

6.5 Slope-Point Form of the Equation for a Linear Function

Slope-Point Form:

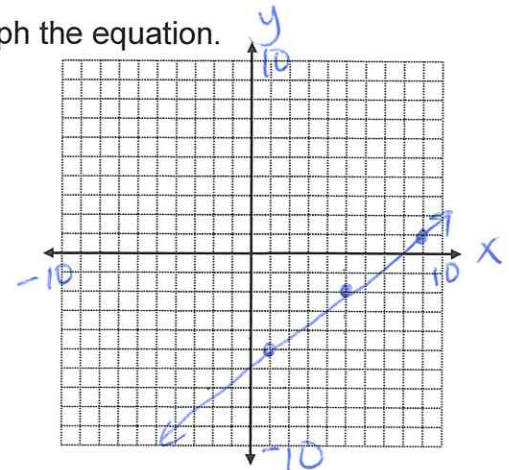
The equation of a line that passes through $P(x_1, y_1)$ and has slope m is: $y - y_1 = m(x - x_1)$

Example: Given the equation $y + 2 = \frac{3}{4}(x - 5)$,

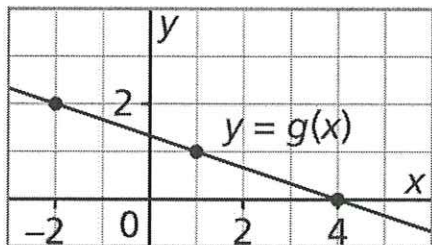
a) Describe the graph of the linear function.

slope: $\frac{3}{4}$
 passes through the point $(5, -2)$

b) Graph the equation.



Example:



a) Write an equation in slope-point form for this line.

slope: $-\frac{1}{3}$ point $(1, 1)$
 $y - 1 = -\frac{1}{3}(x - 1)$

b) Write the equation in slope-intercept form. What is the y-intercept of this line?

$y = -\frac{1}{3}x + \frac{1}{3} + 1 = -\frac{1}{3}x + \frac{4}{3}$
 y-int: $(0, \frac{4}{3})$

Example: Write an equation for the line that passes through $S(2, -3)$ and is:

a) parallel to the line $y = 3x + 5$

same slope = 3

i) in point-slope form

$$y + 3 = 3(x - 2)$$

ii) in slope-intercept form

$$y + 3 = 3x - 6$$

$$y = 3x - 9$$

b) perpendicular to the line $y = 3x + 5$

neg. reciprocal slope: $-\frac{1}{3}$

i) in point-slope form

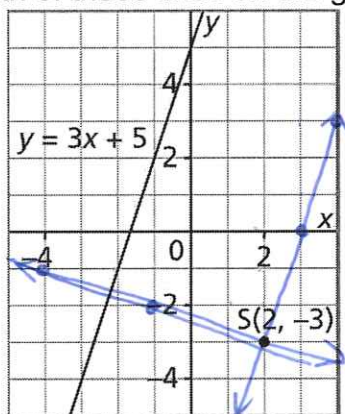
$$y - 2 = -\frac{1}{3}(x + 2)$$

ii) in slope-intercept form

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

$$y = -\frac{1}{3}x + \frac{4}{3}$$

b) Sketch both of these lines on the grid below:



Example: Write an equation for the line that passes through $D(-5, -3)$ and is:

a) parallel to the line $y = \frac{4}{3}x + 1$

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

b) perpendicular to the line $y = \frac{4}{3}x + 1$

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

Example: Write an equation for the line that has x-intercept 4 and is perpendicular to the line

$$y = -\frac{2}{5}x - 6.$$

$(4, 0)$

$$\text{slope} = \frac{5}{2}$$

$$y - 0 = \frac{5}{2}(x - 4)$$

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