

## LESSON 14: SOLVING A SYSTEM OF EQUATIONS

### TASK 1 – AT THE PICTURES

Dollar Cinema in Côte Saint-Luc uses the strategy of inexpensive tickets at \$2.50 a pop to attract customers. To cover costs, they sell their popcorn and drinks at a slightly higher price. For the last two years, they have not changed the price of their refreshments. One year, they made a total profit of \$9,990 selling 900 popcorns and 1020 drinks, and another year, they made \$8,052 selling 802 popcorns and 720 drinks.



After checking the books, they realized that this year they must make \$10,000 in refreshment profit to cover operation costs. If they do not increase the price and are expecting to sell 950 popcorns and 1,000 drinks, will Dollar Cinema be able to stay afloat?

$$x = \$ / \text{popcorn}$$

$$y = \$ / \text{drink}$$

$$900x + 1020y = 9990$$

$$802x + 720y = 8052$$

$$Pg\ 165\ \$\ 7$$

$$Pg\ 157\ \$\ 10$$

yes or no?

find \$/pop and \$/drink

step i. Define variables (unknowns)

① step ii. Construct 2 equations from sentences.

$$\text{Total Profit} = \frac{\$}{\text{unit}} \times \# \text{ of units}$$

step iii. Eliminate to find value of x and y.

step iv. Reread answer it.

Substitution

The width  $y$  is  $\frac{3}{5}$  the size of the length  $x$ .

7 Three sides of the back yard of a suburban home are completely fenced. The fourth side is fenced from the corners of the house to the property lines, as shown in the illustration to the right. These two fence sections measure 8 m and 4 m respectively. The total length of the fence is 78 m. You also know that the ratio of the depth of the back yard to its width is  $\frac{3}{5}$ .

a) Let  $x$  be the depth of the back yard (m), and  $y$  be its width (m). Use these variables to express the situation as a system of equations.



$$y = \frac{3}{5}x$$

$$78 = 8 + y + x$$

$$+ y + 4$$

$$78 = 12 + 2y + x$$

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$$y = \frac{3}{5}x \quad (1)$$

$$78 = 12 + 2y + x \quad (2)$$

$$78 = 12 + 2\left(\frac{3}{5}x\right) + x$$

$$78 = 12 + \frac{6}{5}x + x$$

$$78 = 12 + \left(\frac{6}{5} + 1\right)x$$

$$78 = 12 + 2.2x$$

$$\frac{66}{2.2} = \frac{2.2x}{2.2}$$

$$x = 30$$

step i. isolate one unknown in one equation

step ii sub y into (2)

step iii Add like terms and solve.

add the coefficients and write letter one

step iv sub value into (1)

$$y = \frac{3}{5}x$$

$$y = \frac{3}{5}(30)$$

$$y = 18$$