CHAPTER 13:
COORDINATE GEOMETRY

SECTION 13.6
GRAPHING LINEAR EQUATIONS

Standards:

LINEAR EQUATION

A linear equation is an equation whose graph is a line.

STANDARD FORM

The graph of any equation that can be written in the form $Ax + By = C$ where A and B are not both zero, is a line.

Standard Form

$Ax+By=C$

(x and y are on same side)

Slope-Intercept Form

$y=mx+b$

(solve for y)

m is slope

b is the y intercept

X-INTERCEPTS & Y-INTERCEPTS

Standard form makes it easy to find the intercepts.

If a line crosses the x-axis at (a,0) then its x-intercept is a.

If it crosses the y-axis at (0,b) then its y-intercept is b.

To find x-intercept, let y = 0
To find y-intercept, let x = 0

Standard Form

$Ax+By=C$

makes easy to find x and y intercepts

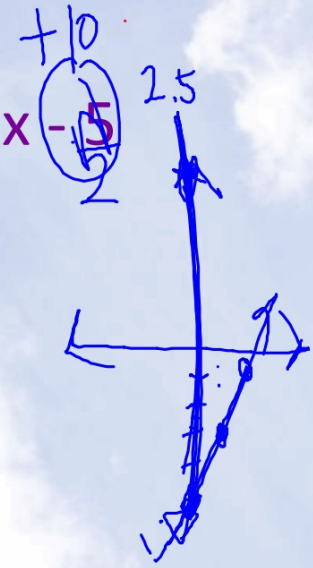
Slope-Intercept Form

$y=mx+b$

m = slope b = y intercept

Write in slope intercept form: $2x+3y=-5$

Write in standard form: $y = 2x - 5$



To Find x intercept Let y=0

To find y intercept Let x=0

EXAMPLE 1

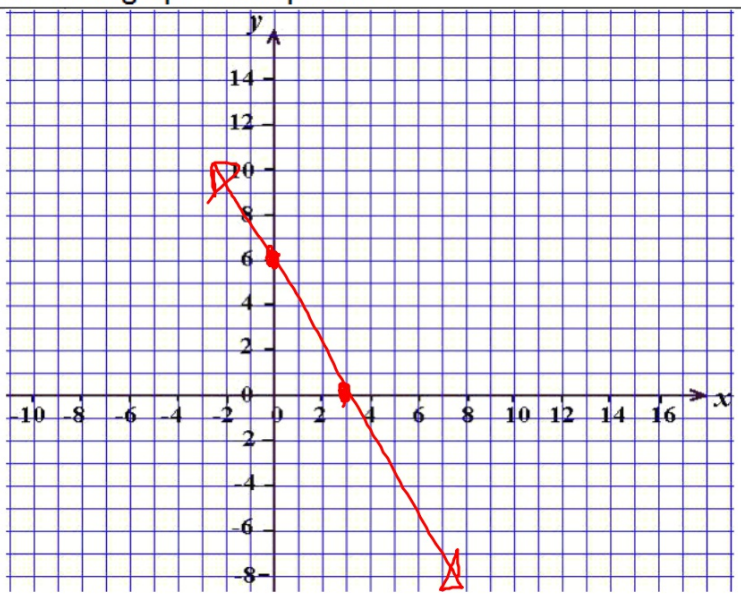
Find the x-intercept and y-intercept of each line. Then graph the equation.

a) $2x + y = 6$

$2x = 6$

$x = 3 \quad (3, 0)$

$y = 6 \quad (0, 6)$



Answer

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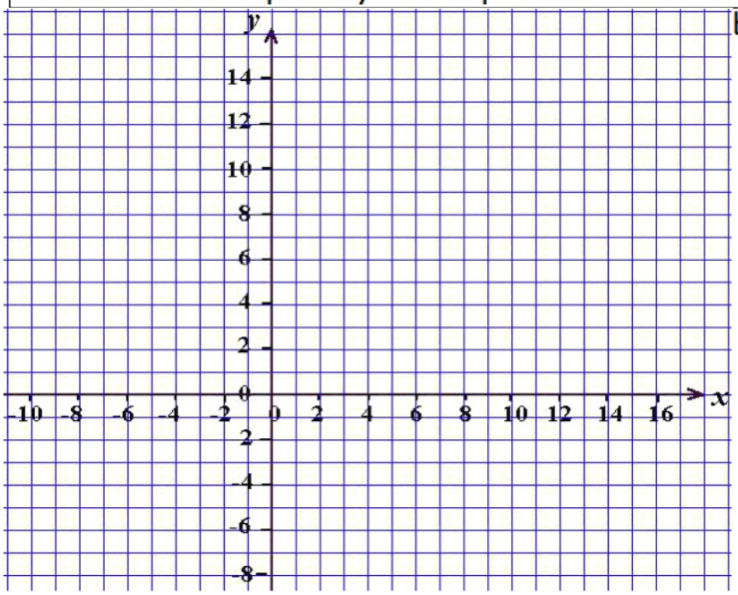


b) $\frac{3x}{3} - \frac{9y}{3} = \frac{18}{3}$

$x - 3y = 6$

$3x = 18 \quad x = 6 \quad (6, 0)$

$0 - 3y = 6$

$y = -2$

Answer

EXAMPLE 1

Find the x-intercept and y-intercept of each line. Then graph the equation.

c) $\frac{9x}{3} - \frac{6y}{3} = \frac{-18}{3}$

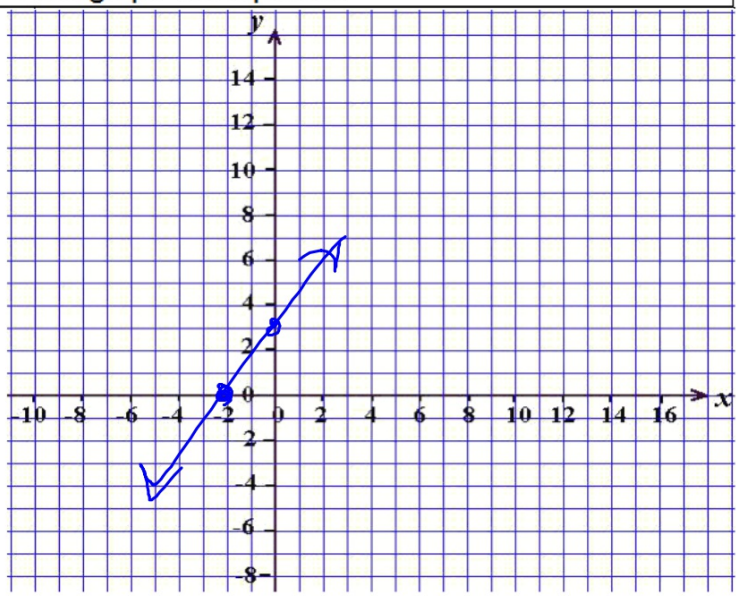
$3x - 2y = -6$

$3x - 0 = -6 \quad (-2, 0)$

$x = -2$

$-2y = -6 \quad (0, 3)$

$y = 3$



Answer

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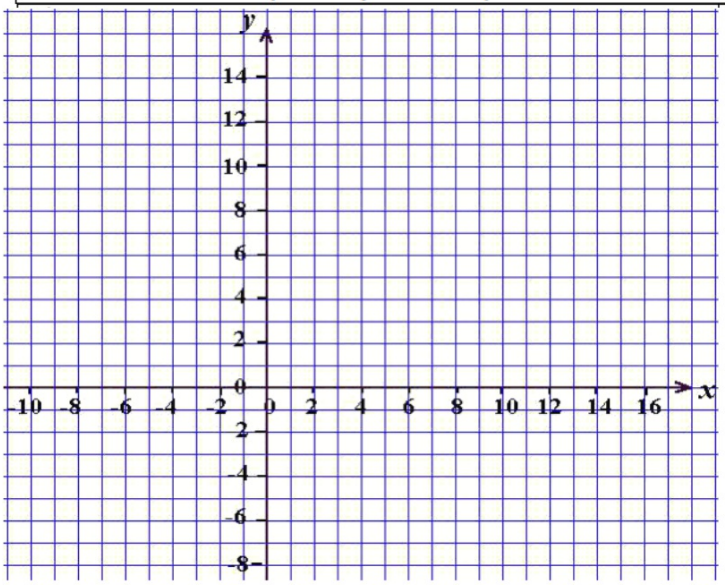
Find the x-intercept and y-intercept of each line. Then graph the equation.



d) $6x + 5y = 30$

Answer

SLOPE-INTERCEPT FORM

A line with equation $y = mx + b$ has slope m and y-intercept b.

EXAMPLE 2

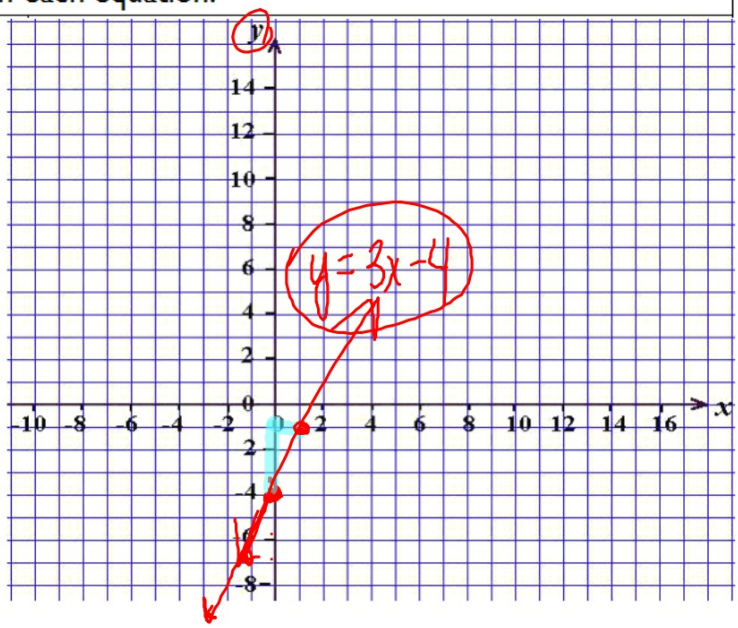
Find the slope and y-intercept of each line. Graph each equation.

a) $y = 3x - 4$

$b = -4$ where it crosses y axis

$m = \frac{3}{1} = \frac{3}{1}$ up -3 down

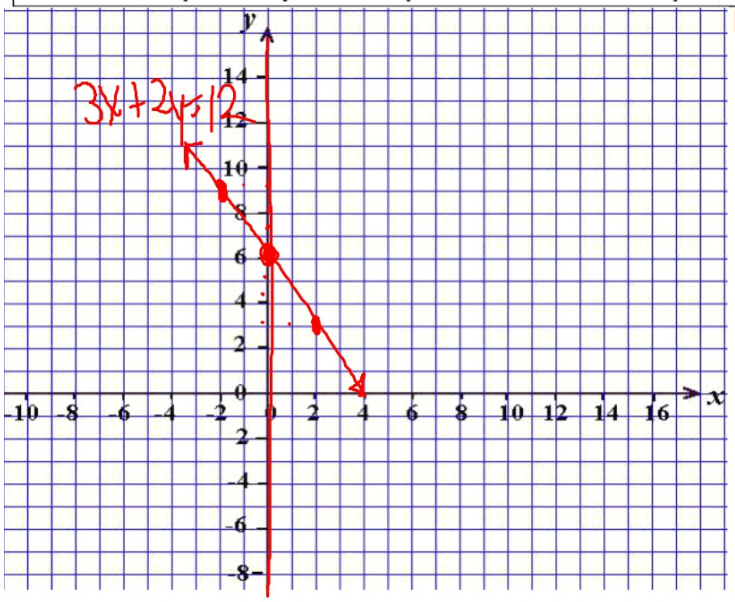
Slope RIGHT -1 left



Answer

EXAMPLE 2

Find the slope and y-intercept of each line. Graph each equation.



b) **3x + 2y = 12**

$-3x$ $-3x$

move into slope intercept form

$$\frac{2y}{2} = \frac{-3x}{2} + \frac{12}{2}$$

$$\frac{-3}{2}\frac{3}{-2}\ y = \boxed{-\frac{3}{2}x} \boxed{+6}$$

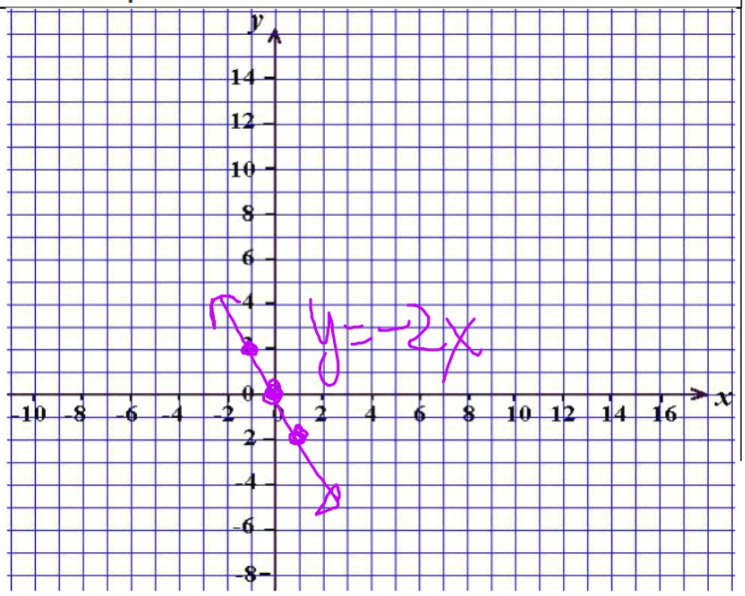
Answer

EXAMPLE 2

Find the slope and y-intercept of each line. Graph each equation.

c) $y = -2x + 0$

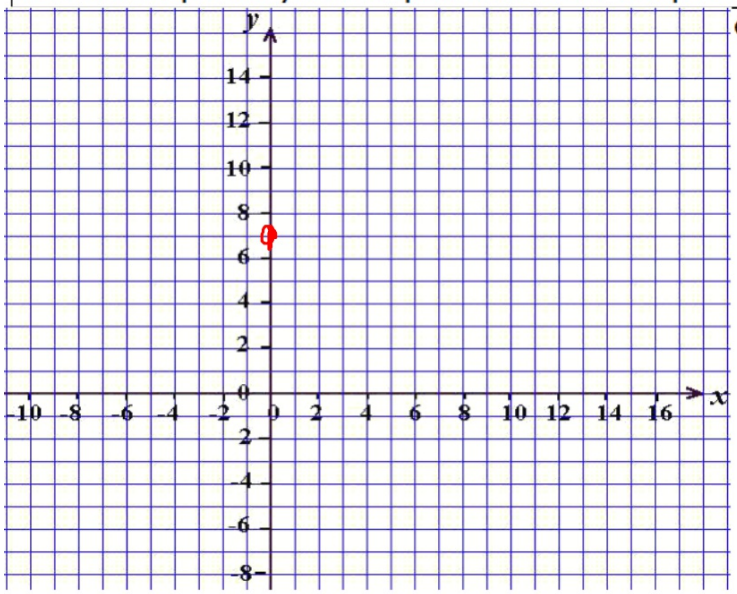
$\frac{-2}{1}$ $\frac{2}{-1}$



Answer

EXAMPLE 2

Find the slope and y-intercept of each line. Graph each equation.



d) **x - 2y = -14**

$-x \qquad -x$

$\frac{-2y}{-2} = \frac{-x}{-2} - \frac{14}{-2}$

$y = \frac{1}{2}x + 7$

Answer

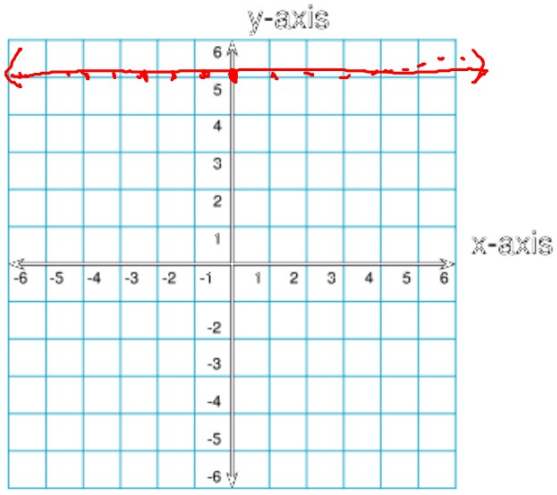
HORIZONTAL LINES	VERTICAL LINES

HORIZONTAL LINES

y = 5

(height)

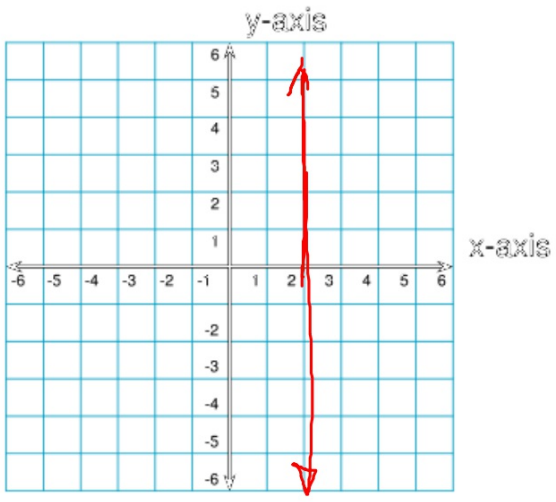
Slope = 0



VERTICAL LINES

x = 2

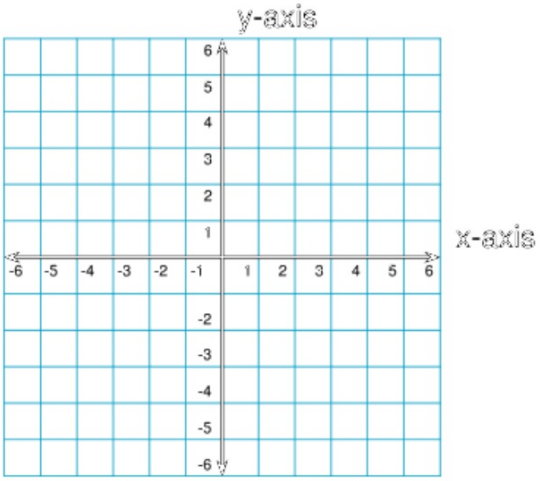
Slope = undefined



HORIZONTAL LINES

y = -2

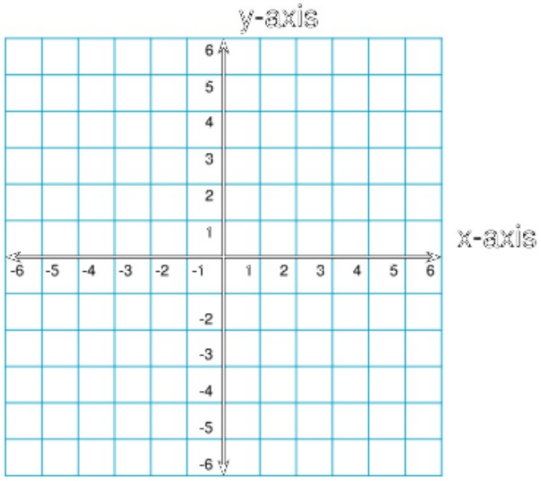
Slope = 0



VERTICAL LINES

x = -4

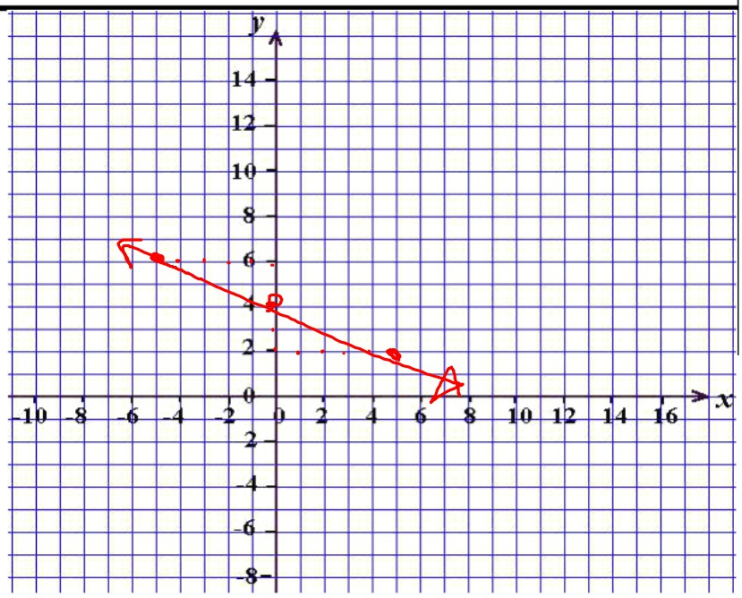
Slope = undefined



EXAMPLE 3

Graph each equation.

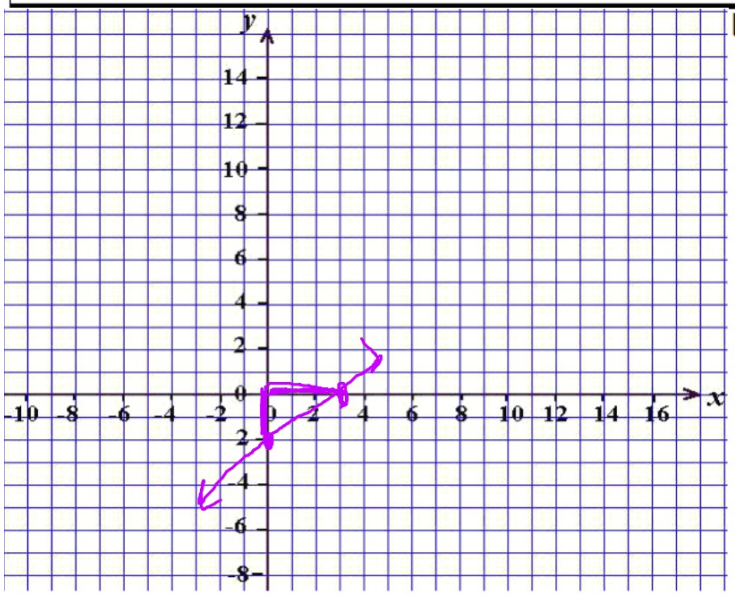
a) $y = -2/5x + 4$



EXAMPLE 3

Graph each equation.

b) $2x - 3y = 6$



$2(0) - 3(0) = 6$

$-3y = 6$ $(0, -2)$

$y = -2$

$2x = 6$ $(3, 0)$

$x = 3$

AND

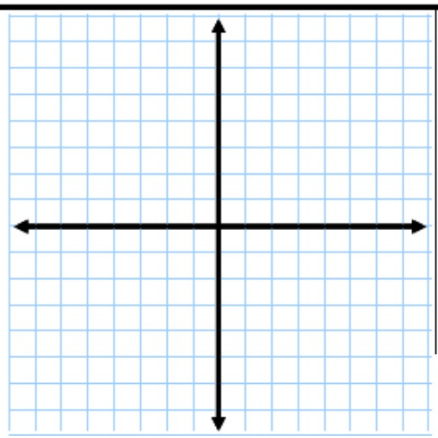
2

3

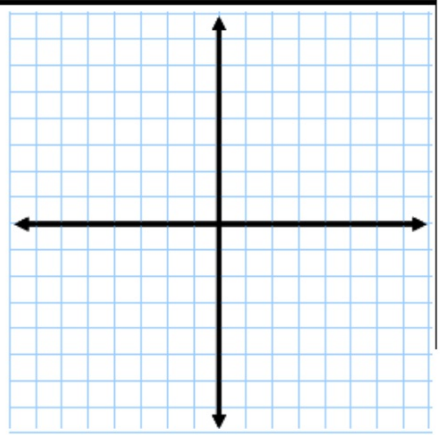
EXAMPLE 3

Graph each equation.

a)



b)



HOMEWORK

Assignment #13.6a

- Pages 550-551 WE #5-29 odd
  MUST USE GRAPH PAPER

5. On the same axes, graph the lines $y = 0$, $y = 3$, and $y = -3$.

6. On the same axes, graph the lines $x = 0$, $x = 2$, and $x = -2$.

Find the x-intercept and y-intercept of each line. Then graph the equation.

7. $3x + y = -21$
8. $4x - 5y = 20$
9. $3x + 2y = 12$
10. $3x - 2y = 12$
11. $5x + 8y = 20$
12. $3x + 4y = -18$

Find the slope and y-intercept of each line. Plot the y-intercept. Then, using the slope, plot one more point. Finally, graph the line.

13. $y = 2x - 3$
14. $y = 2x + 3$
15. $y = -4x$
16. $y = \frac{3}{4}x + 1$
17. $y = -\frac{2}{3}x - 4$
18. $y = \frac{5}{3}x - 2$

Find the slope and y-intercept of each line.

Example $x + 3y = -6$

Solution Write the equation in slope-intercept form.

$$3y = -x - 6$$

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

The slope is $-\frac{1}{3}$. The y-intercept is -2.

19. $4x + y = 10$
20. $2x - y = 5$
21. $5x - 2y = 10$
22. $3x + 4y = 12$
23. $x - 4y = 6$
24. $4x + 3y = 8$

Solve each pair of equations algebraically. Then draw the graphs of the equations and label their intersection point.

25. $x + y = 3$
    $x - y = -1$
26. $2x + y = 7$
    $3x + y = 9$
27. $x + 2y = 10$
    $3x - 2y = 6$
28. $3x + 2y = -30$
    $y = x$
29. $4x + 5y = -7$
    $2x - 3y = 13$
30. $3x + 2y = 8$
    $-x + 3y = 12$