



EQUATIONS OF LINES

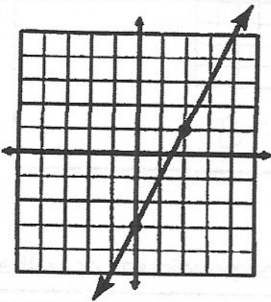
Most linear equations are written **slope-intercept form** or **standard form**.

Slope-Intercept Form: $y = mx + b$

$m =$ slope ; $b =$ y-intercept

Examples: Given the graph, write the equation in slope-intercept form.

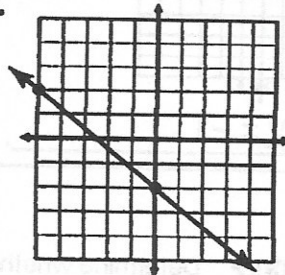
1.



$$m = 2$$
$$b = -3$$

$$y = 2x - 3$$

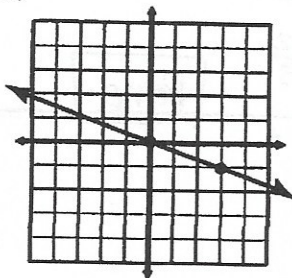
2.



$$m = \frac{4}{5}$$
$$b = -2$$

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

3.

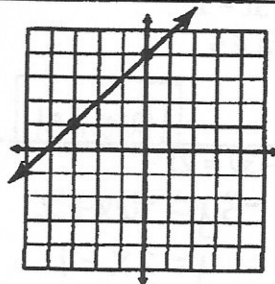


$$m = -\frac{1}{3}$$

$$b = 0$$

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

4.



$$m = 1$$
$$b = 4$$

$$y = x + 4$$

Standard Form: $Ax + By = C$

Because standard form does not give you slope (m), you must be able to convert them to slope-intercept form.

7. $x + y = 6$

$$y = -x + 6$$

8. $5x + 2y = -2$

$$2y = -5x - 2$$

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

9. $2x - 4y = 28$

$$-4y = -2x + 28$$

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

10. $3x - y = 5$

$$-y = -3x + 5$$

$$y = 3x - 5$$

11. $6x + 8y = -16$

$$8y = -6x - 16$$

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

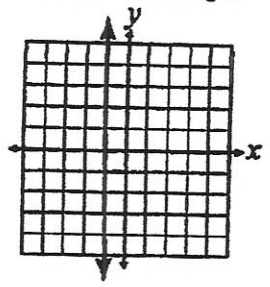
12. $x - 4y = 0$

$$-4y = -x$$

$$y = \frac{1}{4}x$$

VERTICAL LINES

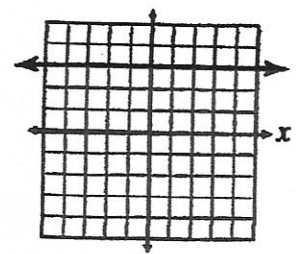
A vertical line is written in the form $x = a$, where a represents the line's x -intercept.



Equation: $x = -1$

HORIZONTAL LINES

A horizontal line is written in the form $y = b$, where b represents the line's y -intercept.



Equation: $y = 3$

THE POINT-SLOPE FORMULA

Used to write the equation of a line when given a point (x_1, y_1) and the slope of the line (m) .

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

*Be sure to distribute and solve for y !

Type 1: Given a Point and Slope

1. $(4, 1)$; slope = 2
 $y - 1 = 2(x - 4)$
 $y - 1 = 2x - 8$
 $y = 2x - 7$

2. $(2, 4)$; slope = $\frac{1}{2}$
 $y - 4 = \frac{1}{2}(x - 2)$
 $y - 4 = \frac{1}{2}x - 1$
 $y = \frac{1}{2}x + 3$

3. $(-6, 0)$; slope = $\frac{2}{3}$
 $y - 0 = \frac{2}{3}(x - (-6))$
 $y = \frac{2}{3}x + 4$

4. $(-8, -1)$; slope = $-\frac{3}{4}$
 $y - (-1) = -\frac{3}{4}(x - (-8))$
 $y + 1 = -\frac{3}{4}x - 6$
 $y = -\frac{3}{4}x - 7$

Type 2: Given Two Points

5. $(-3, 7)$ and $(1, -1)$
 $m = \frac{-1 - 7}{1 - (-3)} = \frac{-8}{4} = -2$
 $y - 7 = -2(x - (-3))$
 $y - 7 = -2x - 6$
 $y = -2x + 1$

6. $(-6, -7)$ and $(3, -4)$
 $m = \frac{-4 - (-7)}{3 - (-6)} = \frac{3}{9} = \frac{1}{3}$
 $y - (-4) = \frac{1}{3}(x - 3)$
 $y + 4 = \frac{1}{3}x - 1$
 $y = \frac{1}{3}x - 5$

7. $(2, -1)$ and $(4, -6)$
 $m = \frac{-6 - (-1)}{4 - 2} = \frac{-5}{2}$
 $y - (-1) = -\frac{5}{2}(x - 2)$
 $y + 1 = -\frac{5}{2}x + 5$
 $y = -\frac{5}{2}x + 4$

8. $(-3, -8)$ and $(2, 7)$
 $m = \frac{7 - (-8)}{2 - (-3)} = \frac{15}{5} = 3$
 $y - 7 = 3(x - 2)$
 $y - 7 = 3x - 6$
 $y = 3x + 1$

Keep 4 #9 write eq of // to $y = 3x + 6$ that passes through $(4, 7)$

$m = 3$
 $(4, 7)$
 $y - 7 = 3(x - 4)$
 $y - 7 = 3x - 12$
 $y = 3x - 5$

10. Write an equation parallel to $2x + 5y = 15$ that passes through the point $(-10, 1)$.

$(-10, 1)$
 $m = -\frac{2}{5}$
 $5y = -2x + 15$
 $y = -\frac{2}{5}x + 3$
 $y - 1 = -\frac{2}{5}(x - (-10))$
 $y - 1 = -\frac{2}{5}x - 4$
 $y = -\frac{2}{5}x - 3$

11. Write an equation parallel to $5x - 4y = 4$ that passes through the point $(-8, 2)$.

$m = \frac{5}{4}$
 $(-8, 2)$
 $-4y = -5x + 4$
 $y = \frac{5}{4}x - 1$
 $y - 2 = \frac{5}{4}(x - (-8))$
 $y - 2 = \frac{5}{4}x + 10$
 $y = \frac{5}{4}x + 12$

12. Write an equation perpendicular to $y = -\frac{1}{5}x + 9$ that passes through the point $(-2, -2)$.

$m = 5$
 $(-2, -2)$
 $m = 5$
 $y - (-2) = 5(x - (-2))$
 $y + 2 = 5x + 10$
 $y = 5x + 8$

13. Write an equation perpendicular to $5x + 6y = 18$ that passes through the point $(10, 7)$.

$m = \frac{6}{5}$
 $(10, 7)$
 $6y = -5x + 18$
 $y = -\frac{5}{6}x + 3$
 $m = \frac{6}{5}$
 $y - 7 = \frac{6}{5}(x - 10)$
 $y - 7 = \frac{6}{5}x - 12$
 $y = \frac{6}{5}x - 5$

14. Write an equation perpendicular to $x - 4y = 20$ that passes through the point $(2, -5)$.

$m = -4$
 $(2, -5)$
 $(y - (-5)) = -4(x - 2)$
 $y + 5 = -4x + 8$
 $y = -4x + 3$
 $-4y = -x + 20$
 $y = \frac{1}{4}x - 5$
 $m = -4$