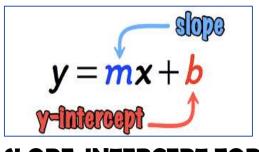
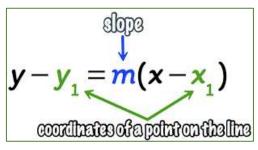
#### **SECTION 2.4** Point Slope Form of Equations

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





**SLOPE-INTERCEPT FORM** 

POINT-SLOPE FORM

1) Write the equation of the line, with the given properties, in slope-intercept form

Slope = 
$$-6$$
, through  $(-3,2)$ 

Plug slope, x and y (from the point) into the equation to find b

$$y = mx + b$$

$$2 = -6(-3) + b$$

2 = 18 + b move 18 to left and subtract it

-16 = b then rewrite the equation using slope and b

$$y = -6x - 16$$

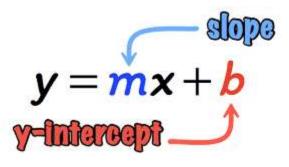
2) Find a point-slope equation of the line having the given slope and containing the given point.

$$m = \frac{6}{7}, (7,5)$$

What is an equation of the line?

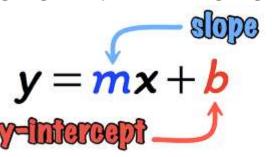
In the equation below, type the slop appropriate positions.

$$y - 5 = \frac{6}{7}(x - 7)$$



3) Find a point-slope equation of the line having the given slope and containing the given point.

$$m = \frac{3}{4}, (5,4)$$



What is an equation of the line?

In the equation below, type the slope and the coordinates of the point in the appropriate positions.

$$y - 4 = \frac{3}{4}(x - 5)$$

4) Find a point-slope equation of the line having the given slope and containing the given point.

$$m = \frac{2}{3}, (8,6)$$

y = mx + b-intercept

What is an equation of the line?

In the equation below, type the slope and the coordinates of the point in the appropriate positions.

$$y - 6 = \frac{2}{3}(x - 8)$$

Write in point-slope form an equation of the line through the pair of points (4,0) and (14,8).

Type an equation of the line in point-slope form using one of the given points.

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SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 0}{14 - 4} = \frac{8}{10} = \frac{4}{5}$$
  
Then use 1st point (4,0)  $y - 0 = \frac{4}{5}(x-4)$   
 $y - y_1 = m(x - x_1)$   $y = \frac{4}{5}(x-4)$ 

6) Write in point-slope form an equation of the line through the pair of points (3,0) and (18,6).
Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 0}{18 - 3} = \frac{6}{15} = \frac{2}{5}$$
  
Then use 1st point (3,0)  $y - 0 = \frac{2}{5}(x-3)$   
 $y - y_1 = m(x - x_1)$   
 $y - y_1 = m(x - x_1)$ 

7) Write in point-slope form an equation of the line through the pair of points (4,0) and (9,2).
Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{2 - 0}{9 - 4} = \frac{2}{5} = \frac{2}{5}$$
  
Then use 1st point (4,0)  $y - 0 = \frac{2}{5}(x-4)$   
 $y - y_1 = m(x - x_1)$   
coordinates of a point (2,0)  $y = \frac{2}{5}(x-4)$ 

8) Write in point-slope form an equation of the line through the pair of points (3,0) and (9,5).
Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 0}{9 - 3} = \frac{5}{6}$$
  
Then use 1st point (3,0)  $y - 0 = \frac{5}{6}(x-3)$   
 $y - y_1 = m(x - x_1)$   $y = \frac{5}{6}(x-3)$ 

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

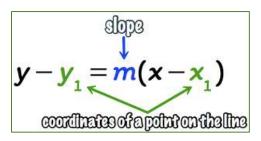
What is an equation of the line in point-slope form?

$$\triangle$$
 A.  $x-4=-\frac{7}{6}(y-9)$ 

$$\bigcirc$$
 B.  $y-4=\frac{7}{6}(x-9)$ 

$$rac{*}{\circ}$$
c.  $y-4=-rac{7}{6}(x-9)$ 

$$\bigcirc$$
 D.  $y = \frac{7}{6}x + \frac{29}{2}$ 



10) Write in point-slope form an equation of the line through the pair of points.

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

What is an equation of the line in point-slope form?

$$\triangle$$
 A.  $x-4=-\frac{7}{6}(y-9)$ 

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 B.  $y-4=\frac{7}{6}(x-9)$ 

$$rac{*}{\circ}$$
c.  $y-4=-rac{7}{6}(x-9)$ 

$$O$$
 D.  $y = \frac{7}{6}x + \frac{29}{2}$ 

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

$$\text{conflictes of a point on the line}$$

9) Write in point-slope form an equation of the line through the pair of points.

Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{12 - 4}{7 - 2} = \frac{8}{5}$$

Then use 1st point (2,4)
$$y - y_1 = m(x - x_1)$$

$$\text{coordinates of a point on the line}$$

$$y - 4 = \frac{8}{5}(x-2)$$

$$y-4=\frac{8}{5}(x-2)$$

10) Write in point-slope form an equation of the line through the pair of points.

Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 9}{5 - 3} = \frac{-5}{2} = -\frac{5}{2}$$

Then use 1st point (3,9)

$$y-9=-\frac{5}{2}(x-3)$$

#### Parallel Lines

#### Perpendicular Lines

PARALLEL LINES

PERPENDICULAR LINES

SAME SLOPE

$$m = \frac{3}{5} | \prod_{m} = \frac{3}{5}$$

$$m = \frac{3}{5} \perp m = -\frac{5}{3}$$

\*change sign and take reciprocal

$$(x,y)$$
 m  
11) Find an equation of the line through  $(4,8)$  and parallel to  $y = 3x - 5$ . same slope  $m = 3$ 

$$y = mx + b$$
  
 $8 = 3(4) + b$   
 $8 = 12 + b$  move 12 to left  
 $-4 = b$  then rewrite the equation using slope and b  
 $y = mx + b$   
 $y = 3x - 4$ 

$$(x,y)$$
 m

12) Find an equation of the line through (1,7) and parallel to y = 2x + 4. Same slope m = 2

$$y = mx + b$$
  
 $7 = 2(1) + b$   
 $7 = 2 + b$  move 2 to left  
 $5 = b$  then rewrite the equation using slope and b  
 $y = mx + b$   
 $y = 2x + 5$ 

13) Write in point-slope form an equation of the line through the pair of points (4,0) and (16,10).
Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{10 - 0}{16 - 4} = \frac{10}{12} = \frac{5}{6}$$

Then use 1st point (4,0)
$$y - 0 = \frac{5}{6}(x-4)$$

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

$$y = \frac{5}{6}(x-4)$$

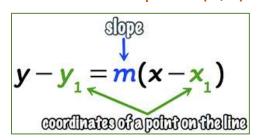
$$y = \frac{5}{6}(x-4)$$

14) Write in point-slope form an equation of the line through the pair of points.

Type an equation of the line in point-slope form using one of the given points.

SLOPE= 
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{3 - 10}{5 - 2} = \frac{-7}{3} = -\frac{7}{3}$$

Then use 1st point (4,0)



$$y - 10 = \frac{7}{3}(x-2)$$

## PARALLEL LINES

### PERPENDICULAR LINES

## SAME SLOPE

$$m = \frac{3}{5} | \lim_{m \to \frac{3}{5}}$$

# OPPOSITE SLOPE

$$m = \frac{3}{5} \perp m = -\frac{5}{3}$$

\*change sign and take reciprocal

15) Write the equation of the line through the given point. Use slope-intercept form.

(x ,y) m  
(-5,8); perpendicular to y = 
$$\left(\frac{6}{5}\right)$$
x - 5

Flip and change the sign  $m = \frac{5}{6}$ 

$$y = mx + b$$

$$8 = \frac{5}{6} (-5) + b$$

 $8 = -\frac{25}{6} + b$  add  $\frac{25}{6}$  to 8 in calculator to get b

 $\frac{73}{c}$  = b then rewrite the equation using slope and b

$$y = mx + b$$

$$y = mx + b$$
  
 $y = \frac{5}{6}x + \frac{73}{6}$ 

16) Write in point-slope form an equation of the line through the pair of points.

(5,11) and (3,6) SLOPE= 
$$\frac{6-11}{3-5} = \frac{-5}{-2}$$

#### Then use 1st point (5,11)

What is an equation of the line in point-slope form?

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

$$\bigcirc$$
 B.  $x-11=\frac{5}{2}(y-5)$ 

$$\bigcirc$$
 C.  $y-11=-\frac{5}{2}(x-5)$ 

$$\nearrow$$
D.  $y-11=\frac{5}{2}(x-5)$ 

$$y - y_1 = m(x - x_1)$$
confinates of a point on the line

(x,y) m 17) Find an equation of the line through (4,7) and parallel to y = 4x + 8.

same slope m= 4

$$y = mx + b$$

$$7 = 4(4) + b$$

$$7 = 16 + b$$
 move 12 to left

-9 = b then rewrite the equation using slope and b

$$y = mx + b$$

$$y = 4x - 9$$

## PARALLEL LINES

PERPENDICULAR LINES

SAME SLOPE

$$m = \frac{3}{5} | \underline{ | m} = \frac{3}{5}$$

OPPOSITE SLOPE

$$m = \frac{3}{5} \perp m = -\frac{5}{3}$$

\*change sign and take reciprocal

18) Write the equation of the line through the given point. Use slope-intercept form.

(x ,y) m  
(-5,7); perpendicular to 
$$y = \frac{5}{4}x - 3$$
  
Flip and change the sign  $m = \frac{4}{5}$ 

$$y = mx + b$$

$$7 = \frac{4}{5}(-5) + b$$

$$7 = -4 + b \quad add 7 \text{ to 7 in calculator to get b}$$

$$11 = b \quad \text{then rewrite the equation using slope and b}$$

$$y = mx + b$$
  
 $y = \frac{4}{5}x + 11$ 

19) Write an equation in slope-intercept form of the line that passes through the given point and is perpendicular to the graph of the given equation.

change sign, reciprocal, reciprocal 
$$m = -4$$
,  
 $y = mx + b$   
 $3 = (-4)(-4) + b$   
 $3 = 16 + b$  move 16 to left  
 $-13 = b$  then rewrite the equation using slope and b

$$y = mx + b$$
  
 $y = -4x - 13$ 

20) Write an equation in slope-intercept form of the line that passes through the given point as parallel to the graph of the given equation.

(x, y)  

$$(-4, -7)$$
;  $y = -3x + 1$   
same slope  $m = 3$   
 $y = mx + b$   
 $-7 = (-3)(-4) + b$   
 $-7 = 12 + b$  move 12 to left  
 $-19 = b$  then rewrite the equation using slope and b  
 $y = mx + b$   
 $y = -3x - 19$ 

21) Write an equation in slope-intercept form of the line that passes through the given point and is perpendicular to the graph of the given equation.

(x,y) 
$$m_1$$
  
 $(-5,3)$ ;  $y = 5x-3$  change sign, reciprocal, reciprocal  $m = -5$   
 $y = mx + b$   
 $3 = (-5)(-5) + b$   
 $3 = 25 + b$  move 25 to left  
 $-22 = b$  then rewrite the equation using slope and  $b$   
 $y = mx + b$   
 $y = -5x - 22$ 

22) Write an equation in slope-intercept form of the line that passes through the given point and is perpendicular to the graph of the given equation.

perpendicular to the graph of the given equation:
$$(x,y) \quad m_{(-3,4); y = \sqrt{3}} x - 2 \quad \text{change sign, reciprocal, reciprocal } m = -3$$

$$y = mx + b$$

$$4 = (-3)(-3) + b$$

$$4 = 9 + b \quad \text{move } 9 \text{ to left}$$

$$-5 = b \quad \text{then rewrite the equation using slope and } b$$

$$y = mx + b$$

$$y = -3x - 5$$