Solutions

Worksheet - Application of Linear Systems

Example 1:
Suppose you are hosting a party in a few weeks and have to start shopping for food and drinks. You wanted to make sure that you buy one of your favourite chips, the Kettle Chips. You went to two different stores, Costco and Loblaws, and got some prices.

COSTCO WHOLESALE

$3.50 per bag (350 grams)

Loblaws

$5.00 per bag (350 grams)

What is the cost per bag (rate) at Costco?

$3.50 / bag

What is the cost per bag (rate) at Loblaws?

$5 / bag

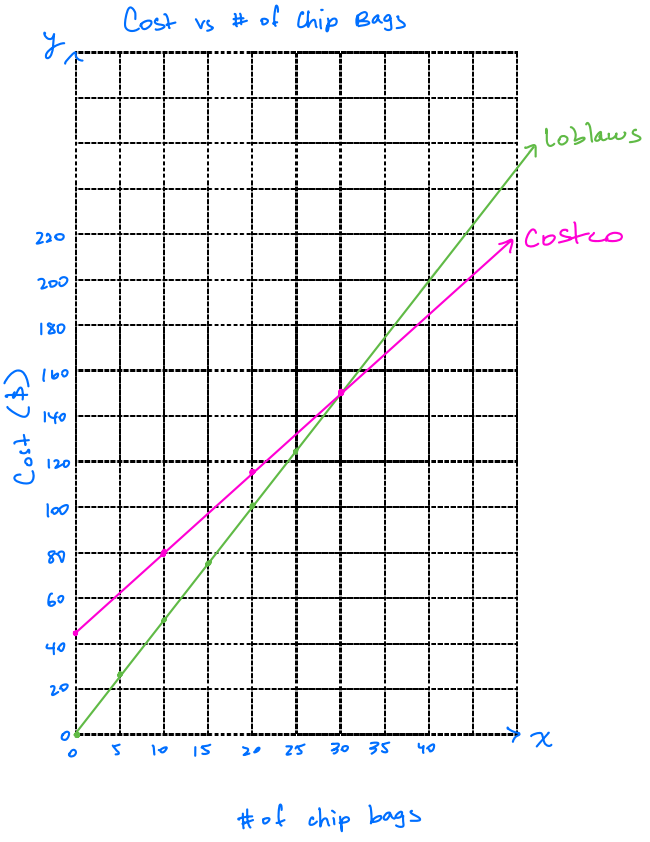
So which store has a better deal? Why?

Costco - smaller unit rate (lower cost per bag)

OOPS! You forgot that you have to be a Costco member to shop at Costco and the yearly membership fee is $45. So now, which store has a better deal?

COSTCO WHOLESALE GOLD STAR MEMBER

Number of Bags	Costco	Loblaw's
0	45	0
5	45 + 3.50(5) = 62.50	0 + 5(5) = 25
10	45 + 3.50(10) = 80	0 + 5(10) = 50
15	97.50	75
20	115	100
25	132.50	125
30	150	150
35	167.50	175
40	185	200



Which store would you recommend to buy chip bags from?

- For 30 bags of chips, it does not matter whether you buy from Costco or Loblaws (same price $150)
- For less than 30 bags, Loblaws is cheaper.
- For more than 30 bags, Costco is cheaper.

Example 2: BOSS Athletics is planning an awards banquet. Two banquet halls are considered for an award reception.

- Hall A charges a fixed cost of $300, plus $35 per guest.
- Hall B charges a fixed cost of $1200, plus $20 per guest.

a) Create equations to model the cost for each hall. Include "let" statements to define your variables.

Let n represent the # of guests.
Let C represent the cost ($)

Hall A: $C = 300 + 35n$ Hall B: $C = 1200 + 20n$

b) Determine the point of intersection of the two lines algebraically

Set costs equal!

$C = C$

$300 + 35n = 1200 + 20n$

$35n - 20n = 1200 - 300$

$\frac{15n}{15} = \frac{900}{15}$

$n = 60$

sub $n = 60$ into either equation to find C

$C = 300 + 35(60)$

$= 2400$

$\therefore$ POI is $(60, 2400)$

↳ If there are 60 guests attending the awards banquet, both halls will charge the same price of $2400.

c) Which banquet hall would you recommend?

- For 60 guests, it does not matter which hall you choose (same price $2400)
- For less than 60 guests, Hall A is cheaper.
- For more than 60 guests, Hall B is cheaper.

> substitute into both equations to see.