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 basics & applications of linear functions • mastery with working with basics & applications of linear systems • understanding basics of function concepts and apply them to lines & linear systems		
CONTEXT of this LESSON:	Where we've been In Lesson 2, you practiced with writing equations in different forms & practiced your algebraic fluency	Where we are Using the different forms of linear equations in order to model applications of linear functions	Where we are heading How do we apply the concept of "functions" to linear relations.

B. Lesson Objectives

a. Write equations to model real world scenarios using slope-intercept form of linear functions
b. Write equations to model real world scenarios using standard form of linear functions
c. Apply function basics like domain and range to real world scenarios

C. Fast Five: Consolidate SKILLS

4. For each statement, define two variables and write a linear equation that models the sentence.

(a) The sum of two numbers is 12.
(b) The sum of the width and length of a rectangle is 36 m.
(c) The total value of nickels and dimes is 75¢.
(d) Fives times some number less three times another number is ten.
(e) A sum of money invested at 5% per year and another sum at 8% per year earned a total of $150 in the first year.
(f) The cost of the rental is $50 plus $5/h.
(g) A rectangle is 2 m longer than it is wide.
(h) The total value of $5 bills and $10 bills is $135.

D. Explorations – House Values

Verbal Description:

Mr Santowski has a summer cottage for which he paid $120,000. Each year, the value of the house increases by $8,000.

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) When will my cottage double in value?

(e) What will be the value of my cottage in 5 years time?

(f) At what rate is the value of the house changing from year to year?

(g) Explain the meaning of statement V(10) = 200,000

(h) What is the x-intercept and what does it mean?

(i) What would be a reasonable domain for this scenario? Why

HL EXTENSION Questions:

(j) Write an equation for the following NEW scenario ➔ After 10 years, the value of the cottage increases annually by $12,000. Now evaluate V(15) and re-determine the doubling time.

(k) The $8,000 increase in the first year is percent increase of $6\frac{2}{3}\%$. If the change in value were to be modeled with an EXPONENTIAL function, determine (i) a new equation, (ii) V(10) and (iii) the "doubling time"

E. Explorations - Income & Earnings

Verbal Description:

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.

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).

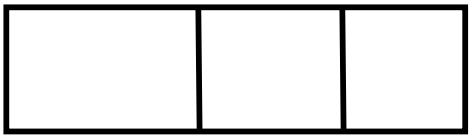
(l) Solve E(S) = $950. Is it possible to solve for E(S) = $925? Why/why not?

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

F. Explorations – Geometry Problems ➔ Perimeter of a rectangle

Verbal Description:

Mr Santowski is constructing 3 adjacent, rectangular pens to contain puppies, as illustrated below. I have 36 meters of fencing material available.



Data Table: List some possible values for the length and width of the pens.

length					
Width					

Questions:

a. Write the equation in standard form, relating the lengths and width combinations possible.

b. Write the equation in slope-intercept form.

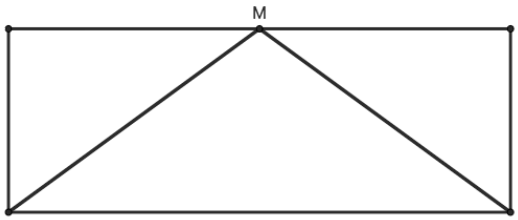
c. Determine the values of the intercepts and interpret their meaning.

d. What does the slope mean in this question?

e. Which form do you find easiest for this problem? Why?

f. State the domain and range of this function and explain your thinking.

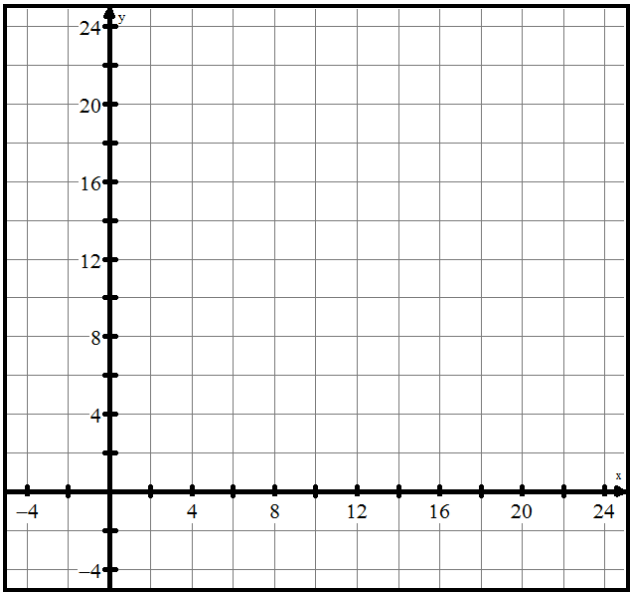
Extension: Determine the equation, relating the lengths and width combinations possible, given the modified diagram where M is the midpoint.



G. Explorations ➔ Mixtures

A candy store is preparing a mixture of chocolate raisins and chocolate peanuts. The raisins are sold for $2.25/kg and the peanuts are sold for $1.75/kg. They will produce a 20 kg mix that they will sell for $41 (or $2.05/kg).

Graph:



DEFINE YOUR VARIABLES, then complete the tables

Data Table: List some possible combinations of amounts of raisins & peanuts to account for the 20 kg.

Amt of Raisins					
Amt of Peanuts					

Data Table: List some possible combinations of amounts of raisins & peanuts to account for the VALUE of $41.

Amt of Raisins					
Amt of Peanuts					

Questions:

(a) Write an equation for the amount of the mixture made.

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

(c) What would be the domain and range of this function?

(d) Write an equation for the total cost of the mix.

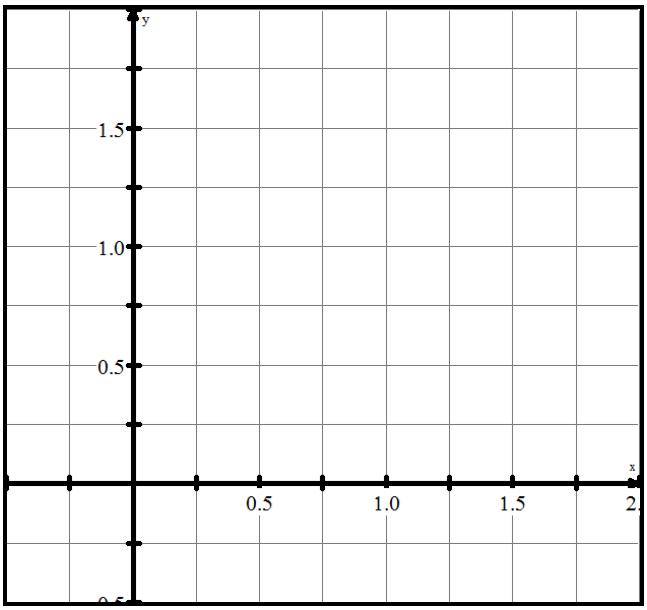
(e) What do the x- and y-intercepts represent?

(f) What would be the domain and range of this function?

K. Explorations: Equations in Standard Form - Rates

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.

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 travelled.

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

(c) Write an equation for the distance travelled.

(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 travelling by car.