

**Learning Target 0: I can create a linear equation and use it to answer various questions.**

Driving Home Problem: As you drive home from the football game, the number of kilometers you are away from home depends on the number of minutes you have been driving. Assume that the distance varies linearly with time. Suppose you are 11 km from home when you have been driving for 10 minutes, and 8 km from home when you have been driving for 15 minutes.

- a.) Write the particular equation expressing the number of kilometers you are from home ( $d$ ) in terms of the number of minutes since you left the game ( $t$ ).

$(t, d) \rightarrow (10, 11) \quad m = \frac{8-11}{15-10} = \frac{-3 \text{ km}}{5 \text{ min}} \quad d-11 = -\frac{3}{5}(t-10)$   
 $(15, 8) \quad d-11 = -\frac{3}{5}t + 6$

$d = -\frac{3}{5}t + 17$

- b.) Predict your distance from home after driving for 20 minutes, 25 minutes, and 37 minutes.

<b>20 mins</b>	<b>25 mins</b>	<b>37 mins</b>
$d = -\frac{3}{5}(20) + 17$	$d = -\frac{3}{5}(25) + 17$	$d = -\frac{3}{5}(37) + 17$
$= -12 + 17 = \boxed{5 \text{ km}}$	$= -15 + 17 = \boxed{2 \text{ km}}$	$= -22.2 + 17 = \boxed{-5.2 \text{ km}}$

- c.) When were you are 7 km from home how many minutes have you been traveling?

$d = -\frac{3}{5}t + 17$   
 $7 = -\frac{3}{5}t + 17$

$\rightarrow -10 = -\frac{3}{5}t$

$(-\frac{5}{3})(-10) = (-\frac{3}{5}t)(-\frac{5}{3})$

$\rightarrow \frac{50}{3} \approx 16.67 \text{ min} = t$

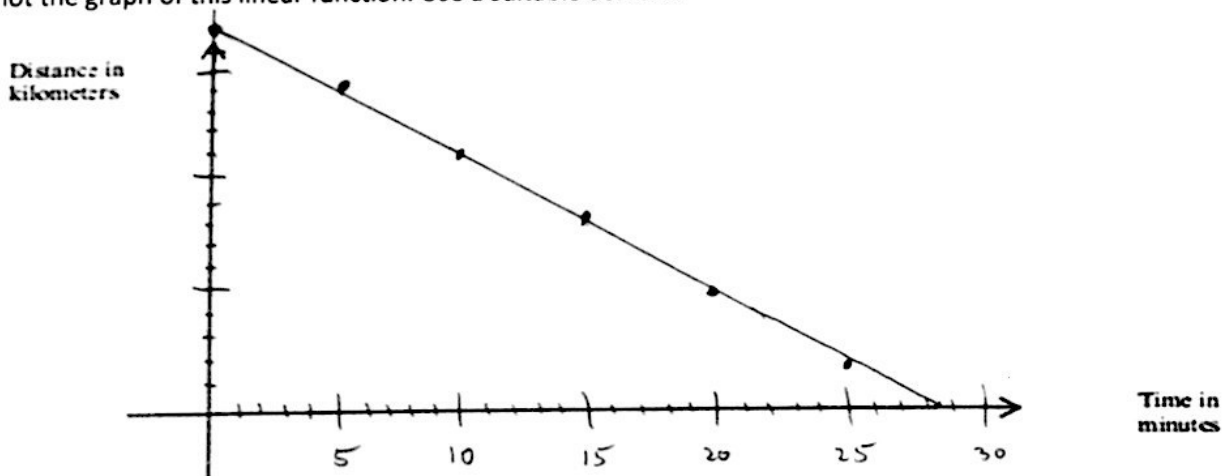
Find the distance-intercept. What does this number represent in the real world?

$t=0$  When we begin traveling home ( $t=0$ ) we are 17 km from home.  
 $d=17$

- e.) Find the time-intercept. What does this number represent in the real world?

$d=0$  The time it takes to travel home ( $d=0 \text{ km}$ ) is 28.3 minutes.  
 $t=28.3$

- f.) Plot the graph of this linear function. Use a suitable domain.



- g.) What is the slope? What does this number represent? What is the significance that the slope is negative?

The slope is  $-3 \text{ km} / 5 \text{ min} = -0.6 \text{ km/min}$ . The ratio of the change in distance to home to change in time traveling is  $-3 \text{ km}$  to  $5 \text{ minutes}$ . The fact that it is negative means that we are getting closer to home (dist decreasing).

**Learning Target 1: I can find a solution to a system of equations by graphing.**

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

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

$-4 = -x + 2y$

$x + \frac{4}{5} = \frac{2}{5}y$

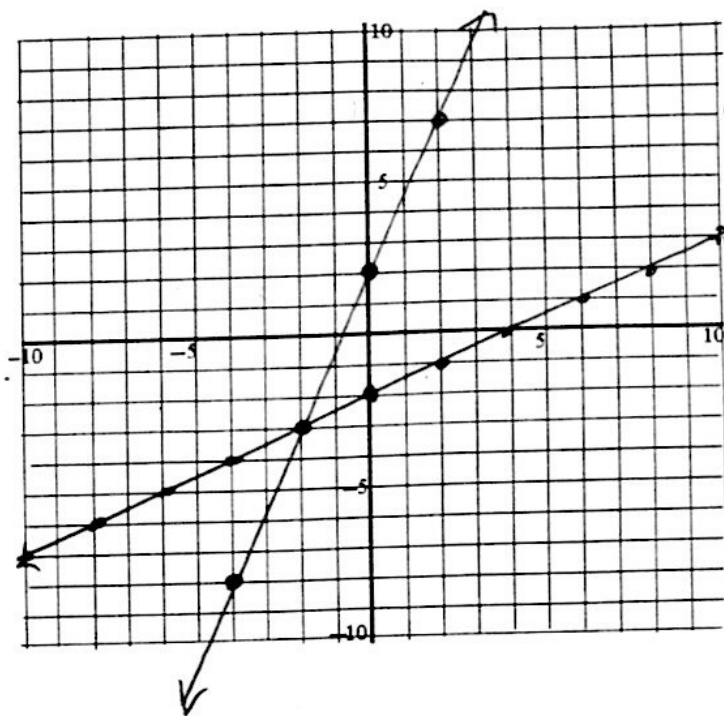
$x - 4 = 2y$

$5x + 4 = 2y$

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

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

$(-2, -3)$



**Learning Target 2 & 3: I can find a solution to a system of equations by substitution and/or elimination.**

- 3.) The length of a rectangle is equal to triple the width. If the perimeter is 86 centimeters, find the length and width of the rectangle.

Let  $l$  = length of rectangle (cm)  
 $w$  = width of rectangle (cm)

$2l + 2w = 86$

$2(3w) + 2w = 86$

$6w + 2w = 86$

$8w = 86$

$w = 10.75 \text{ cm}$      $l = 3(10.75)$

$l = 32.25 \text{ cm}$

- 4.) On the last quiz, 30 students took the quiz and every student either got an A, B, or C. The number of B's was 1 more than twice the number of A's. The number of C's ~~was~~ <sup>was</sup> 3 less than the number of A's. How many of each grade did the students receive?

Let  $A$  = # of "A"s

$B$  = # of "B"s

$C$  = # of "C"s

$A + B + C = 30$

$A + (2A + 1) + (A - 3) = 30$

$4A - 2 = 30$

$4A = 32$

$A = 8$

$B = 2(8) + 1 = 17$

$C = 8 - 3 = 5$

There were 8 A's,  
 17 B's, and  
 5 C's earned.

$A + B + C = 30$

$B = 2A + 1$

$C = A - 3$

- 5.) One night a theater sold 205 movie tickets. An adult's ticket costs \$10.50, and a child's ticket costs \$6.50. In all, \$1852.50 was taken in. How many of each kind of ticket were sold?

Let  $a = \#$  of adult tix sold  
 $c = \#$  of child tix sold

$$a + c = 205 \longrightarrow a = 205 - c$$

$$10.5a + 6.5c = 1852.50$$

$$10.5(205 - c) + 6.5c = 1852.50$$

$$2152.5 - 10.5c + 6.5c = 1852.5$$

$$-4c = -300$$

$$c = 75$$

$$a + 75 = 205$$

$$a = 130$$

130 adult tickets and 75 child tickets were sold.

- 6.) Roland has 21 coins consisting of dimes and quarters. The number of dimes is 3 more than twice the number of quarters. Find the number of each coin.

Let  $d = \#$  of dimes  
 $q = \#$  of quarters

$$d + q = 21$$

$$d = 2q + 3$$

$$(2q + 3) + q = 21$$

$$3q + 3 = 21$$

$$3q = 18$$

$$q = 6$$

$$d = 15$$

Roland has 6 quarters and 15 dimes

- 7.) The system  $\begin{cases} 2x - 8y = 16 \\ x = 4y + 8 \end{cases}$  has infinitely many solutions. Circle all the statement(s) below that are true. (More than one statement can be true)

$$x = 4y + 8$$

$$x - 8 = 4y$$

a.) Any ordered pair  $(x, y)$  makes both equations true.  $\frac{1}{4}x - 2 = y$

b.) The equation  $y = \frac{1}{4}x - 2$  has the same solution set as the system above.

c.) The graphs are parallel lines. These equations represent the same line, not two distinct lines that run parallel.

d.)  $(4, -1)$  is a solution to the system.

**Learning Target 4: I can apply my knowledge of systems in an application setting.**

8.) Jeremy is considering two different cell phone plans. The first plan has a \$25 monthly fee plus \$0.25 per minute used. The second plan offers a \$10 monthly fee with a \$0.40 charge per minute used.

a.) Write an equation that represents each equation.

Let  $C = \text{Cost}(\$)$   
 $m = \# \text{ of minutes}$

First Plan

$$C = 0.25m + 25$$

Second Plan

$$C = 0.4m + 10$$

b.) Complete the table for each plan.

FIRST PLAN	
Minutes	Cost
0	25
10	27.5
35	33.75
200	75

SECOND PLAN	
Minutes	Cost
0	10
10	14
35	24
200	90

c.) At what price will the two companies be the same? Show algebraically.

$$0.25m + 25 = 0.4m + 10$$

$$15 = 0.15m$$

$$100 = m$$

100 minutes

$$0.25(100) + 25 = C$$

$$25 + 25 = C$$

$$C = \$50$$

d.) How many minutes will be used when the cost is the same?

100 minutes

e.) What does the rate of change mean in this situation?

The rate of change is the ratio of change in cost (\$) to change in minutes talked (\$0.25/min and \$0.40/min)

f.) What does the y-intercept mean in this situation?

The y-intercept is the cost incurred for talking zero minutes. (\$25 and \$10)

e.) If Jeremy expects to use the phone for no more than 75 minutes each month, which plan should he choose? Explain. Jeremy should choose plan 2.

$$\text{Costs for plan 1} = 0.25(75) + 25 = \$43.75$$

$$\text{Costs for plan 2} = 0.40(75) + 10 = \$40$$