

### Lesson #3: Solving Linear Equations (1.2 in your text)

By the end of this lesson, you should be able to:

- Find the solution to a given linear equation
- connect the solution to the graph of the relation that corresponds to the linear equation

#### Example 1: Using an equation to solve a linear equation

Patrick belongs to an online movie site that charges a monthly membership fee of \$5.95, plus an additional \$1.45 for every movie he downloads. He is saving his money, and so has set a budget of \$20/month for movie downloads. How many movies can Patrick download per month if he wants to stay within his budget?

To begin:

1) How much does Patrick have to pay per month no matter what? This will be his "initial value".

5.95

2) Select a variable to represent the part of this scenario that can change. In this case, the number of movie downloads).

$m = \text{movie downloads}$

3) Now create an equation by setting Patrick's budget,  $b$ , equal to his initial value plus his number of movie downloads.

$$\therefore b = 5.95 + 1.45m$$

$$20 = 5.95 + 1.45m$$

$$\frac{14.05}{1.45} = \frac{1.45m}{1.45}$$

$$9.69 = m$$

$\therefore \text{Max. movie rentals is } 9.$

Example 2: representing a problem with an equation in order to solve

Jessica left Ottawa at 10:00 p.m., with 55 L of gas in her car. She drove west at 100 km/h. The low fuel warning light came on when she had only 10 L left in her tank. If her car uses gas at a rate of 7.9 L/100 km, at what time did her warning light come on?

Solution:

Before you can solve this, you have to come up with an equation to represent your problem.

1) How much gas does Jessica's car use per hour?

She drove 100 km/h and her car uses 7.9 L/100 km. How many L/h does the car use?

$$7.9 \text{ L/h}$$

The equation to represent the total amount of gas used would be

$$G = 55 - 7.9t$$

Where  $G$  is gas left in her tank and  $t$  is the number of hours passed when this amount was left.

$$10 = 55 - 7.9t$$

2) use the equation to find the value of your variable

$$\begin{array}{r} 10 - 55 = -7.9t \\ -45 = -7.9t \\ \underline{-7.9} \quad \underline{-7.9} \\ 5.7 = t \end{array}$$

3) now you can use the value to solve the problem. The original question was: at what time did her fuel warning light come on?

5 hours

$$0.7 \cancel{K} \times \frac{60 \text{ min}}{\cancel{K}} = 42 \text{ min.}$$

∴

@ 3:42 pm or 15:42 hours  
is when the light came on.

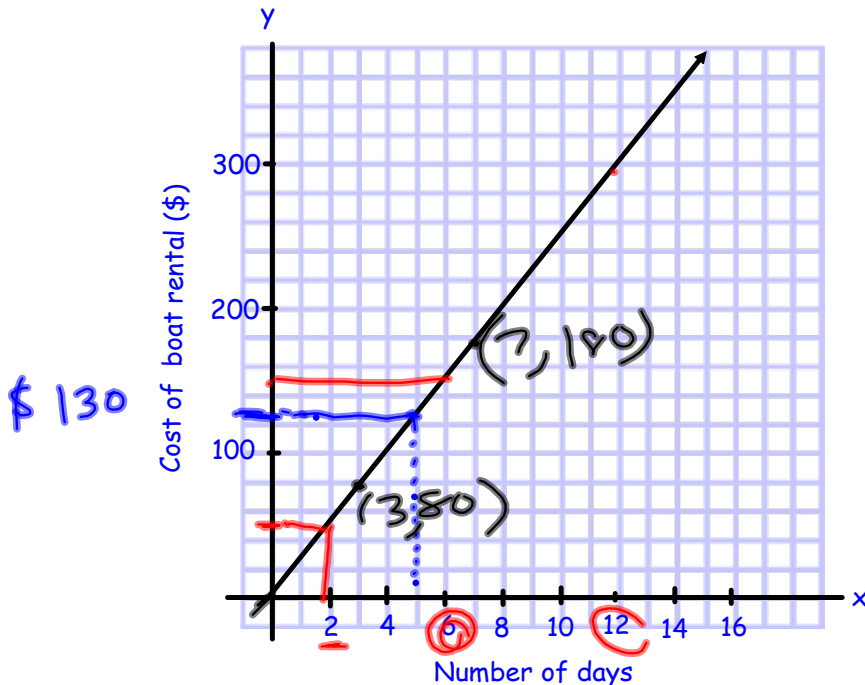
Example 3: Solve a problem using the graph of a linear relation

Given the graph below, answer the following questions:

- a) What is the approximate cost to rent a boat from Billy Joe's Rent-A-Boat for 5 days \$130  
b) How many days can you rent a boat for if you pay \$50, \$150 and \$300?

2, 6, 12 days.

Billy Joe's Rent-A-Boat



$$y = mx + b$$

$$y = 25x + b$$

$$80 = 25(3) + b$$

$$80 = 75 + b$$

$$\boxed{5 = b}$$

$$\therefore y = 25x + 5$$

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{180 - 80}{7 - 3} \\ &= \frac{100}{4} \\ &= \frac{25}{1} \end{aligned}$$