Review of Functions & Function Terminology | HL1 - Lesson 2

A. Lesson Context

BIG PICTURE of this UNIT:	• What is meant by the term FUNCTIONS and how do we work with them? • mastery with working with basic terminology of functions • understanding basics of function concepts and apply them to parent functions		
CONTEXT of this LESSON:	Where we've been In IM2 & IM3, you practiced with function notations and function representations	Where we are What are the key terms associated with studying and analyzing functions	Where we are heading How do we apply the concept of "functions" to all the functions in HL Math

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!!

B. Function FACTS (Skills Review/Foreshadow Focus)

You will be given a graph f(x) = everything under the sun. You will use the graph to answer the following questions to the best of your group's ability. This exercise is a "skills inventory", but also a "what do you do if you're stuck" exercise.

The following questions relate to evaluations & working with & understanding function notation

(a) Evaluate the following:

f(2) ; f(-5) ; f(1) ; g(12) ; f(4) ; f(-6) ;

$f(2) \times g(2)$; $\dfrac{f(0)}{g(0)}$; $\dfrac{g(0)}{f(0)}$

(b) Evaluate

$|f(7)|$ $g(|-4|)$; $|g(-4)|$; is $|g(-4)| = g(4)$? ; is $g(|-4|) = g(4)$?

(c) Evaluate fog(-1) ; fof(-4) ; gof(11) ; $g^{-1}(2)$; $f^{-1}(-3)$

(d) Solve the following:

f(x) = 7 ; g(x) = -5 ; f(x) = -3 ; f(x) = 5 ; g(x) = -1

(e) state the graphical and algebraic significance of f(0) as well as g(0)

(f) State the domain and range of g(x) and also for f(x)

(g) is f(-4.75) positive or negative? Explain how you determined this.

(h) is g(-4.75) positive or negative? Explain how you determined this.

(i) state the graphical and algebraic significance of f(x) = 0 as well as g(x) = 0

(j) For what values of x is f(x) > 0? Explain how you determined this.

(k) Solve g(x) < 0.

(l) How often does the line y = -1 intersect y = f(x)? Intersect y = g(x)

(m) How often does the line x = -1 intersect y = f(x)? Intersect y = g(x)

(n) Interpret the meaning of the state f(x) = g(x) then solve the equation f(x) = g(x).

(o) Interpret the meaning of the state f(x) < g(x) then solve the inequality f(x) > g(x).

(p) Calculate the value of the difference quotient $\frac{f(7)-f(4)}{7-4}$ as well as $\frac{f(9)-f(7)}{9-7}$ and explain the sig. of the DQ.

(q) Determine the average rate of change of y = g(x) between x = 4 and x = 9

Now let's work on other function concepts that relate to characteristics of functions, specifically y = f(x) now.

(a) On what interval is y = f(x) increasing, given the restricted domain of $\left\{x \in R \middle| -6 < x \leq 7\right\}$?

(b) On what interval is y = f(x) decreasing, given the restricted domain of $\left(-6,7\right]$?

(c) Where are the local maximums & minimums of y = f(x), given the restricted domain of $\left\{x \in R \middle| -6 < x \leq 7\right\}$?

(d) Given the restricted domain of $\left\{x \in R \middle| -10 < x \leq 4\right\}$, on what interval is y = f(x) concave up? Concave down?

(e) Where are the roots of y = f(x)?

(f) Does y = f(x) appear to have any asymptotes? If so, where?

(g) What does the concept of discontinuities mean, given that I have created y = f(x) to be a discontinuous function.

(h) What is a jump discontinuity? Where does f(x) have a "jump" discontinuity?

(i) What is an infinite discontinuity? Where does f(x) have an infinite discontinuity?

(j) If h(x) = x + 2, what would the graph of y = f o h (x) look like? Why?

(k) If h(x) = x + 2, what would the graph of y = h o f (x) look like? Why?

(l) What would the graph of y = -f(x) look like? Why?

(m) What would the graph of y = f(-x) look like? Why?

(n) Explain how the graph of y = f(x) changes if you are asked to graphed y = | f(x) |

(o) To determine the end behavior of the function f(x) , what does the function "do" as $x \rightarrow +\infty$ and what does the function "do" as $x \rightarrow -\infty$?

(p) What does the term “bounded” mean and explain if/how it applies to y = f(x) & to y = g(x)

(q) Evaluate $\lim_{x \to -5^+} f(x)$ & $\lim_{x \to -5^-} f(x)$ & $\lim_{x \to -5} f(x)$ & f(-5).

(r) Evaluate $\lim_{x \to -6^+} f(x)$ & $\lim_{x \to -6^-} f(x)$ & $\lim_{x \to -6} f(x)$ & f(-6)

(s) Graph the inverse relation for y = g(x).

(t) Classify y = f(x) & y = g(x) as being either: (i) one to one, (ii) one to many, (iii) many to one, or (iv) many to many

(u) Which function(s) have/has symmetries : (i) f(x) only, (ii) g(x) only, (iii) both f(x) and g(x), (iv) neither f(x) nor g(x)

(v) What is meant by the terms “even” function and “odd” function? Give examples of each one. Are all parabolas examples of even functions/ Why or why not?

(w)What is an “identity function” and why is it called an “identity function”?