LEARNING OBJECTIVE: we will compare the properties of linear functions in different ways. (G8M5L6)

CONCEPT DEVELOPMENT:

Functions: A function is a rule that assigns each input exactly one output.
Stated another way: no *x*-values are repeated.

Linear Functions: A function where the rule is specifically a linear equation in the form $y = mx + b$.

Functions can be viewed represented four ways

Verbally/Written Description	Equation
I have $500 in my bank account now, and deposit $75 per week.	$y = 75x + 500$ **or** $f(x) = 75x + 500$
Table	**Graph**

Weeks (x)	Money (y)
0	500
1	575
2	650
3	725
5	875
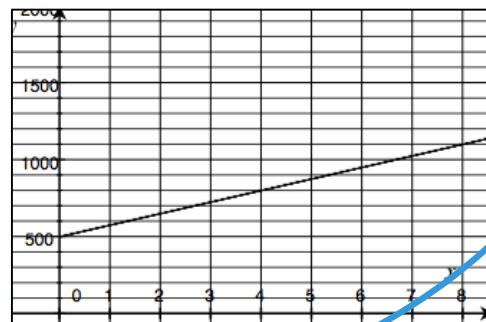
All of the 4 representations above describe the same function, where the amount of money in my bank account IS A FUNCTION of the number of weeks that have passed by.

y is a function of x

Guided Practice:

Steps to Comparing Linear Functions
1. Read the scenario carefully, study any tables/graphs, and highlight the important information.
2. Identify the rate for each function.
3. Re-read the scenario and answer the question asked.

Mason and Julia drive separate cars at a constant speed. They both drive the same route from San Jose to San Luis Obispo, a distance of 147 miles. Mason begins at 1:40PM and arrives in San Luis Obispo at 4:15PM. Julia's trip can be described by the equation $f(x) = 64x$, where the distance she travels is a function of how many hours she drives for. Who gets to San Luis Obispo faster?

1:40
4:15
2:35

Mason
$y = mx$ $y = 57x$
$147 = m \cdot 155$
$\frac{147}{155} = \frac{m \cdot 155}{155}$ $m = .948 \times 60 = 56.9$
2hr. 35m.

Julia
$f(x) = 64x$ Speed 64 MPH
$\frac{147}{64} = \frac{64x}{64}$
$x = 2.3$ hrs.
2 hr. 18 min.

Rayan is researching cell phone plans. Sprint charges a flat rate of $75 each month. This means that he would pay $75 with no additional costs. The charge for T-Mobile is a function of the number of texts you send that month—the amount he pays will change each month based on how many texts he sends that month. The table below represents the inputs and corresponding output that the function assigns

Input (number of texts)	Output (cost of bill)
50	$50
150	$60
200	$65
500	$95

+100 +50 (between 50,150,200) +10 +5

$.10/text

300        $75

$y = mx + b$
$50 = \frac{1}{10}(50) + b$

When does it become cheaper for Rayan to go with Sprint v. T-Mobile?

Sprint
$y = 75$

T-Mobile
$y = .10x + 45$

$75 = .10x + 45$
$30 = .10x$
$300 = x$ $y = 75$

When Rayan sends more than 300 texts he should use Sprint.

G8M5L6: Comparing Functions Represented in Different Ways

A function describes the volume of water in gallons, y, that flows from faucet A for x minutes. The graph below is the graph of this function. Faucet B's water flow can be described by the equation $y = \frac{5}{6}x$, where y is the volume of water in gallons that flows from the faucet in x minutes. Assume the water flow is constant.
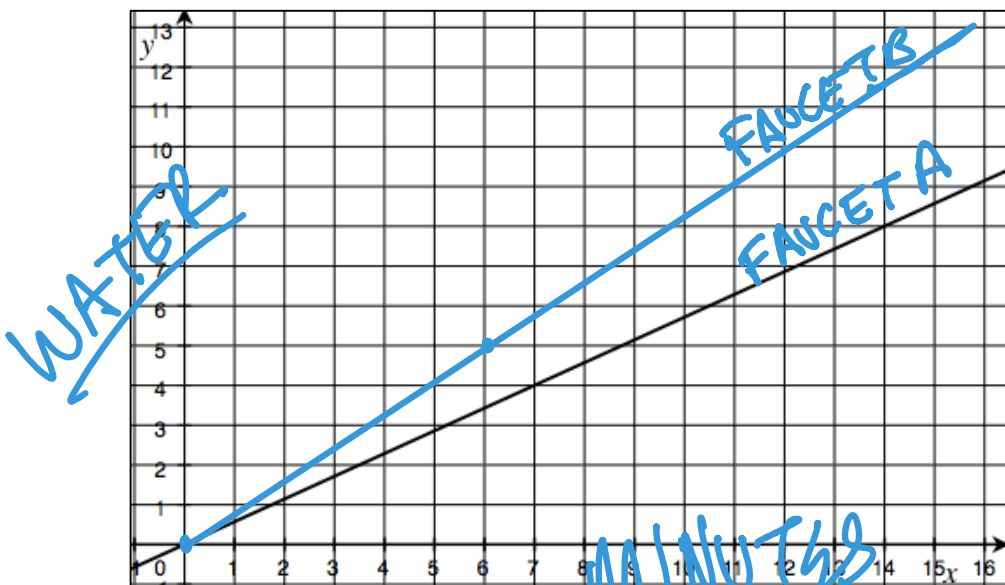
Which faucet has a faster flow?

FAUCET A $Y = \frac{4}{7}X$

FAUCET B $y = \frac{5}{6}x$

Each faucet is being used to fill 50 gallon tubs. How long will it take each faucet to fill the tub? How do you know?

(A) $y = \frac{4}{7}x$ $\boxed{x = 87.5 \text{ mm.}}$ (B) $y = \frac{5}{6}x$ $\boxed{x = 60 \text{ mm}}$

$50 = \frac{4}{7}x$ $50 = \frac{5}{6}x$

Suppose the tub that is being filled by faucet A already has 15 gallons in it. If both faucets are turned on at the same time, which tub will be full first?

$50 = \frac{4}{7}x + 15$ $\boxed{x = 61\frac{1}{4} \text{ mm}}$ $\boxed{\text{B still fills first}}$

$\frac{4}{7}x = 35$
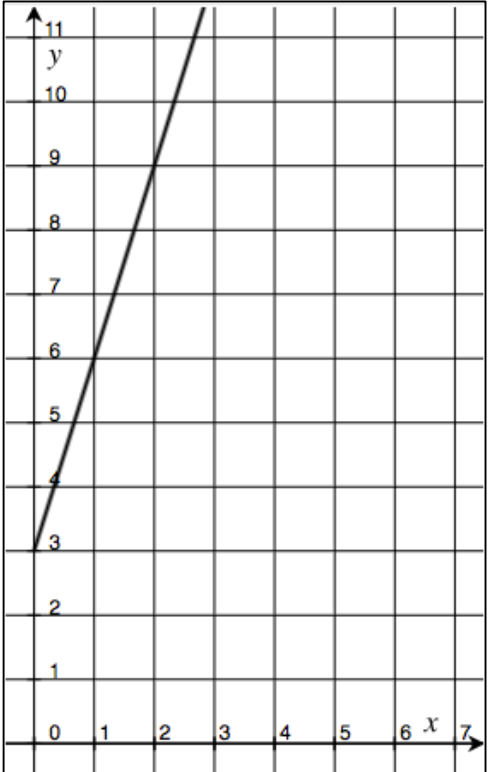
Two people, Adam and Bianca, are competing to see who can save the most money in one month. Use the table and the graph below to determine who will save more money at the end of the month.

Adam's Savings	Bianca's Savings

Adam's Savings graph:

$y = 3x + 3$

Bianca's Savings table:

Input (number of days)	Output (total amount of money)
5	$17
8 +3	$26 +9
12 +4	$38 +12
20 +8	$62 +24

$\frac{9}{3} = \frac{13}{4}$

$= \frac{24}{8} = 3$

$y = 3x + 2$

State how much money each person had at the start of the competition.

Adam had $3   Bianca had $2.

Who had more money at the end of the month?

Adam has $1. more.   Both save $3 per day.

Independent Practice:

Give problem set for Lesson 7 as independent practice.

Activating Prior Knowledge:

$2(x + 5) = 3(x + 6)$	$-(4x + 1) = 3(2x - 1)$	$15x - 12 = 9x - 6$
$3(x + 5) = 4(x + 6)$	$3(4x + 1) = -(2x - 1)$	$\frac{1}{3}(15x - 12) = 9x - 6$
$4(x + 5) = 5(x + 6)$	$-3(4x + 1) = 2x - 1$	$\frac{2}{3}(15x - 12) = 9x - 6$

Closure:

What can you look for in descriptions of functions to determine if they are linear or not? Be specific in the type of description (i.e. table, graph, story, equation). What are you looking for in each of these instances?

Teacher Notes:

Map to Lesson 7, Mod 5.