NAME:_____ Math 7.2, Period _____

Mr. Rogove Date:_____

Learning Objective:

We will write rules for linear functions based on a table of values and define functions as continuous or discrete (Lesson 57)

Concept Development:

Constant rates and proportional relationships can be described by a function, specifically a linear function where the rule is a linear equation in the form of $y = mx + b$, where m and b are constants.

Example: A bathtub has 12 gallons of water already in it, and is filling at a rate of 2 gallons per minute.

$y = 2x + 12$

Function notation: instead of writing $y = 3x - 4$, we can say $f(x) = 3x - 4$.

$f(x)$ is read as "f of x" or "y is a function of x."

Example: Christine walks 3 miles each hour.

$y = 3x$

$f(x) = 3x$

The number of miles you walk is a function of time you spend walking.

Different ways to say the same thing.

x	y
independent variable	dependent variable
horizontal axis	vertical axis
x	$f(x)$
input	output
domain	range

Linear functions that can only have integer inputs in the function are called **discrete rate functions**.

Example: a box of cookies cost $3.00

Linear functions that can have any input including fractional values are called **continuous rate functions**.

Example: A pound of grapes cost $3.00

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Guided Practice:

Steps for Evaluating Functions

1. Read the scenario carefully, and study the table (if values are provided) to verify the function is linear.
2. Create the function rule based on the information provided.
3. Graph your rule.
4. Answer any questions about the rule.

The table below shows the function of time in minutes with respect to mowing an area of lawn in square feet.

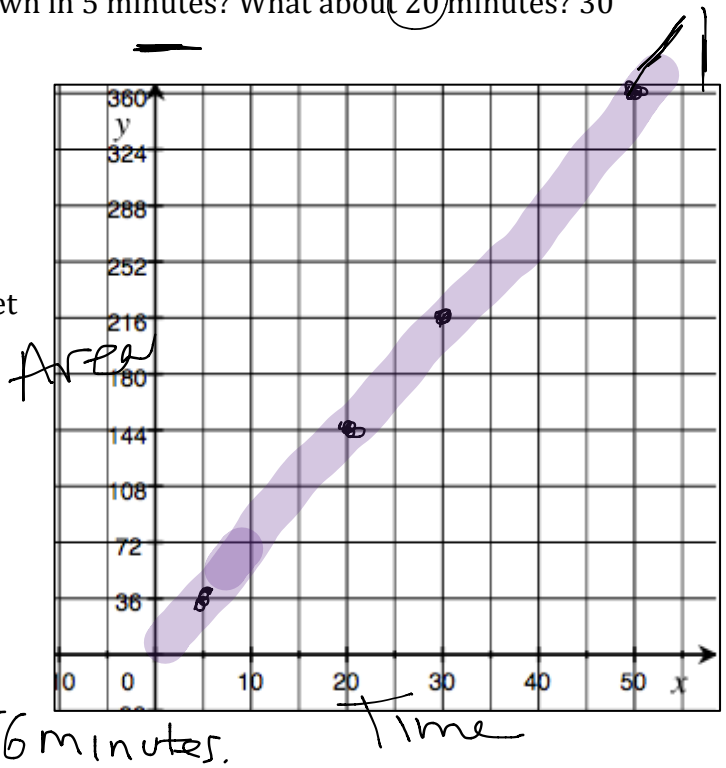
Linear? $\frac{y}{x} =$

Number of minutes (x)	5	20	30	50
			×7.2	×7.2
Area mowed in square feet (y)	36	144	216	360

What is the rate of mowing a lawn in 5 minutes? What about 20 minutes? 30 minutes? 50 minutes?

$\frac{36}{5} = 7.2$

$\frac{144}{20} = 7.2$



Write a function rule that describes the area in square feet *(y)* that can be mowed in *x* minutes.

$f(x) = 7.2x$

$y = 7.2x$

How long will it take to mow 400 square feet of lawn?

$f(x) = 7.2x$

$\frac{400}{7.2} = \frac{7.2x}{7.2}$ 55-56 minutes.

How many square feet can you mow in ~~24 minutes~~?

$f(x) = 7.2x$ $f(24) = 7.2(24)$ 172.8 sq ft.

Is this a continuous rate function or discrete rate function?

CONTINUOUS

What are the restrictions on the domain and range?

$x \geq 0$ $y \geq 0$

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Water is flowing from a hose, and the amount of water that comes out has been captured at the times indicated in the table below.

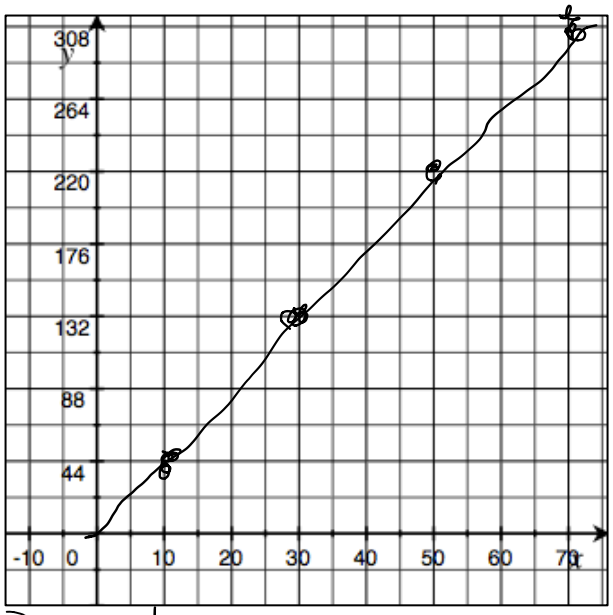
Time in minutes *(x)*	10	25	50	70
Total Volume of Water in gallons *(y)*	44	110	220	308

Linear ✓

$\frac{y}{x}$

Describe the function in terms of volume and time.

The volume of H_2O is a function of time



Write a function rule that describes the volume of water in gallons, y, in x minutes. Graph the function.

4.4 GPM

$f(x) = 4.4x$

What number does the function assign to 250? That is, how many gallons of water flow from the hose in 250 minutes?

$f(250) = 4.4 \times 250 = 1100$ gallons

Is this a discrete rate or a continuous rate function?

CONTINUOUS

A backyard pool needs 17,300 gallons of water to fill it up. If it already $\frac{1}{4}$ full, write a rule that describes the volume of water flow as a function of the time needed for filling the pool with the hose, including the number of gallons already in the pool.

$f(x) = 4.4x + 4325$ H_2O ~~ALREADY~~ in pool

How many hours will it take to finish filling up the pool?

$17300 = 4.4x + 4325$

49 hrs.

What are the restrictions on the domain and range?

$x \geq 0$ $y \geq 0$

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You can buy a reusable mug for $9.00 at the theatre, and refill your soda for $2.00 each time.

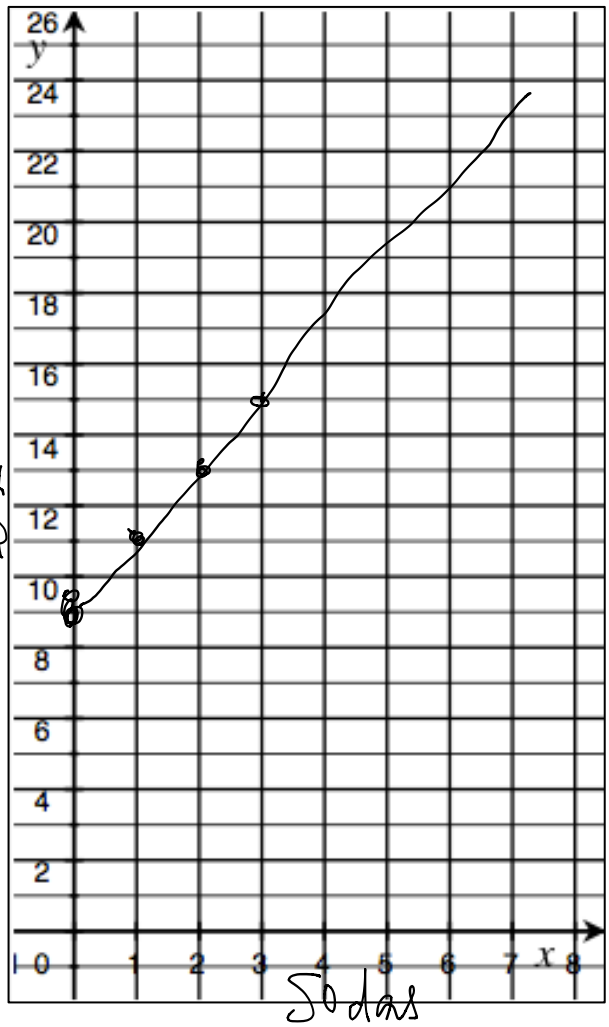
Complete the table below.

Number of sodas purchased (x)	0	2	4	5	6
Amount paid (y)	9	13	17	19	21

Write a function rule that describes the amount of money paid, *y*, for *x* sodas. Graph the function.

cost/soda mug

$f(x) = 2x + 9$



Is the function continuous of discrete?

Discrete.

How much money would you need to 8 sodas?

$f(x) = 2x + 9$

$25

If you had $31, how many sodas would you be able to drink?

11 Sodas

What are the restrictions on the domain and range?

$x \geq 0$ $y \geq 9$

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Logan has a certain amount in her bank account when she decides she's going to make recurring weekly deposits (put the same amount in each week). Below is a partial table of values.

Number of weeks *(x)*	0	1	3	6	10	12
Amount in Logan's bank account *(y)*	75	95	13	195	275	315

How much money does Logan have when she decides she's going to start to deposit the same amount?

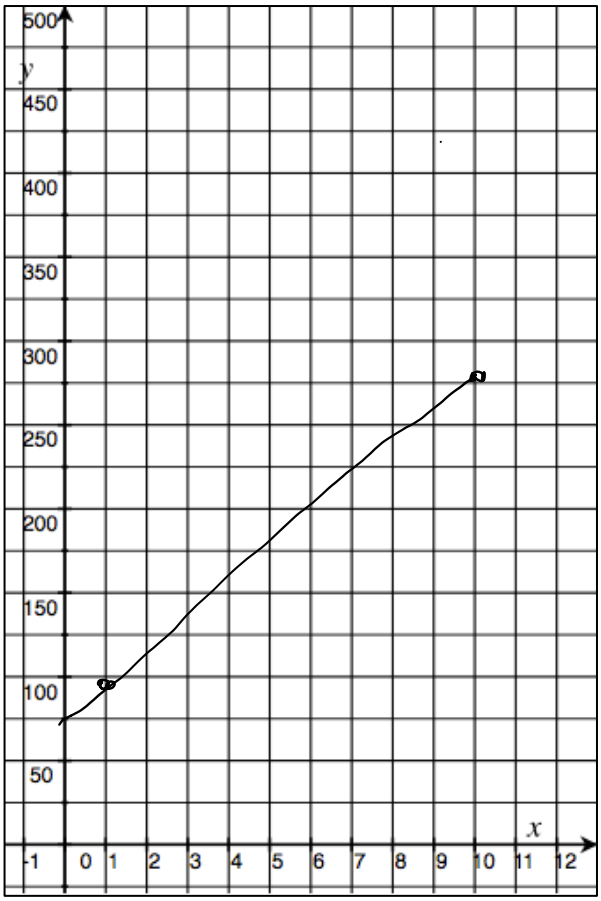
$75

How much does Logan deposit each week?

$20/wk

Write a function rule that describes the amount of money Logan has in her account, *y*, after *x* weeks. Graph the function.

F(x)=20x+75



If Logan needs $500 to go on tour, how long will it take her to save that amount?

Is this discrete or continuous?

Discrete.

What are the restrictions on the domain and range?

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Independent Practice:

Activating Prior Knowledge:

Closure:

Teacher Notes:

Map to Lesson 3 and 4, Mod 5 Give out exercises for lesson 4 if there's time to show that not all functions can be described using numbers.