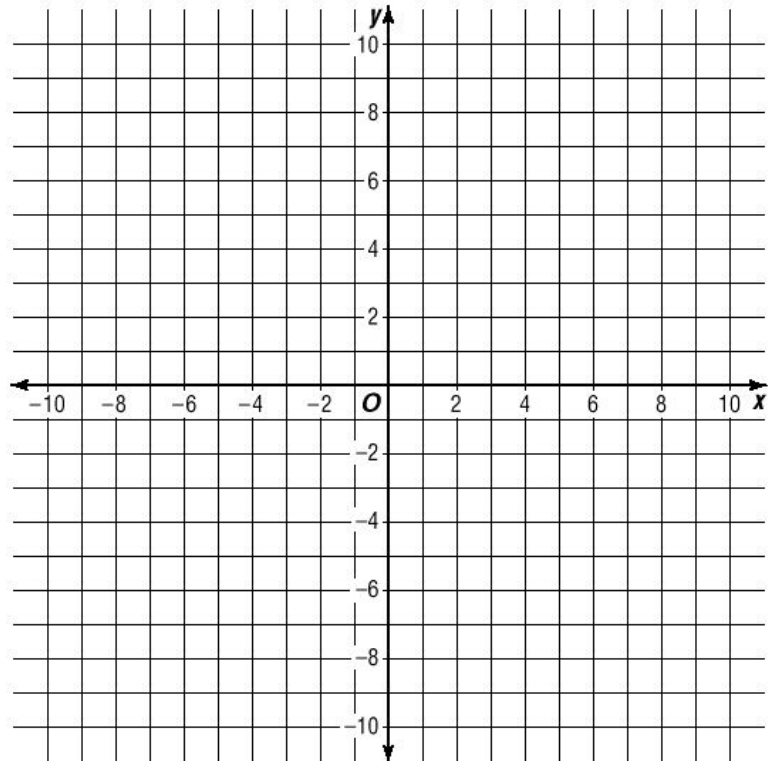**Other Forms:**  Convert to slope-intercept, then graph.
**Don't forget:**
While solving, if you multiply or divide both
sides by a negative, reverse the direction of
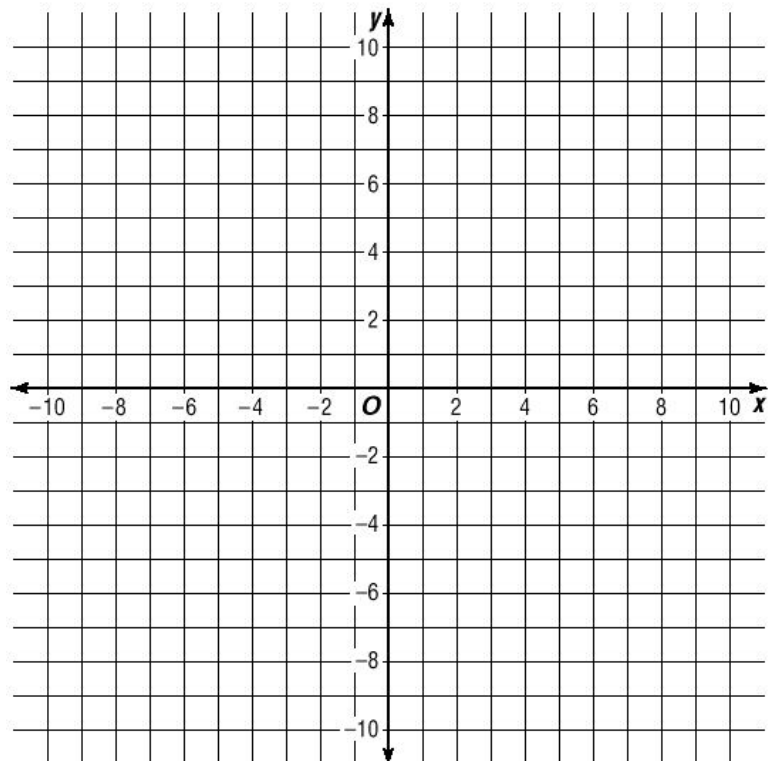the > symbol.

**Examples:**

1. $3x - y \leq 6$

2. $y - 2 > 2(x - 6)$

**Practice:**

1. $3x - 2y < 6$

2. $\dfrac{x - y}{2} \geq 4$

# Test Review

**Slope-Intercept Form:**

**100.** Convert $y-2=-\dfrac{3}{4}(x+8)$ to Slope-Intercept Form.

**200.** Through $(-4,2)$ and $(-3,4)$ in Slope-Intercept Form.

**300.** Perpendicular to $15x-4y=59$ through $(-2,11)$ in Slope-Intercept Form.

**Slope:**

**100.** Find the slope between $(-4,2)$ and $(-3,4)$.

**200.** Find the perpendicular slope to the graph of: $y=5$

**300.** Find the slope of a line parallel to: $\dfrac{2}{3}y=\dfrac{4}{5}x-5$

**Word Problems:**

**100.** A tow truck charges $25 to pick you up plus $3 a mile for the tow. (c=charge, m=miles)

**200.** Michael made 5 pancakes in 30 minutes, and 10 pancakes in 40 minutes. (p=pancakes, m=minutes)

**300.** A phone company charges $0.50 the first minute and $0.15 for every minute after that. (c=charge, m=minutes)

**Point-Slope Form:**

**100.** Through $(-1,5)$ and $(-3,4)$ in Point-Slope Form.

**200.** Parallel to $x-3y=4$ through $(2,-8)$ in Point-Slope Form.

**300.** Perpendicular to $\dfrac{2}{3}x-\dfrac{1}{2}y=5$ through $(-2,7)$ in Point-Slope Form.

**Standard Form:**

**100.** Convert $y-3=\dfrac{1}{2}(x+4)$ to Standard Form.

**200.** Parallel to $2x-y=4$ through $(1,-1)$ in Standard Form.

**300.** Write an equation in Standard Form for the line whose x-intercept is -2 and whose y-intercept is 13.
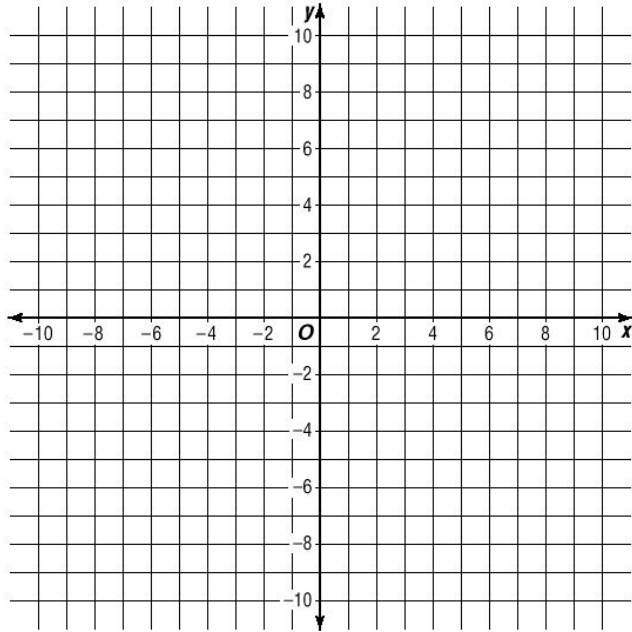
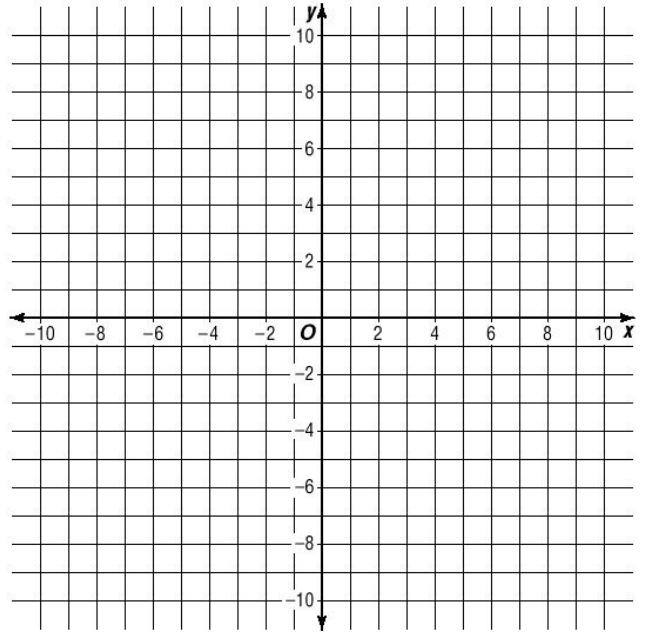# Practice Test: Linear Equations   Math 3   6.6

**Graph each inequality below:**

**10.** $y > -2x + 5$



**11.** $2x - 3y \leq 9$



**Write an equation for each using the variables given.**

12. Lisa can currently run a quarter-mile in 85 seconds.  If she practices for the next ten weeks, she can improve (decrease) her time by 2 seconds every week.  Write an equation that could be used to find Lisa's mile time (t) in seconds based on the number of weeks (w) she has spent training.

12.  Slope-Intercept Equation:_____

13. A baby tiger weighs 45 pounds at 5 months and 77 pounds at 9 months.  If the growth of the baby tiger can be modeled by a linear equation, what is the weight of a baby tiger at birth?

13. Point-Slope Form Equation:_____

**Write an equation in Slope-Intercept Form of a line *perpendicular* to the equation below which passes through the point given.**

14. $x + 5y = 15$  $(-3, 2)$

14.  Slope-Intercept Form:_____