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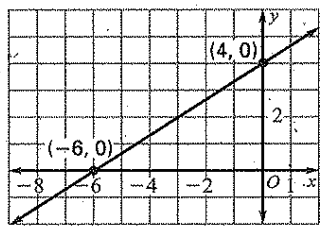
California Standard Algebra 6.0

California Standards

Algebra 6.0

Students graph a linear equation and compute the *x*- and *y*-intercepts (e.g., graph $2x + 6y = 4$). They are also able to sketch the region defined by linear inequalities (e.g., they sketch the region defined by $2x + 6y < 4$).

Graph Linear Equations and Inequalities

Terms to Know	Example
The ***x*-intercept** is the x-coordinate of a point where a graph crosses the x-axis.	The *x-intercept* is -6. The *y-intercept* is 4.
The ***y*-intercept** is the y-coordinate of a point where a graph crosses the y-axis.	
A **linear inequality in two variables** is the result of replacing the $=$ sign in a linear equation with $<$, $\leq$, $>$, or $\geq$.	$x - 4y > 7$ is a *linear inequality.*

Example 1

Graph a Linear Equation

Graph the equation $3x - y = 2$. What are the x- and y-intercepts of the graph?

Solution

STEP 1 Solve the equation for y.

$$3x - y = 2$$

$$y = 3x - 2$$

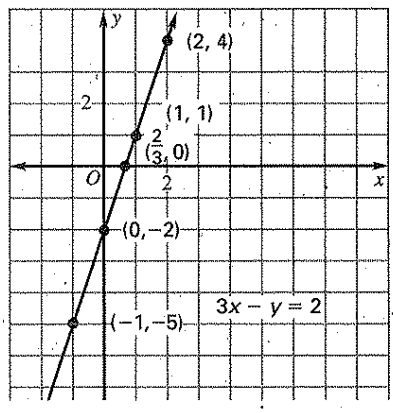
STEP 2 Make a table by choosing a few values for x and finding the values of y.

x	-2	-1	0	1	2
y	-8	-5	-2	1	4

STEP 3 Plot the points. Notice that the points appear to lie in a straight line.

STEP 4 Connect the points by drawing a line through them. Use arrows to indicate that the graph goes on without end.

STEP 5 Notice that the graph intersects the x-axis at the point $\left(\frac{2}{3}, 0\right)$ and the y-axis at the point $(0, -2)$.



Answer The x-intercept is $\frac{2}{3}$. The y-intercept is -2.

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Example 2 **Find Intercepts of an Equation**

What are the x- and y-intercepts of the graph of $3x - 5y = 45$?

Solution

To find the x-intercept, substitute 0 for y and solve for x.

$3x - 5y = 45$ **Write the original equation.**

$3x - 5(0) = 45$ **Substitute 0 for *y*.**

$x = 15$ **Solve for *x*.**

To find the y-intercept, substitute 0 for x and solve for y.

$3x - 5y = 45$ **Write the original equation.**

$3(0) - 5y = 45$ **Substitute 0 for *x*.**

$y = -9$ **Solve for *y*.**

Answer The x-intercept is 15. The y-intercept is -9.

Example 3 **Graph a Linear Inequality**

Graph the inequality $y < -2x + 9$.

Solution

STEP 1 Graph the equation $y = -2x + 9$.

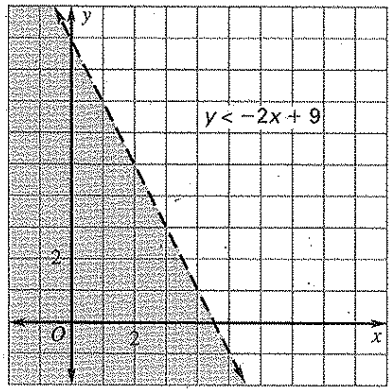
The inequality is $<$, so use a dashed line.

STEP 2 Test (0, 0) in $y < -2x + 9$.

$0 \stackrel{?}{<} -2(0) + 9$

$0 < 9$ ✓

STEP 3 Shade the half-plane that contains (0, 0), because (0, 0) is a solution of the inequality.

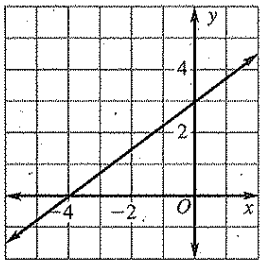


Exercises

1. What is the y-intercept of the graph of $5x + 2y = 10$?

Ⓐ $y = 5$ Ⓑ $y = 2$ Ⓒ $y = 0$ Ⓓ $y = -2$

2. Which equation is shown on the graph below?



Ⓐ $4x + 3y = 12$ Ⓑ $-3x + 4y = 12$

Ⓒ $3x + 4y = 9$ Ⓓ $-4x + 3y = 9$

3. What are the coordinates of the y-intercept of the graph of $-9x + 2y = -4$?

Ⓐ (0, 2) Ⓑ (0, −2)

Ⓒ $\left(\frac{4}{9}, 0\right)$ Ⓓ $\left(0, -\frac{4}{9}\right)$

4. What are the coordinates of the x-intercept of the graph of $-2x - 5y = 7$?

Ⓐ $\left(-\frac{7}{5}, 0\right)$

Ⓑ $\left(-\frac{7}{2}, 0\right)$

Ⓒ $\left(0, \frac{7}{2}\right)$

Ⓓ $\left(0, \frac{7}{5}\right)$

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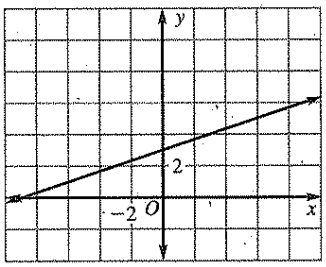
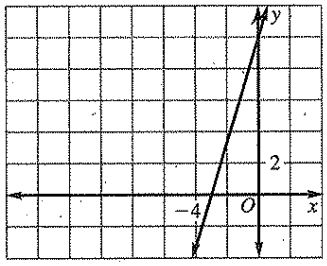
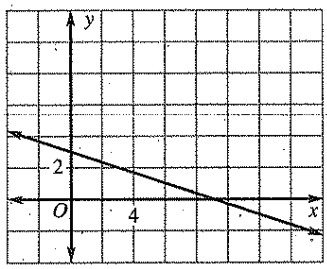
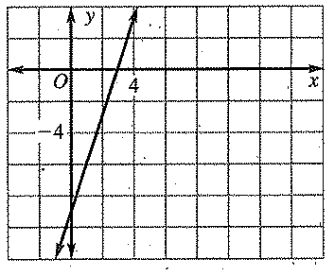
5. Which of the following is the graph of $y = \frac{1}{3}x + 3$?

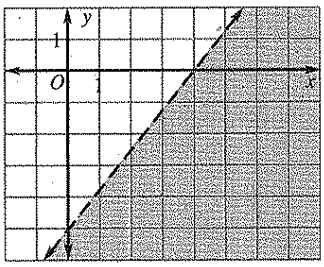
Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

6. Which inequality is shown on the graph below?



Ⓐ $5x - 4y < -5$ Ⓑ $5x + 4y < 20$

Ⓒ $5x - 4y < 20$ Ⓓ $5x + 4y < -4$

7. What is the y-intercept of the graph of $7x + 14y = -28$?

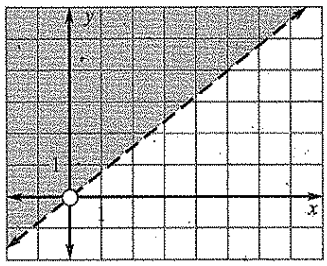
Ⓐ 4 Ⓑ 2 Ⓒ -2 Ⓓ -4

8. What are the coordinates of the x-intercept of the graph of $y = \frac{4}{7}x$?

Ⓐ $(0, 0)$ Ⓑ $(3, 0)$

Ⓒ $(7, 0)$ Ⓓ $(0, 4)$

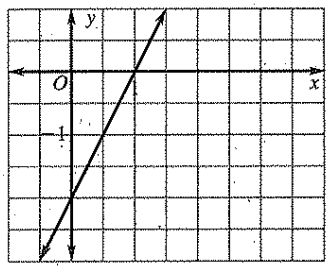
9. Which inequality is shown on the graph below?



Ⓐ $y < \frac{4}{5}x$ Ⓑ $y \leq \frac{4}{5}x$

Ⓒ $y > \frac{4}{5}x$ Ⓓ $y \geq \frac{4}{5}x$

10. Which equation is shown on the graph below?



Ⓐ $y = 2x + 1$

Ⓑ $y = \frac{1}{2}x - 2$

Ⓒ $y = \frac{1}{2}x + 1$

Ⓓ $y = 2x - 2$

11. What are the coordinates of the x-intercept of the graph of $5x - 3 = 10y - 6$?

Ⓐ $\left(0, -\frac{3}{5}\right)$

Ⓑ $\left(\frac{3}{5}, 0\right)$

Ⓒ $\left(-\frac{3}{5}, 0\right)$

Ⓓ $\left(0, \frac{3}{5}\right)$

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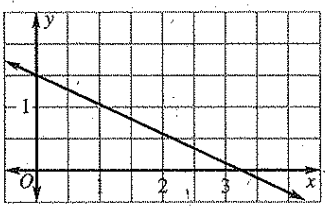
12. Which equation is shown on the graph below?



(A) $-12x - 26y = 39$

(B) $12x + 26y = 39$

(C) $26x + 12y = 39$

(D) $26x - 12y = 39$

13. What are the coordinates of the y-intercept of the graph of $y + 4 = 3x - 2$?

(A) $(0, -6)$

(B) $(-2, 0)$

(C) $(0, -2)$

(D) $(2, 0)$

14. Which set represents all values of y such that $(0, y)$ is a solution of $2x - 9y \leq 15$?

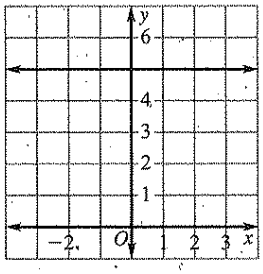
(A) $\left\{y : y \leq -\frac{5}{3}\right\}$

(B) $\left\{y : y \leq \frac{5}{3}\right\}$

(C) $\left\{y : y \geq -\frac{5}{3}\right\}$

(D) $\left\{y : y \geq \frac{5}{3}\right\}$

15. Which equation is shown on the graph below?



(A) $x - y = 5$

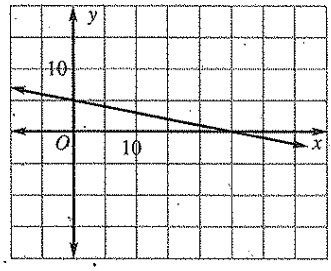
(B) $x = 5$

(C) $x + y = 5$

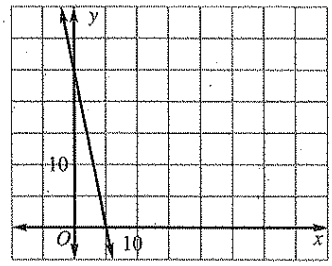
(D) $y = 5$

16. Which of the following is the graph of $y = -\frac{1}{5}x + 5$?

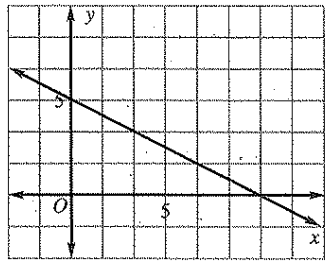
(A)



(B)



(C)



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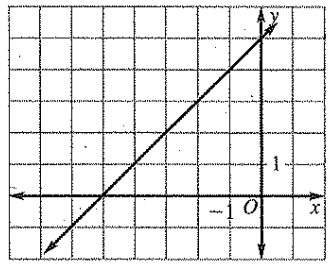

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