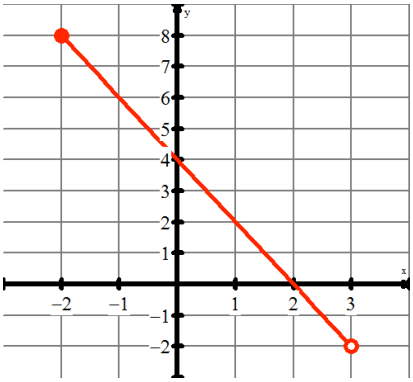
BIG PICTURE of this UNIT:	• How do we WORK WITH & EXTEND the concept of "functions" • Why are linear equations written in different forms? • How do we EXTEND our knowledge of LINEAR functions, beyond the basics of IM2?

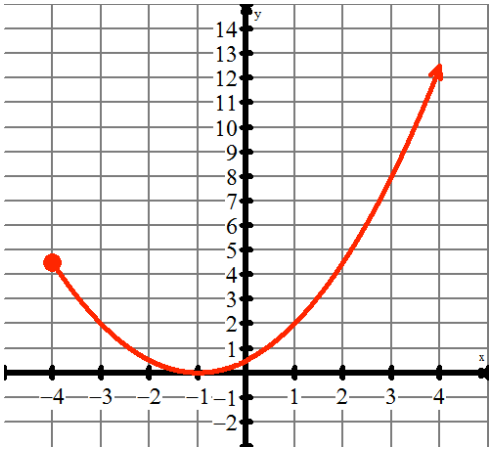
In your group, discuss & prepare solutions to the following questions. Record the key ideas of your discussions/solutions in your notebook. Then, once you have had your discussions, present your solutions on the board. Solutions do NOT necessarily NEED to be correct – they simply form the basis for DISCUSSIONS !!!! 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!!

1. State the domain and range of the following graphs. Use MUST use set notation (for practice!!) and may use interval notation. {1,7}

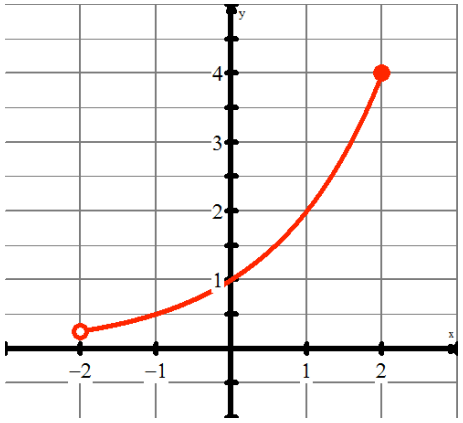
(a)



(b)



(c)



2. Determine the equation of each function from Q1(a), (b), and (c). {3, Q1,E1}

3. Recalling your work with right triangle trigonometry (HINT:SOHCAHTOA), determine the measure of the angle that the line from Q1 makes with the x-axis. {T1}

4. Solve the following equations for x: {1,8}

   (a) Solve for x if -3 = 2x + 5

   (b) Solve for x if y = 2x + 5

   (c) Solve for x if 3x – 2 = 5

   (d) Solve for x if 3x – 2y = 5

   (e) Solve for x if 8 – 5 = 3(x – 2)

   (f) Solve for x if y – 5 = 3(x – 2)

5. Given the linear function $\frac{x}{5}+\frac{y}{10}=1$, determine: {3,4}
   a. The slope
   b. The intercepts
   c. Write the equation in function form.

6. Use algebraic methods to solve the following systems of equations. Algebraically as well, verify your answers. {6}

   a. $\begin{aligned} a+3b&=7 \\ 2a-5b&=-8 \end{aligned}$

   b. $\begin{aligned} y-6&=\frac{1}{2}(x-2) \\ \frac{x}{5}+\frac{y}{10}&=1 \end{aligned}$

   c. $\begin{aligned} 4x+6y&=11 \\ y+\frac{1}{6}&=-\frac{2}{3}(x-3) \end{aligned}$

7. A function, $f(x)$, has the following features: {1}
   - The domain of $f(x)$ is the set of **natural numbers**;
   - $f(1)=1$
   - $f(x+1)=f(x)+3x(x+1)+1$

   a. Determine $f(2)$, $f(3)$, $f(4)$, $f(5)$ and $f(6)$
   b. Describe the function.

8. Bob bumps his head and starts plotting all his data points in "reverse" order. For example, when he tries to plot (3,2), he plots (2,3) instead. A problem in his textbook tells him to graph the line y = 3x + 2 {2,8}

   a. List some of the points that would be on the line y = 3x + 2. Draw the CORRECT line.
   b. List some points that Bob would use in his line. Draw Bob's line.
   c. What is the slope of Bob's line? What is the equation of Bob's line?
   d. Now also draw the line y = x. Describe what you observe about the three graphs.

9. Use DESMOS to graph the absolute value function ($f(x)=|x|$). {13}

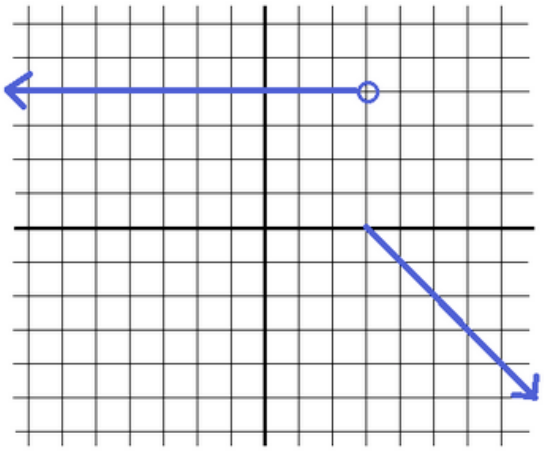
   a. State the domain and range of $f(x)=|x|$.
   b. The equation for the absolute value function can also be written as a piecewise function. Identify the two "pieces", their domain and thus write the piecewise function equation for $f(x)=|x|$. Verify your work by graphing this piecewise function on DESMOS.
   c. Translate the function 4 units to the left. Draw the graph and write the new equation for this newly transformed function.

10. Factor the following expressions: {4, Q1}

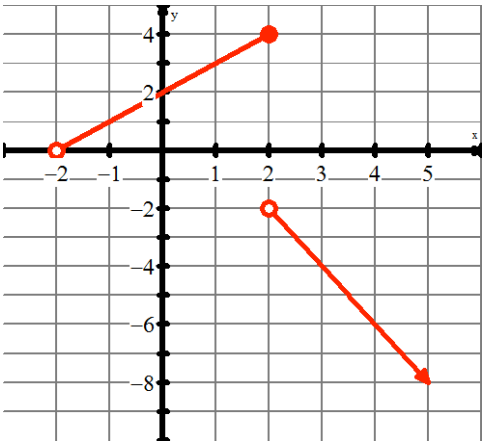
a. $3x + 6$ b. $25 - 5x$ c. $5x^2 - 25x$ d. $6x^2 - 54$ e. $2x^2 - x - 6$

11. Determine the equations of the two piecewise functions graphed below: {13}

(a)



(b)



12. For the following data tables or number sets, write an algebraic equation that tells me: {3,8}

a. how I can get the **output value**, f(x) from the **input value**, x (hence the direction of the arrow.)

b. how I can get the **input value**, x, from the **output value**, f(x) (hence the second arrow at the bottom.)

x →	f(x)
1	3
2	5
3	7
4	9

x →	f(x)
2	23
3	19
4	15
5	11

x →	f(x)
2	4
4	9
6	14
8	19

HOMEWORK:

John works at a clothing store and his weekly salary is $300 and he earns 5% commission on his weekly sales, up to a maximum of $24,000 in weekly sales. In this question, you will explore the relationship between John's salary and the number of weeks he works. {5,13}

Questions:

(a) Write an equation to help analyze this situation.

(b) Determine the slope & state its meaning.

(c) Determine the y-intercept and state its meaning.

(d) What will be John's earnings if he sells $6,525 worth of clothing?

(e) When will John's earnings be $700?

(f) Evaluate E(7000)

(g) Solve E(S) = $1,000

(h) John gets a raise in pay and now earns a base salary of $500, but his commission remains at 5% of total sales. Write a new equation and graph it on the grid. What is similar about the 2 graphs? What is different about the 2 graphs.

(i) John now gets a raise in pay. He stills earns a base salary of $300, but his commission is now 7.5% Write a new equation and graph it on the grid. What is similar about the 2 graphs? What is different about the 2 graphs.

(j) John now gets promoted to Store Manager and earns a weekly salary of $1100. and graph it on the grid. What does this graph look like?

HL EXTENSION: Floor & Ceiling (or STEP) Functions (or Greatest Integer Functions). MODIFIED SALARY: John works at a clothing store and his weekly salary is $300 and he earns 5% commission **on every $1000 of weekly sales**.

(k) Evaluate E(12500).

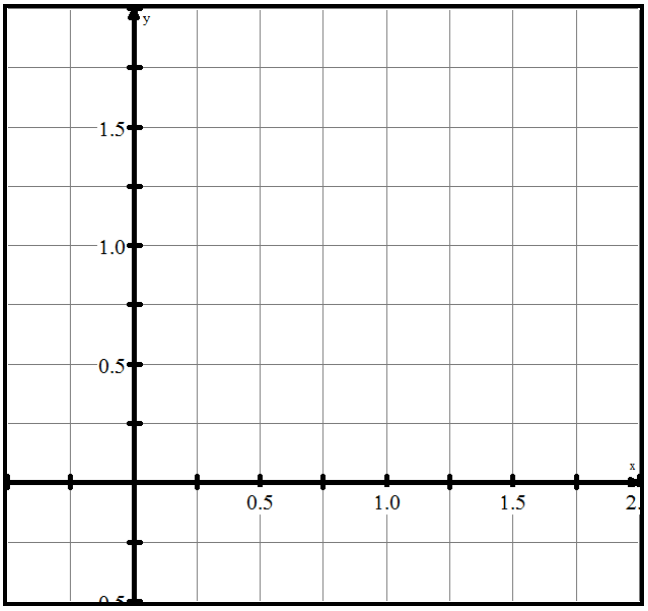
(l) Solve E(S) = $950. Is it possible to solve for E(S) = $925? Why/why not?

(m) Write an equation and then graph it on DESMOS

QUESTION #2

Jose travelled 95 km from Oakville to Oshawa by car and by train. The car averaged a speed of 60 km/hr and the train averaged 90 km/hr. The whole trip took 1.5 hours of travel time. {6}

Graph:



DEFINE YOUR VARIABLES, then complete the tables

Data Table (time):

x						
y						

Data Table (distance):

x						
y						

Questions:

(a) Write an equation for the time traveled.

(b) What do the x- and y-intercepts represent?

(c) Write an equation for the distance traveled.

(d) What do the x- and y-intercepts represent?

(e) Use algebra to write and solve a single equation that can be used to determine how much time was spent traveling by car.