Key

Unit 4 Learning Goals Check List:

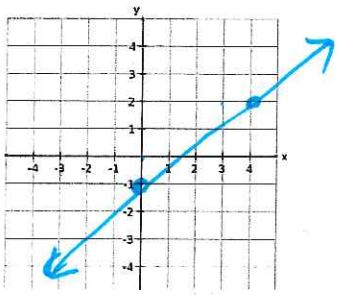
section	Learning Goal	✓

4.1 a) I can write and graph linear equations in slope intercept form.

Ex. Write an equation of the line in slope intercept form and then graph.

a) Slope $= \frac{3}{4}$; y intercept = -1

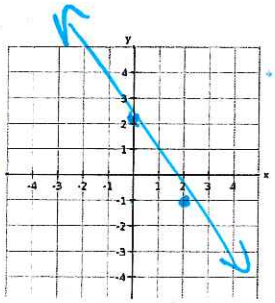
$y = \frac{3}{4}x - 1$



b) $6x + 4y = 16$

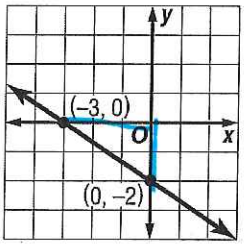
$4y = -6x + 16$

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



Ex. Write the equation of each graphed line in slope intercept form.

a)

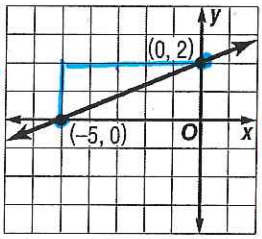


m
slope $= \frac{-2}{3}$

b: -2 (y intercept)

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

b)



$m = \frac{2}{5}$

$b = 2$

$y = \frac{2}{5}x + 2$

b) I can model real world data with equations in slope intercept form.

Ex. The cost to join Gold's Gym includes a start-up fee of $145, plus monthly dues of $45. Write an equation to model the cost of membership at Gold's Gym in any month after start up. How much would it cost to be a member for one year?

$y = 145 + 45x$

or $y = 45x + 145$

Cost $= 45(12) + 145$

$= \$685$

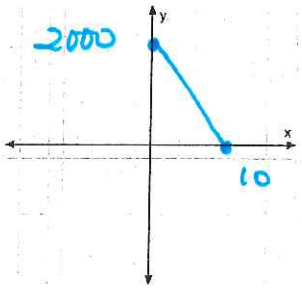
Ex. Houston toads are disappearing in Bastrop County. There are currently approximately 2000 toads, but the population is decreasing at a rate of 200 toads per year.

a) Write an equation to model the population in any year.

b) Sketch a graph (**Label your x & Y axis!**) and explain the meaning of the x & y intercepts.

$y = 2000 - 200x$

or $y = -200x + 2000$



y intercept = 2000 = # toads 1st year

x intercept = 10 means # years b/f population is gone

Domain: $[0, 10]$

Range: $[0, 2000]$

4.2 **a) I can write the equation of a line in slope intercept form from a slope and a point on the line.**

Ex. Slope = 3 and passing through the point (-2,5)

$y - y_1 = m(x - x_1)$ $\quad x_1, y_1$

$y - 5 = 3(x - (-2))$

$y - 5 = 3(x+2)$

$y - 5 = 3x + 6$

$y = 3x + 11$

Ex. slope = -1 and passing through the point (4, -7)

$y - y_1 = m(x - x_1)$ $\quad x_1, y_1$

$y - (-7) = -1(x - 4)$

$y + 7 = -1(x - 4)$

$y + 7 = -x + 4$

$y = -x - 3$

b) I can write the equation of a line in slope intercept form from 2 points on the line.

Ex. Write the equation of the line containing the points (-4, -2) and (-5, -6).

x_1, y_1 $\quad x_2, y_2$

Step 1: slope: $\frac{-6-(-2)}{-5-(-4)} = \frac{-4}{-1} = 4$

Choose only 1 point.

Step 2: $y - (-2) = 4(x - (-4))$

$y + 2 = 4(x + 4)$

$y + 2 = 4x + 16$

$y = 4x + 14$

4.3 **a) I can write equations of lines using the point slope formula.**

Ex. line passing through point (5,1); with slope of $-\frac{2}{3}$

x_1, y_1

$y - 1 = -\frac{2}{3}(x - 5)$

$y - 1 = -\frac{2}{3}x + \frac{10}{3}$

$+1 \quad +1$

$y = -\frac{2}{3}x + \frac{13}{3}$

Ex. line passing through (-1,-3) and (5,6)

x_1, y_1 $\quad x_2, y_2$

slope: $\frac{6-(-3)}{5-(-1)} = \frac{9}{6} = \frac{3}{2}$

$y - 6 = \frac{3}{2}(x - 5)$

$y - 6 = \frac{3}{2}x - \frac{15}{2}$

$+6 \quad +6$

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

b) I can write the equation of a line in all 3 different formats.

Ex. Write the equation in point-slope form, slope-intercept form, and standard form for the line that contains the points (-5,7) and (3,1)

$m = \frac{1-7}{3-(-5)} = \frac{-6}{8} = -\frac{3}{4}$

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

$y - 1 = -\frac{3}{4}x + \frac{9}{4} + \frac{4}{4}$

$+1$

$y = -\frac{3}{4}x + \frac{13}{4}$

4.4 a) I can write the equation of parallel and perpendicular lines in slope intercept form.

$Ax+By=C$ $m=-\frac{A}{B}$

Ex. Write the equation of the line passing through (-1,-4) and parallel to the line: $9x + 3y = 8$

$m=-\frac{9}{3}$

$y-(-4)=-\frac{9}{3}(x-(-1))$

$y+4=-\frac{9}{3}(x+1)$

$y+4=-\frac{9}{3}x-\frac{9}{3}-\frac{12}{3}$

$y=-\frac{9}{3}x-\frac{21}{3}$

$y=-\frac{9}{3}x-7$

Ex. Write the equation of the line passing through (4, -5) and perpendicular to $2x - 5y = -10$

x_1, y_1

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

$y+5=-5/2x+10$

-5

$y=-5/2x+5$

$m=-\frac{A}{B}=\frac{-2}{-5}=\frac{2}{5}$

$\perp m=-\frac{5}{2}$

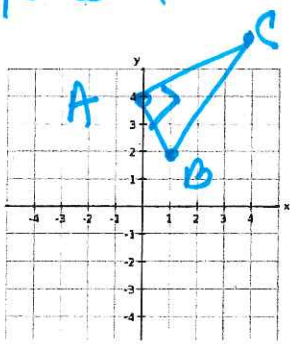
b) I can recognize parallel and perpendicular lines.

Identify each pair of lines as parallel, perpendicular, or neither. Show the algebra and justify your answer!

$-3x + 4y = 8$ $m=3/4$	$3x + 5y = 10$ $m=-3/5$	$2x + 7y = -35$ $m=-2/7$
$-4x + 3y = -6$ $m=4/3$	$5x - 3y = -6$ $m=5/3$	$4x + 14y = -42$ $m=-2/7$
neither	perpendicular	parallel

c) I can use parallel & perpendicular slopes to prove geometric shapes.

Ex. Triangle ABC has vertices $A(0, 4)$, $B(1, 2)$, and $C(4, 6)$.
Determine whether triangle ABC is a right triangle. Explain.



$m\overline{AB}=\frac{2-4}{1-0}=-2$

$m\overline{AC}=\frac{6-4}{4-0}=\frac{1}{2}$

$m\overline{BC}=\frac{6-2}{4-1}=\frac{4}{3}$

$\overline{AB}\perp\overline{AC}$

so Rt $\triangle$

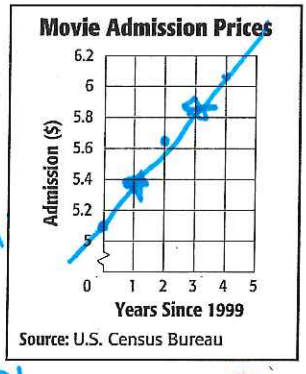
4.5 a) I can use a scatter plot to investigate relationships between two variables.

Ex.

Use the table to graph a scatter plot.

Next draw a line of best fit.

Write an equation for that line In slope intercept form.



Years Since 1999	Admission (dollars)
0	$5.08
1	$5.39
2	$5.66
3	$5.81
4	$6.03

$(1, 5.39)$ $(3, 5.81)$

$m=\frac{5.81-5.39}{3-1}=\frac{.42}{2}=.21$

$y-5.39=.21(x-1)$

$y-5.39=.21x-.21$

$+5.39$

$y=.21x+5.18$

Based on the information and your equation, what would have been the price of a movie ticket in 2006?

$1999-2006$

$=7$ yrs

$y=.21(7)+5.18$

Cost in 2006 ≈ $6.65

4.6 I can write equations for best-fit lines using linear regression and a calculator.

Ex. Write an equation of the regression line for the data in each table below. Then find the correlation coefficient.

$y = -1.5x + 19.8$

1) TURTLES The table shows the number of turtles hatched at a zoo each year since 2006.

	0	1	2	3	4
Year	2006	2007	2008	2009	2010
Turtles Hatched	21	17	16	16	14

2) POPULATION Detroit, Michigan, like a number of large cities, is losing population every year. Below is a table showing the population of Detroit each decade.

	0	10	20	30	40
Year	1960	1970	1980	1990	2000
Population (millions)	1.67	1.51	1.20	1.03	0.95

Source: U.S. Census Bureau

a. Find an equation for the regression line. $y = -0.0192x + 1.652$

b. Find the correlation coefficient and explain the meaning of its sign. $r = -.98$

c. Estimate the population of Detroit in 2008.

$y = -.0192(48) + 1.652 = 0.7344$ million

$\approx$ 3/4 million ppl

4.7 Pre-AP extension

a) I can find the inverse of a linear function and graph both the function and its inverse.

Ex. Find the inverse function of the linear equation: $y = 3x + 4$

Graph the original equation along with its inverse (label each)

Graph the line y = x

$y = 3x + 4$

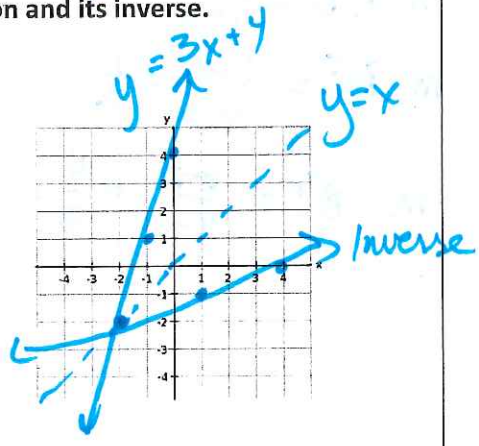
x	y
-2	-2
-1	1
0	4
1	7

$x = 3y + 4$

$x - 4 = 3y$

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

x	y
1	-1
4	0
7	1
-2	-2



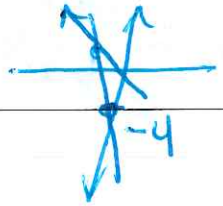
Linear transformations lab -

I can identify transformations of linear functions, including rotations (changes in slope) and vertical shifts (changes in the y intercepts)

ex. What transformations took place to change the graph of the parent function y = x, to y = 2x – 3.

Down 3 units & rotated → steeper slope

Ex. What transformations took place to change the graph of the linear function, $y_1 = 3x - 4$ to $y_2 = -2x + 1$



Rotated left, flatter slope & moved up 5 units.