Notes	Thinking Process
Exponential Growth (House) In Charlotte, houses and apartments are being built and sold at extremely high rates. Every time you listen to a local radio station, you hear commercials about apartments, houses, and real estate. What is the buzz all about? Did you know that most houses **appreciate**, which means over time they will be worth more than 100% of the value it was initially worth? Remember 100% is 1 as a decimal so (1+) means house problem. If I purchased a house for $200,000 that was valued at $200,000 and it appreciated 1.4% in 1 year, I would earn money if I sold it after a year. Starting Value: $200,000 sold 100% is 200,000(1) = $200,000 $200,000 earned 1.4% appreciation after 1 year is $200,000(.014)^1 = 2800 Our process would be $200,000(1) + 200,000(.014)^1$, but is simplified to be $200,000(1 + .014)^1$ I would make $2800 and all would be good! Total New Value $202,800.00 We could model this situation as $y = 200,000(1.014)^1$ Imagine if you waited 2, 3 or 10 years before you sold the house. What do you think could happen?	 What does it mean when we hear **appreciate?** What other times does something **appreciate**? What does the 1 represent? The (.014)? Why did we add 1 & .014? What is 1 + .014? What does the power of 1 represent?

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Exponential growth model
(I CALL THEM HOUSE PROBLEMS)
$$y = A(1+r)^x$$

A = starting value
r = rate of increase
x = time in years
y = value of items after x years

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Identify each part from the example above:

A =
r =
x =

You Try

The population in a neighborhood in Charlotte is 5000 people. The number of people in that neighborhood is projected to increase by a rate of 7% each year for the next 10 years. Based on the projection, what will be the approximate population of that neighborhood in 4 years?

Key Words that tells us this is appreciation:

A =

r =

x =

$y = A(1+r)^x$

You Try

You purchase land off Sugar Creek for $30,000 in 2019. It earns 6% interest each year. What is the value of the land when you graduate?

Key Words that tells us this is appreciation:

A =

r =

x =

$y = A(1+r)^x$

Exponential Decay (Car)

Unlike houses, cars tend to have the exact opposite effect when we talk about value. The value of a car goes down extremely fast. This is called **depreciation**. It is nice to have a car, just know you will not be making any money if you try to sell it over the years. (1 -   ) means a car problem.

If I purchase a 2020 Acura NSX for $158,000 and the car depreciates 17% the first year.

Start Value:
$158,000 purchased at 100% would be 158,000(1)   =   158,000
$158,000 depreciated 17% after a year would be $158,000(.17)^1 = 28,860$

Our process would be $158,000(1) - 158,000(.17)^1$, but is simplified as
$158,000(1 - .17)^1$

This car would lose 28,860 in value after 1 year. The new value after a year would be $131,140. I would lose money, so all is not well!

We could model this situation as $y = 158,000(.83)^1$

Exponential decay model
(I CALL THEM CAR PROBLEMS)

$$Y = A(1 - r)^1$$

A = Initial Value
R = rate of decrease
X = time in years
Y = value after x year

What does it mean when we hear **depreciate?**

What other times does something **depreciate**?

What does the 1 represent?

The (.17)?

Why did we subtract 1 & .17?

What is 1 - .17?

What does the power of 1 represent?

Identify each part from the example above:

A =
r =
x =

What is the sign of your r?

You Try Queroy takes a medicine that has a dosage of 8 mg, The medicine dissolves in his body at a rate of 30% per day. How many mg's of the medicine will be in his body after 3 days? (List all decimals of mg)	Key Words that tells us this is depreciation: What are your units? A = r = x = $y = A(1- r)^x$
You Try Sierra's parents purchase her a car for her 16th birthday valued at $15,000. If Sierra goes off to college in 2 years, what will be the value of the car in 2 years if it depreciates 19% each year?	Key Words that tells us this is depreciation: A = r = x = $y = A(1- r)^x$