

# Lesson 4: Applications of Linear Functions

**GOAL:**  
 To solve contextual problems modelled by linear functions.  
 To solve contextual problems involving the characteristics of quadratic functions.

## Example 1: Linear Application with Equation Given

\$2.50 necklace

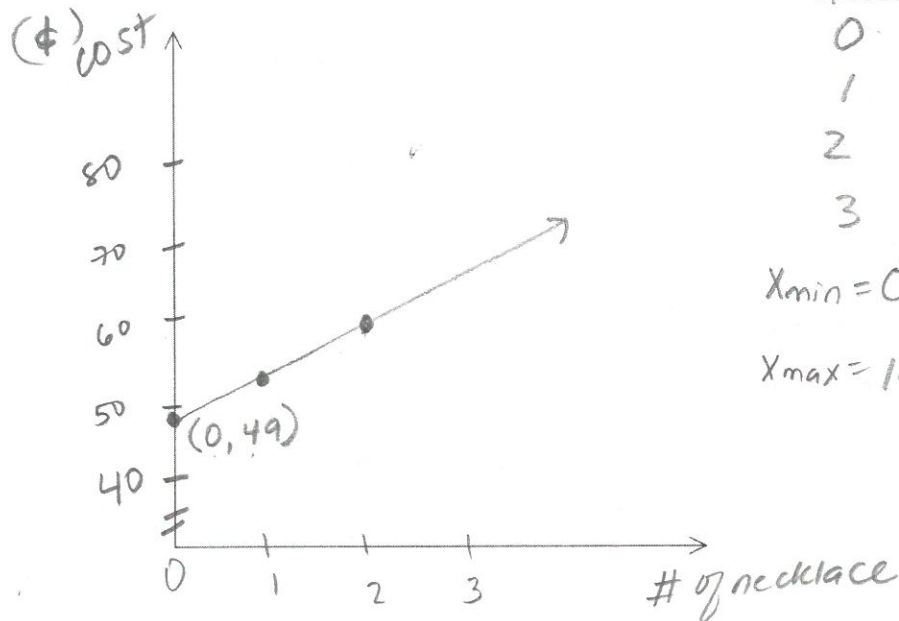
Maya is making necklaces for a craft fair. It costs her \$2.50 to make each necklace, and she needs to pay \$49 to rent a table at the craft fair. This situation is modelled by the following equation:

$$C = 2.5n + 49$$

$$y = 2.5x + 49$$

where  $n$  represents the number of necklaces made and  $C$  represents the total cost.

- a) Sketch a graph of this function. (When making a graph for a word problem, extra labelling is required to show the shape, scale, and context.)



# of necklace	Cost
0	49
1	51.50
2	54
3	56.50

$x_{min} = 0$        $y_{min} = 40$

$x_{max} = 10$        $y_{max} = 80$

- b) Find Maya's total cost if she plans to make 200 necklaces. You can substitute the value for  $n$  (200) into the equation but you can also use the 2<sup>nd</sup> CALC: 1:Value option on the graphing calculator too. This is similar to the process that you use to find the **y-intercept**. Your teacher will guide you through this method.

$$C = 2.5(200) + 49$$

$$C = \$549$$

cost is \$549 if she makes 200 necklaces

2nd TRACE

1: Value

$$X = 200$$

Note: we must change the window

$-\$8.50$   
day

**Example 2: Linear Application with Equation Given**

Ahmed starts the week with  $\$165$  and spends  $\$8.50$  per day. This situation is modelled by the following equation:

$$L = 165 - 8.5d$$

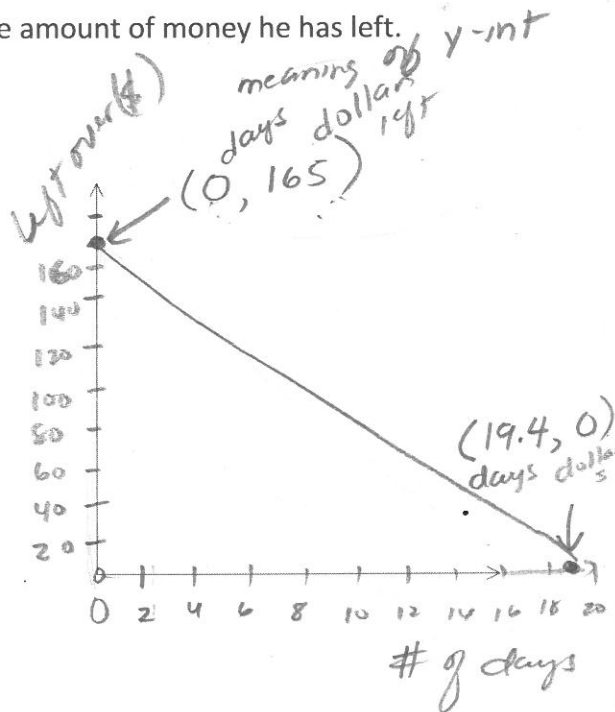
where  $d$  is the number of days that have passed and  $L$  is the amount of money he has left.

a) Sketch the graph.

**2nd** **GRAPH** for table of values

# of days	Left over \$.
0	165
1	156.50
2	148
3	139.50

$x_{min} = 0$        $y_{min} = 0$   
 $x_{max} = 19.4$        $y_{max} = 165$



b) State the domain and range of this situation.

# of days      possible \$  
 $[0, 19.4]$        $[0, \$165]$

c) How much money does Ahmed have after 5 days have passed?

$\$122.50$  left

$$L = 165 - 8.50(5)$$

$$L = \$122.50$$

d) How much money does Ahmed have after 30 days have passed?

$-\$90$

$$L = 165 - 8.50(30)$$

$$L = \underline{\underline{-90}}$$

e) When will Ahmed have  $\$100$  left? This is the same as asking you to find the  $x$  value when you know the  $y$  value. In this case, you will be finding the  $d$ -value when you know the  $L$ -value. This is the same process that you used to find the  $x$ -intercepts of functions. You will enter an equation into the  $y =$  screen ( $Y_2 = 100$ ) and then use 2<sup>nd</sup> CALC: 5: intersect to solve for the  $d$ -value. Your teacher will guide you through the process.

$$Y_2 = 100$$

**2nd** **TRACE**

**7.65 days.**

**5** Intersect

on the 7th day he will have approx.  $\$100$ .