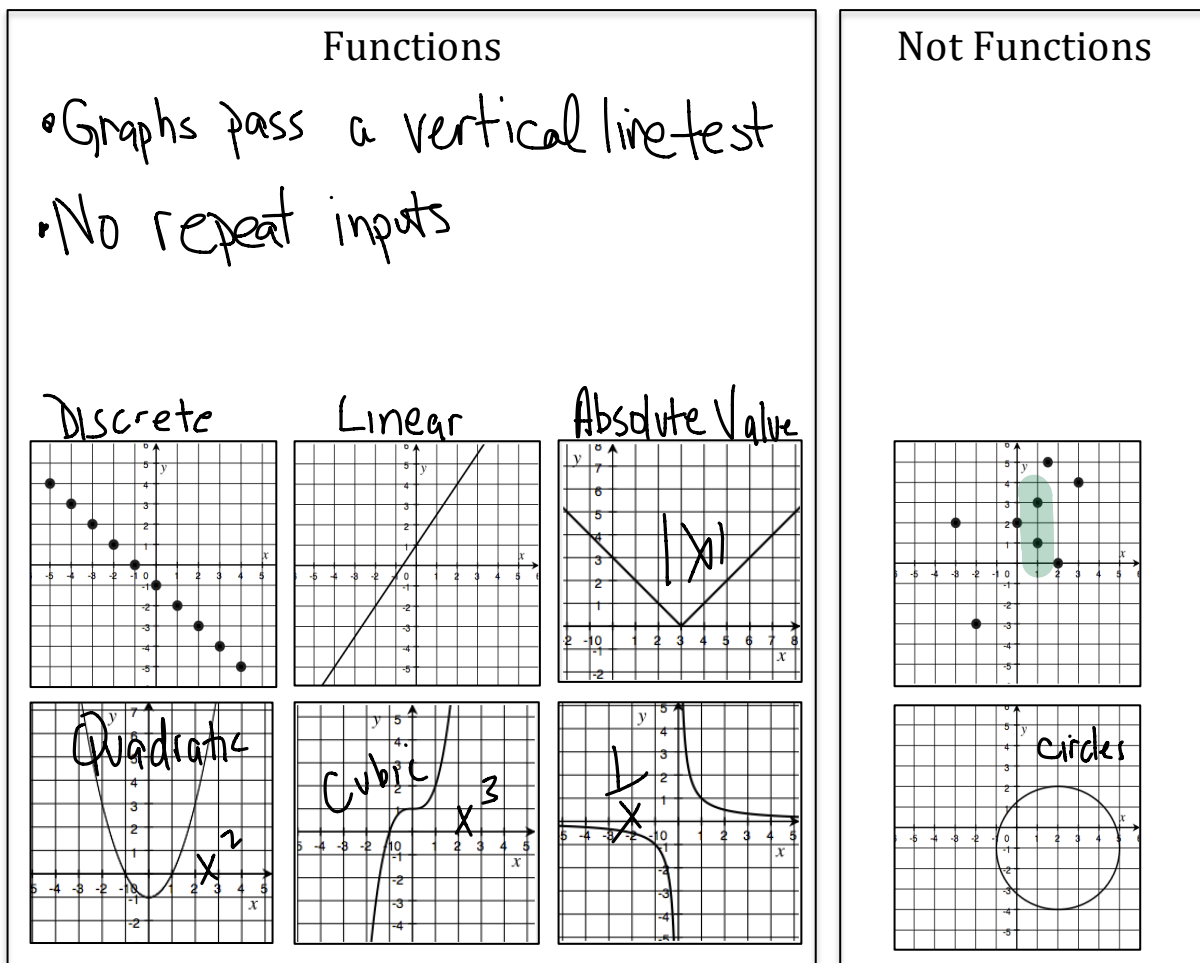## Learning Objective:
We will classify functions as continuous rate or discrete rate functions and introduce other ways to think about functions. (G8M5L4)

Concept Development:
Remember the definition of a function!!

Function: A function is a formula or a rule that assigns to each input exactly one output.

Functions	Not Functions
•Graphs pass a vertical line test •No repeat inputs Discrete Linear Absolute Value Quadratic x^2 Cubic x^3	Circles

Linear functions that can only have a specific set of inputs (such as integers) in the function are called **discrete rate functions**.
Example: a box of cookies cost $3.00

Linear functions that can have any input including rational number values are called **continuous rate functions**.
Example: A pound of grapes cost $3.00

NOTE: Some functions do not involve numbers at all!!

Example:

Input	Output
Soccer Ball	Sphere
Dice	Cubes
Soda can	Cylinder
Stick of butter	Rectangular prism
Globe	Sphere

What is the rule that the function is describing?

shape of object

ANOTHER NOTE: Some functions might describe a rule that is an equation, but <u>the equation might not be linear.</u>

Example: There is a relationship between the length of the side of a square and its area.

Side length (feet)	Area (square feet)
1	1
2	4
3	9
4	16
16	256
20	400

Area of square

What is the equation that models this relationship?

$$f(x) = x^2$$

What lets you know this is NOT linear?

$$\frac{1}{1} \neq \frac{4}{2} \neq \frac{9}{3} \neq \frac{16}{4}$$

NAME:_____   Math _____ , Period _____

Mr. Rogove   Date:_____

Guided Practice:

Steps for Describing Functions
1. Study the scenario and information provided carefully.
2. Create a function rule that describes the relationship between input and output.
3. Determine the limitations/restrictions on the input and output and state whether the function is discrete or continuous.
4. Answer any questions about the rule.

If 4 copies of the same book cost $112, what is the unit rate for the book?

$112 \div 4 = \$28/book$

a. Write a function rule that describes the relationship between the cost and the number of books.

$y = 28x$ or $f(x) = 28x$

b. What are the limitations on the input and output?

$x \geq 0$, Integer $y \geq 0$

c. Is this a discrete rate function or a continuous rate function?

Discrete → You can only buy whole books

d. How many books can you buy for $70?

2 books   w $14 leftover for ice cream!

A faucet in the bathroom has left on, and water is flowing at a constant rate. 7 gallons of water flow from the faucet every 2 minutes. What is the unit rate for the water flow? 3.5 gpm , $\frac{7}{2}$

a. Write a function rule that describes the relationship between the volume of the water and time.

$f(x) = 3.5x$

b. What are the limitations on the input and output?

$x \geq 0$, $f(x) \geq 0$

c. Is this a discrete rate function or a continuous rate function?

CONTINUOUS - you can leave faucet on for fractions if time

d. How long will it take for this faucet to fill up a bathtub that can hold 100 gallons of water?

$28\frac{4}{7}$ minutes $f(x) = 3.5x$
GOOD $\frac{100}{35} = \frac{3.5x}{35}$

$28 min 34 sec$
BETTER

Consider the following function: there is a function G so that the function assigns to each input, the number of a particular player, an output, their height. For example, the function assigns to the input 1 an output of 5'11".

Jersey Number	Height
1	5'11"
2	5'4"
3	5'9"
4	5'6"
5	6'3"
6	6'8"
7	5'9"
8	5'10"
9	6'2"

a. What is the output assigned to the input 2?

$$G(2) = 5'4''$$

b. Is there a rule (formula) that you can use to describe the function?

$$G(Jersey\#) = height$$

c. Is the function continuous or discrete?

Discrete → No player jerseys are fractions

A function produces the following table of values

Input	Output
Banana	Yellow
Cherry	Red
Orange	Orange
Tangerine	Orange
Strawberry	Red

a. Can this function be described by a rule using numbers? Explain.

No. No number can define the function

b. Describe the function.

The functions assigns to each fruit its color

c. Write two more inputs and their assigned outputs.

grape → purple

raspberry → red

blackberry → black

d. Would this be considered a continuous or a discrete function?

Discrete!

A **linear** function has the table of values below related to the number of buses needed for a field trip.

Number of students (x)	35	70	105	140
Number of Buses (y)	1	2	3	4

a. Write the linear function that represents the number of buses needed, y, for x number of students.

b. Describe the limitations of x and y.

c. Is the rate continuous or discrete? Explain.

d. The entire 8th grade student body of 294 is going on a field trip to San Francisco. What number of buses does our function assign to 294 students?

e. Some 7th graders are going on their own field trip to Half Moon Bay, but there are only 183 students going. What number does the function assign to 183 students? How many buses will be needed for the trip?

f. What number does the function assign to 50? Explain what this means in the context of the story.

A linear function has the table of values below related to the cost of movie tickets.

Number of tickets (x)	3	6	9	12
Total Cost (y)	$27.75	$55.50	$83.25	$111

a. Write the linear function that represents the total cost, y, for x tickets purchased.

b. Is the rate continuous or discrete? Explain.

c. What number does the function assign to 4? What does this mean?

d. What is the output given for an input of 11?

Independent Practice:

Activating Prior Knowledge:

Closure:
Give out exit ticket for lesson 4.

Teacher Notes:
Homework is Lesson 4 problem set.