

Lesson Context

<p>BIG PICTURE of this UNIT:</p>	<ul style="list-style-type: none"> • What is meant by the term FUNCTIONS and how do we work with them? • What are the most important components of “Problem Solving”? • From last year’s course, what are the major topics from linear relations that we have worked with, remember, and are fluent with? • How do we apply the concept of linear relations to (i) geometry & (ii) data analysis & (iii) functions
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Lesson Objectives

- Write equations of linear models in multiple forms to model applications
- Apply function concepts like domain and range and function notation in the context of linear models
- Continue working with systems of equations and multiple ways to solve linear systems

PART 1 – Skills REVIEW

- Mr. S is doing a home project that involves the purchase of interlocking paving stones. The Perfect Paving Company charges \$10 per square foot to install interlocking paving stones, as well as \$400 delivery fee.
 - Explain what $C(500) = 5400$ means in the context of this problem.
 - Determine the greatest **area** that Mr. S can cover with these paving stones for \$3600.
 - Determine two possible **dimensions** of the area that Mr. S can cover with the stones he purchased.
 - In order to complete this project, Mr. S also needs to include 5 cubic yards for sand (where the cost is \$15 per cubic yard.) How much will this extra cost reduce the area that he can cover with the paving stones, given his \$3600 budget?



2. Abigail is planning on flying to Paris and then travel through Switzerland and Austria to Italy by train. When she goes to the bank to buy the foreign currencies, one euro will cost her \$1.40 and one Swiss franc costs her \$0.90. Abigail will spend \$630 to purchase these two foreign currencies.
 - a. Create a table to show the ways that Abigail can spend up all of her \$630. (HINT: What will your variables represent?)
 - b. Graph the data from your table. (HINT: what will be your variables?)
 - c. Write an equation that models this context.
 - d. State the domain and range of the model that you created to describe this relation.
 - e. Is this example of a relation also an example of a **function**? Why/why not?
 - f. Determine the slope of this relation. What might the slope really mean??

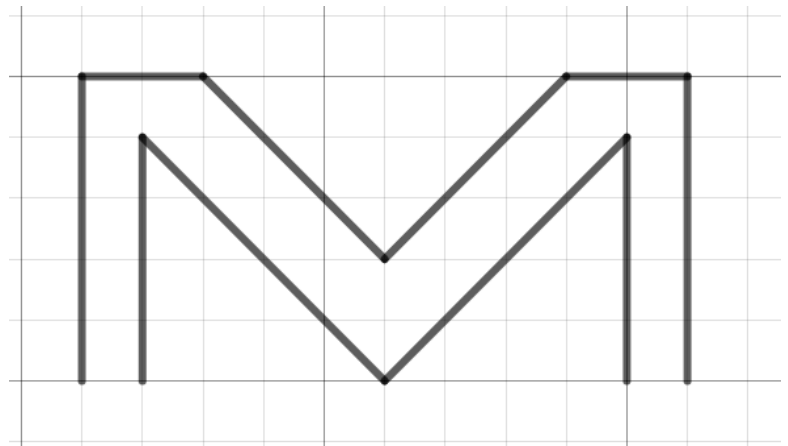
3. Hank sells furniture and earns \$280/week plus 4% commission on sales.
 - a. Determine the weekly sales that Hank needs to make to meet his weekly budget requirement of \$900.
 - b. Hank is offered an alternate pay option: he can earn \$200/week plus a 6% commission. He asks you for advise – should he take the new pay option Yes or no and why?

4. Six cups of coffee and a dozen muffins originally cost \$15.35. The price of a cup of coffee increases by 10% and the price of a dozen muffins increases by 12%. The new cost of six cups of coffee and a dozen muffins is \$17.06. Determine the new price of one cup of coffee and one muffin.

PART 2 – Skills PRACTICE

1. You are selling tickets for the Maadi Community Theatre for their production of *1001 Arabian Knights*. Student tickets cost \$5 and general admission tickets cost \$8. If you sell 500 tickets and collect \$3475, how many student tickets and how many general admission tickets did you sell?

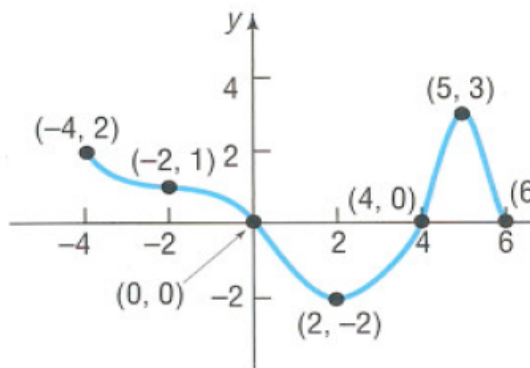
2. Use DESMOS to re-create this LINEAR LOGO. Take a screenshot and record your equations/domains/ranges. What skills/concepts did you need to know in order to do this?



3. Graph the function $f(x) = 4 - \frac{3}{4}x$. From your graph (or from your calculator or from algebra):
- Determine the range if the domain were $\{x \in \mathbb{R} \mid -8 \leq x < 8\}$
 - Determine the domain if the range were $\{y \in \mathbb{R} \mid -\frac{5}{2} \leq y < 1\}$
 - Evaluate $f(-2)$
 - What value of x makes $f(x) = -8$?
 - At what point(s) does $f(x)$ intersect with $g(x)$, where the function $g(x)$ is defined in standard form as $4x - 8y = 128$ if the domain were: (i) $\{x \in \mathbb{R} \mid -8 \leq x < 8\}$ and (ii) infinite

4. Use the given graph of a function to answer the questions:

10. Use the given graph of the function f to answer the questions:



- Find $f(0)$ and $f(6)$.
- Find $f(2)$ and $f(-2)$.
- Is $f(3)$ positive or negative?
- Is $f(-1)$ positive or negative?
- For what values of x is $f(x) = 0$?
- For what values of x is $f(x) < 0$?
- What is the domain of f ?
- What is the range of f ?
- What are the x -intercepts?
- What is the y -intercept?
- How often does the line $y = -1$ intersect the graph of f ?
- How often does the line $x = 1$ intersect the graph of f ?
- For what value of x does $f(x) = 3$?
- For what value of x does $f(x) = -2$?

Higher Level Extension Work

1. Solving Linear Equations Involving Absolute Value.

- a. Explain what the Absolute Value “function” does to an input, for example the numbers -3 and +5
- b. Evaluate $|-2 + 5 + 7 - 13 \times 2|$ and evaluate $(-2 + 5 + 7 - 13 \times 2)$ and explain WHY the answers are different.
- c. Solve $|2x + 5| = 4$ GRAPHICALLY on DESMOS and explain WHY there are two solutions.
- d. Explain HOW to solve the equation $|2x + 5| = 4$ ALGEBRAICALLY.
- e. Solve $|2x + 5| = x + 4$ GRAPHICALLY and explain WHY there are two solutions.
- f. Explain HOW to solve the equation $|2x + 5| = x + 4$ ALGEBRAICALLY.
- g. Solve the following equations involving absolute value ALGEBRAICALLY.

(i) $|-2x + 5| = x + 4$

(ii) $\left|-\frac{2}{3}x - 1\right| = x + 4$

(iii) $|2x + 5| = x - 4$

(iv) $4 - |3x - 6| = 4 - x$