

# 3-7

## Equations of Lines in the Coordinate Plane

**Content Standard**  
 Prepares for G.GPE.5 Prove the slope criteria for parallel and perpendicular lines . . .

**Objective** To graph and write linear equations

Take note

### Key Concept Slope

**Definition**

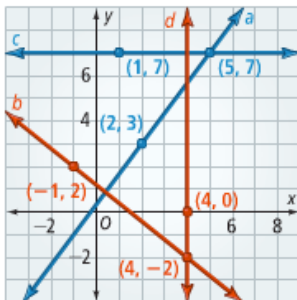
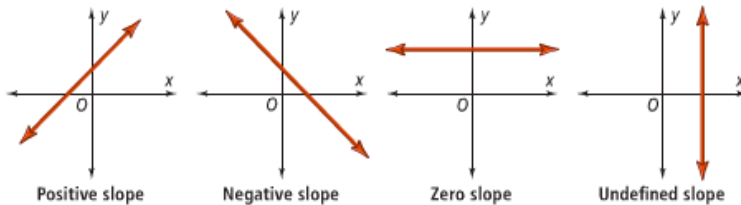
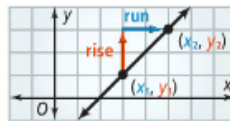
The **slope**  $m$  of a line is the ratio of the vertical change (**rise**) to the horizontal change (**run**) between any two points.

**Symbols**

A line contains the points  $(x_1, y_1)$  and  $(x_2, y_2)$ .

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

**Diagram**



- What is the slope of line  $a$ ?
- What is the slope of line  $c$ ?

Take note

## Key Concept Forms of Linear Equations

## Definition

The **slope-intercept form** of an equation of a nonvertical line is  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept.

## Symbols

$$y = mx + b$$

$\uparrow$        $\uparrow$   
 slope    $y$ -intercept

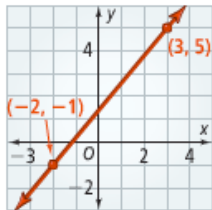
The **point-slope form** of an equation of a nonvertical line is  $y - y_1 = m(x - x_1)$ , where  $m$  is the slope and  $(x_1, y_1)$  is a point on the line.

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

$\uparrow$        $\uparrow$        $\uparrow$   
 $y$ -coordinate   slope    $x$ -coordinate

Write equations for all of the following situations:

3. a. What is an equation of the line with slope  $-\frac{1}{2}$  and  $y$ -intercept 2?  
 b. What is an equation of the line through  $(-1, 4)$  with slope  $-3$ ?



5. a. What are the equations for the horizontal and vertical lines through  $(4, -3)$ ?

Rewrite all the equations on the previous slide in an alternate form.

2. a. Graph  $y = 3x - 4$ .

b. Graph  $y - 2 = -\frac{1}{3}(x - 4)$ .

c.  $x = 3$

d.  $y = -2$

