

BIG PICTURE of this UNIT:

- How do we WORK WITH & EXTEND the concept of “functions”
- Why are linear equations written in different forms?
- How do we EXTEND our knowledge of LINEAR functions, beyond the basics of IM2?

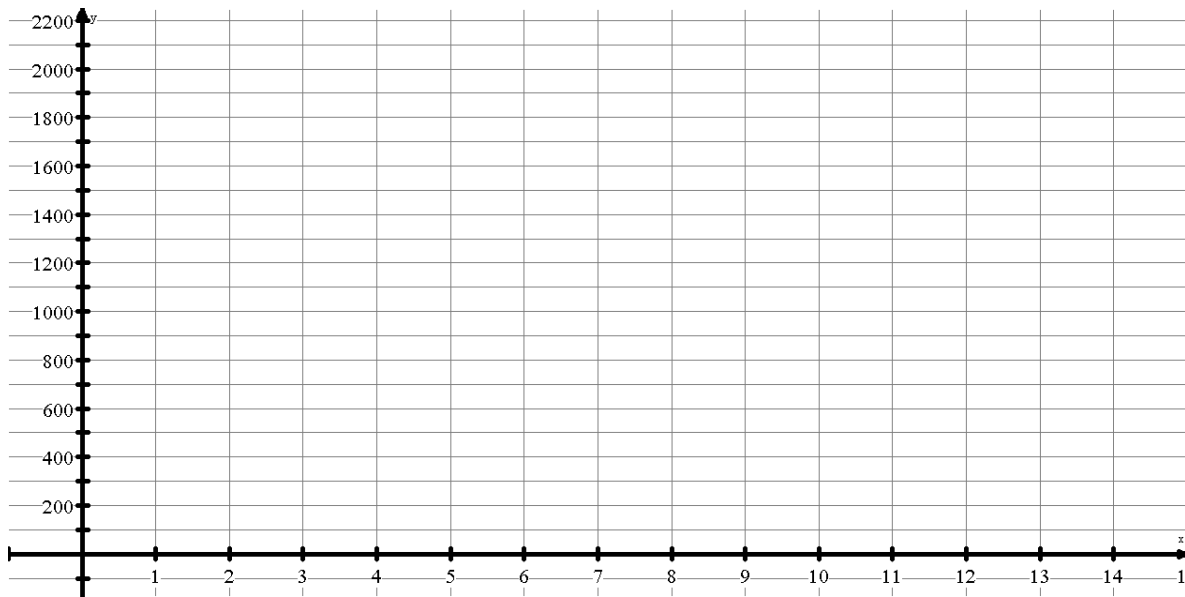
In your group, discuss & prepare solutions to the following **CONCEPT EXTENSION** questions. Record the key ideas of your discussions/solutions in your notebook. Then present your solutions on the board. Solutions do NOT necessarily NEED to be correct – they simply form the basis for DISCUSSIONS!!!! If your group has (i) multiple solutions that lead to the same answers OR (ii) same/different solutions that lead to different answers, present them ANYWAY!!

- For this question, you are working with the linear function $f(x) = 3x - 5$. {3,6,8}
 - Determine where this line intersects with $2x - 5y = 12$. Verify your work algebraically. {6}
 - Write the equation of the line that is perpendicular to $f(x)$ and goes through the point $(-5, 2)$. Write equation in point-slope form and then in standard form. {3}
 - Write the equation of the inverse function of $f(x) = 3x - 5$. Use correct notations in your final answer. {8}
- Working the linear function $3x + 2y - 6 = 0$: {3,4,8}
 - Mr. S feels that the equation of this line in function notation is $f(x) = \frac{3}{2}(x - 2)$. True or false? {3,4}
 - Mr. S thinks the equation of the inverse is $f^{-1}(x) = \frac{2}{3}x + 2$. Explain/show **in three different ways** whether he is correct or not. {8,4}
- Two functions are given as $f(x) = \frac{1}{2}x + 5$ and $g(x) + 4 = 2(x - 1)$. {1,9,10}
 - Determine the equations for $y = f^{-1}(x)$ and $y = g^{-1}(x)$
 - Evaluate the following:
 - $f(4)$
 - $g(4)$
 - $g^{-1}(7)$
 - $f^{-1}(-2)$
 - $f(g^{-1}(3))$
 - $f^{-1}(g(-4))$
 - $g^{-1}(f^{-1}(3))$
 {1,9}
- An electronics store pays its employees by commission. The relation $p(s) = 100 + 0.05s$ is used to find the employee's weekly pay, p , in dollars, and where s represents the employees weekly sales in dollars. {5,8}
 - Describe the function in words.
 - Determine the equation of the inverse, $p^{-1}(s)$.
 - Describe the inverse relation in words.
 - Describe a situation where an employee might use the inverse function.
 - State a reasonable domain and range for $p^{-1}(s)$.

5. Use DESMOS to graph the following function $g(x) = \frac{1}{x-4} + 6$ as well as the lines $x = 4$ and $y = 6$. {15}
- The lines $x = 4$ and $y = 6$ are the vertical and horizontal asymptotes. Explain what an asymptote is.
 - Sketch the function and state its domain and range.
 - Without technology, PREDICT where the function $g(x) = \frac{1}{x+3} - 2$ would have its asymptotes and sketch the function. NOW, verify with your TI-84.
6. A relation is defined as $h(x) = -4x + 6$ where $\{x \mid -2 \leq x \leq 3, x \in \mathbb{R}\}$. {1,7,8}
- Sketch a graph of $y = h(x)$.
 - Sketch a graph of $y = h^{-1}(x)$.
 - State the domain and range of $y = h(x)$ and $y = h^{-1}(x)$.
 - Are $h(x)$ and $h^{-1}(x)$ functions?
 - Repeat parts a, b, c and d for $h(x) = -4x + 6$ if $\{x \mid -2 \leq x \leq 3, x \in \mathbb{Z}\}$
7. Let $f(x) = 3x - 5$ and let $g(x) = x^2 + f(x)$. Evaluate the following: {1,8,9,Q}
- (a) $f(5)$ (b) $f(-1)$ (c) $f(K)$ (d) $f^{-1}(-1)$ (e) $f^{-1}(0)$ (f) $f(2x - 1)$ (g) $f(x^2)$ (h) $g(5)$ (i) $g(-1)$
8. Two functions are given as $f(x) = \frac{1}{2}x + 5$ and $g(x) = 2x - 10$. {1,9,10}
- Evaluate (i) $f(4)$ (ii) $g(7)$ (iii) $g(4)$ (iv) $f(-2)$ (v) $f(g(7))$ (vi) $f(g(4))$ {1,9}
 - What conclusion can you make about the two functions? {9,10}

9. A hotel has the following rates that apply to groups who rent their ballroom. They charge \$400 for any time of 2 hours or less. If the rental time exceeds 2 hours, then an additional rate of \$200 per hour are charged. However, if the total rental time is more than 8 hours, they only charge an hourly rate of \$100. All rentals are not allowed to exceed 12 hours. {5,13}
- What is the independent variable (input)? What would the domain be?
 - What is the dependent variable (output)? What would the range be?
 - Would you expect this relation to be a function? Why/why not?
 - Evaluate $C(7)$ as well as $C(11)$.
 - Evaluate $\$1150 = C(t)$ and interpret.
 - To help draw a graph, complete the following table of values. Then graph this relation.
 - Write the equation for this relation.

Time									
Cost (\$)									



HOMEWORK:

Watch the following videos about composition and record the examples into your notebook. Our next lesson will help you consolidate your understanding of this concept and your ability to work algebraically with this concept.

(1) from Mathispower4u → <https://www.youtube.com/watch?v=qxBmISCJSME>

(2) from Patrickjmt → <https://www.youtube.com/watch?v=S4AEZEITPDo>