8.2: Modelling and Solving Linear Systems

November 16, 2016 10:38 AM

Modelling equations

Situations in life can often be modeled by mathematical equations. Looking at these equations can help us determine the best options.

Steps to Model an equation

Step 1: identify the variables
Step 2: identify equations using the variables
Step 3: Analyze the results graphically or algebraically

Example 1: People Can rent ski and snowboard equipment from two places at Winterland Resort.
Option A: Charges a one-time $30 fee and then $8 per hour.
Option B: Charges $14 per hour

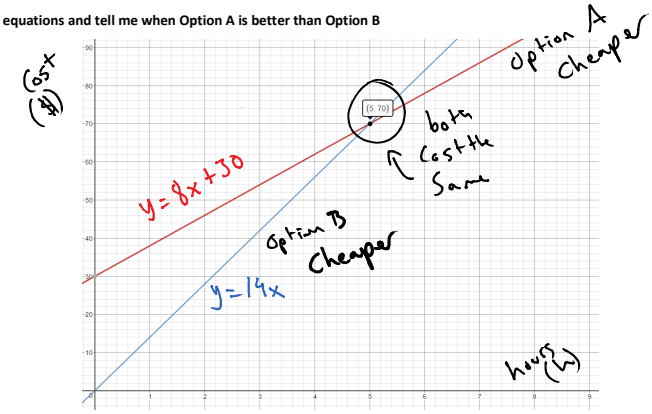
What are the variables?

x: hours Skiing or Snowboarding
y: total Cost

What are the two equations?

$y = 14x$
$y = 30 + 8x$

Graph the equations and tell me when Option A is better than Option B



Your Turn: A movie theater charges $11 for an adult ticket and $8 for children or senior tickets. One night the theater sold 240 tickets total and made $2370.

How many adult tickets were sold?

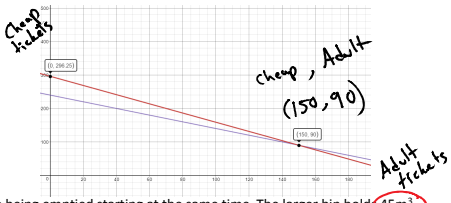
What are the variables?

x: # of Adult tickets
y: # of Cheap tickets

$240 = x + y$
$-x \quad -x$
$-x + 240 = y$
$y = -x + 240$

What are the two equations?

$2370 = 11x + 8y$
$-11x \quad -11x$
$\frac{-11x + 2370}{8} = \frac{8y}{8}$
$y = -\frac{11}{8}x + 296\frac{1}{4}$



Example 2: Two hopper-bottom grain bins are being emptied starting at the same time. The larger bin holds 45m³ of grain. It is emptied at a rate of 1 m³ per minute. The smaller bin stores 30m³ of grain. It is is emptied at a rate of 0.5m³ per minute.

time
t

Which bin is emptied first if they are both full and at what do they have the same volume of grain in them?

What are the variables?

V: Volume of grain
t: time (in minutes)

What are the two equations?

bin 1: $V = 45 - 1t$
bin 2: $V = 30 - 0.5t$

Graph the equations and tell me when they have the same volume

Your turn: Two pools start draining at the same time. The larger pool contains 54675 L of water and drains at a rate of 25L/min. The smaller pool contains 35400 L of water and drains at a rate of 10L/min.

Which empties first if they both start out full and at what point do they have the same amount of water in them?

426 Q:1-17 odd

HW: page 440, Q:1, 3,5,7,11,13,15

Bathroom

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Gab