$$m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

Name: _____   Date: _____

Learning Goal 0.1	Expectations for graphing from previous years.

Example Find the slope of the line.

a.   Between the points $(-2, 4)$ and $(3, 6)$.

$$m = \frac{6-4}{3-(-2)} = \frac{+2}{+5} = \frac{-2}{5}$$

(annotations: 1 over first point, 2 over second point)

b. $y = 5 - 3x$.

$y = mx + b$ (slope, y-int.)

$= -3x + 5$

$m = -3$

c. $y + 1 = -\frac{2}{5}(x - 10)$.

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

$m = -\frac{2}{5}$ $(10, -1)$

d.   A line parallel to $4x - 3y = 12$.

equal slopes.

x-int $(y=0)$
$x = 3$

y-int $(x=0)$
$y = -4$

$m = \frac{-4-0}{0-3} = \frac{-4}{-3} = \frac{4}{3}$

Example Find the equation of the line in slope – intercept form.

a.   Horizontal line through $(-2, 5)$.

$y = 5$

b.   Through $(0, 5)$ and $(-4, -6)$.

y-int $(x=0)$

$m = \frac{-6-5}{-4-0} = \frac{-11}{-4} = \frac{11}{4}$

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

c. y −intercept of 2 and perpendicular to
$y = 3x - 5$

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

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

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

d. $y - 1 = \frac{2}{3}(x + 9)$

$y - 1 = \frac{2}{3}x + 6$
$+1 \qquad +1$

$y = \frac{2}{3}x + 7$

Assignment   Handout   Quiz Next Day!

Not a unique solution

Example Find the equation of the line in point – slope form.

a. Through $(-4, 5)$ and $(-2, 6)$.

  1   2

$$m = \frac{6-5}{-2-(-4)}$$

$$= \frac{1}{2}$$

① $y - 5 = \frac{1}{2}(x+4)$

② $y - 6 = \frac{1}{2}(x+2)$

b. $x -$ intercept of 5 and parallel to
$$3x - 5y = 15$$

x-int $(5,0)$
y-int $(0,-3)$

$$m = \frac{-3-0}{0-5} = \frac{3}{5}$$

$$y - 0 = \frac{3}{5}(x-5)$$
$$y = \frac{3}{5}(x-5)$$

Example The sales of a small company have been growing linearly with time. The sales were $27 000 in its second year of operation and $63 000 in its fifth year.

a. Find an equation to represent the sales, $S(t)$, as a function of time in years, t, in point – slope form.

① $(2, 27\,000)$
② $(5, 63\,000)$

$$m = \frac{63\,000 - 27\,000}{5-2} = \frac{36\,000}{3} = 12\,000$$

$$y - 27\,000 = 12\,000(x-2)$$

$\quad x$

b. What will the sales in the company's seventh year?

$$y - 27\,000 = 12\,000(7-2)$$
$$= 12\,000(5)$$
$$y - 27\,000 = 60\,000$$
$$y = 87\,000$$

The company will have $87 000 of sales in its 7th year

c. How many years until sales reach $100 000? What assumptions are you making?

$$100\,000 - 27\,000 = 12\,000(x-2)$$
$$73\,000 = 12\,000(x-2)$$
$$6.1 \doteq x - 2$$
$$x \doteq 8.1$$

It will take just over 8 years for the company to make $100 000 in sales, assuming the growth in sales remains linear.