Course: MFM2P Gr. 10 Applied   **Lesson: 5 - 5**

Unit: Linear Systems   **Topic: Solving Problems using Linear Systems**

⊞ *homework check:* **Lesson 5 - 4**

⊞ *note:* **Solving Problems using Linear Systems**

When problem solving, we can use any of the three methods to solve the linear system that we find. Despite the method we choose, all three should give the same solution. For example, determine the most appropriate algebraic method and solve the given systems.

a) The sum of two numbers is 255. When the smaller is subtracted from the larger, the difference is 39. Find the numbers.

Let x represent the larger number.
Let y represent the smaller number.

$x + y = 255$
$x - y = 39$

This system lends itself nicely to elimination,

so we can subtract to eliminate x.

$0x + 2y = 216$

$$\frac{2y}{2} = \frac{216}{2}$$

$y = 108$

Now substitute back into equation one to find x.

$x + y = 255$

$x + 108 = 255$

$x = 255 - 108$

$x = 147$

Therefore, the larger number is 147 and the smaller number is 108.

b) The two most common names of places in Canada are Mount Pleasant and Centreville. The total number of places with these names is 31. The number of places called Centreville is one less than the number of places called Mount Pleasant. How many places have each name?

Let C represent the number of places called Centreville.
Let M represent the number of places called Mount Pleasant.

Write the equations represented by the information provided and solve.

$M + C = 31$

$C = M - 1$

This system lends itself nicely to use substitution.

$M + (M - 1) = 31$

$2M - 1 = 31$

$2m = 32$

$\dfrac{2M}{2} = \dfrac{32}{2}$

$M = 16$

Substitute back into equation two to find C.

$C = M - 1$

$C = 16 - 1$

$C = 15$

Therefore, 16 places are called Mount Pleasant and 15 laces are called Centreville.

⌗ *homework assignment:* **Lesson 5 - 5**

<u>**Lesson 5 – 5: Solving Problems with Linear Systems**</u>

**For each of the following word problems, use the method that is MOST appropriate to solve.

1. Julie's annual salary in dollars, S, can be represented by the equation $S = 30500 + 500n$ where n is the number of years worked. Asia's annual salary can be represented by the equation $S = 26000 + 1000n$. After how many years of work will they have the same salary?

2. Shane invests $8000. Part of the money is invested at 5% and part of it is invested at 3.25%. After one year, he has a total of $312.50 in interest. How much did Shane invest at each rate?

3. Gym A charges $25 per month plus an initiation fee of $200. Gym B charges $35 per month and has an initiation fee of $100. After how many months will the cost at each gym be the same?

4. Marcus orders basketball shirts. Medium shirts cost $4 per shirt and Large shirts cost $5 per shirt. If Marcus orders a total of 70 shirts and spends $320, how many of each size was ordered?

5. Students hold a car wash. They charge $7 per car and $10 per van. If they washed a total of 52 vehicles, and earned $457, how many of each vehicle did they wash?

6. Meredith drove a total of 255 km in 2.75 hours. She drove part of the way at 100km/h and part at 60 km/h. If the equation for time can be represented by $\dfrac{x}{100} + \dfrac{y}{60} = 2.75$, write an equation for the total distance driven and solve the system.

7. Gareth plans to invest $3050, part at 8% interest and part at 7.5% interest. If Gareth earns $234 in interest, how much did he invest at each interest rate?