Math Notes

Simultaneous Equations

What are simultaneous equations?
- Simultaneous equations are a pair of equations given, where you have to solve for the value(s) of x and y which fulfills both equations
- They come in either both linear equations, one linear and one quadratic or both quadratic equations.

Ways to solve simultaneous equations
- Numerical
- Substitution
- Elimination
- Graphical
  Linear & Linear -> 1 set of answers
  Quadratic & Linear -> 2 sets of answers

What to do?
- Label the equations (1) and (2) before heading on.
- Example
  $7x + 9y = 39$ ---- (1)
  $3x + 2y = 13$ ---- (2)

Method #1) Numerical
- Create a 2-Row table for each equation
- First row will be for x and second row for y
- For x, label each column with integer values with 0 as the median (Create a range)
- For y, solve the equation accordingly with the value of x.
- The set(s) of answers that appear in both equation is the answers.

Math Notes

Method #2) Substitution

- Change the subject of one of the equation to a variable and label it equation (3).
- Substitute equation (3) to the other equation.
- Solve the equation mentioned above and you'll obtain the value of the other variable.
- Continue and find the value of the variable that was the subject of equation (3) by substituting in the value of the variable found above.
- Example

  $2x - 3y = 12$ ---- (1)

  $4x + y = 3$ ---- (2)

  From (2),

  $y = 3 - 4x$ ---- (3)

  Substitute (3) into (1),

  $2x - 3(3 - 4x) = 12$

  $2x - 9 + 12x = 12$

  $14x = 21$

  $x = 1.5$

  Substitute $x = 1.5$ into (2),

  $4(1.5) + y = 3$

  $y = 3 - 6$

  $y = -3$

Math Notes

Method #3) Elimination

- Multiply the equations to make the coefficient of one variable of both equations equal
- Label the new equation(s)
- Subtract one equation with the other and calculate to obtain the value of one variable.
- Using method #2, substitute the value of the variable into either equations and calculate to obtain the value of the other variable.
- Example

  $2x - 3y = 12$ ---- (1)

  $4x + y = 3$ ---- (2)

  (1) * 2, $4x - 6y = 24$ ---- (3)

  (3) - (2),

  $(4x - 6y) - (4x + y) = 24 - 3$

  $-7y = 21$

  $y = -3$

  Substitute $y = -3$ into (2)

  $4x - 3 = 3$

  $4x = 6$

  $x = 1.5$

Method #4) Graphical

- Making use of Method #1, plot a graph.
- The set(s) of answers for the equations are where the lines intersect.
- The answers are in the form of coordinates, (x , y)

REMEMBER: IF THERE ARE MORE THAN A SET OF ANSWERS, THE DIFFERENT VALUES OF X OR Y ARE NOT INTERCHANGEABLE.