Warmup

Which has a greater rate of change?

a) (10, 9) (-3, 4) $\frac{49}{-3-10} = \frac{5}{13}$

b) (-4, 7) (-3, 8) $\frac{8-7}{-3-4} = 1$

Discrete or continuous

a) Filling up a pool with a hose

Continuous

b) Folding socks in the clean laundry

Discrete

List out the domain: You are trying to be healthy by walking two more miles a week.

Words: Weeks

Set: $\{0, 1, 2 \ldots \infty\}$

Interval: $[0, \infty)$

Inequality: $0 \leq x < \infty$

x	y
0	0
1	2
2	4
3	6
∞	∞

Pre 2.4

What is domain?

X-values, input, independent

What are the following letters representing?

R Q N Z

Real # Rational # Natural # Integers 1, 2, 3. ∞ -1, -2, -3, ... -∞

When you see $x \geq 0$ or $x > 0$ OR $x < 0$ or $x \leq 0$, what does all that mean?

$x \geq 0$: equal to → [ ] → all #'s above 0, include 0

$x > 0$: all greater than 0 → 0 → not = to → ( )

$x < 0$: all #'s below 0 → 0 → not = to → ( )

$x \leq 0$: less than OR = to → closed → [ ] → include 0

Continuous and discrete...we still struggle with this. First, what are the differences? How can we tell them apart?

does not end ends

How can you tell the difference when:

a) You are given a word problem

Discrete → can't have ½ a golf ball (whole #'s)

Continuous → water flowing, Lamy whining

b) You are given a graph

Discrete → Dots

Continuous → Connect

c) You are given a function

Sequence → Discrete Function → Continuous

Key things here:

- If a function is **continuous**, the domain is going to be all real numbers
- Sequences (either one) are always DISCRETE
- Linear and exponential functions (where we swap the **n** for the **x**) are CONTINUOUS
- Another name for the **common difference** is slope and another name for the **ratio** is base
- Arithmetic sequences ~ Linear Geometric sequences ~ exponential

So let's look at the following word problem and see what we can figure out.

Every day you are adding 3 golf balls to a bin that has an infinite amount of space.

1) Continuous or discrete?

2) What would be the domain?

Days $\{0, 1, 2, \ldots \infty\}$

3) Would this be arithmetic or geometric? So is that linear or exponential? How do you know?

Rate of change constant — Adding +3 Golf Balls

Let's think back to the leaves that we were raking last week. What were the two options that we could do?

So for the first one where you made $2 a bag, what kind of function is that? Linear

Would it be continuous or discrete?

no 1/2 bags

What would be the domain?

Bags → $\{0, 1, 2 \ldots \infty\}$ $[0, \infty)$

What did you like about this plan?

You get money in the beginning only with a few bags

The 2nd option you made $0.02, then $0.04 then $0.08 and so on such that the amount kept doubling.

Would this be continuous or discrete?

exponential

What would be the domain?

Bags → $\{0, 1, \ldots \infty\}$

What did you like about this plan?

Had to wait to ~~get~~ lots $

1.26×10^{29}

$0.02(2)^{100-1}$

Over time, which plan was better? Why?

B → more $ over time

Sketch a picture of what the two graphs would look like.