

Lesson: Exponential Decay

Grade Level: High School

Goal: Students will understand the exponential decay model and be able to apply it to multiple situations.

Prior Knowledge: Exponential Growth - Teach Pacific NW Federal Credit Union's lesson on Exponential Growth.

Procedure:

1. Use the companion PowerPoint, "**Exponential Decay**" to guide the students through a discussion about exponential decay.

Note: If using this as a distance learning tool – use this as a 3-day learning guide (2 day if class periods are longer)

Day 1 – Send out the **PowerPoint** with a possible **class discussion** planned after to discuss in detail. Have students work through the exponential decay equation as the PowerPoint presents it.

Day 2 – Send students the first hand out, "**Exponential Decay**"

Day 3 – Send out the second hand out, "**Exponential Decay and Exponential Growth Review.**"

2. As you go through the PowerPoint, guide students through the example equations – each student should do the equation in their own notebook to have it to look back on as they do the worksheets on their own.
3. Assign the first worksheet, "**Exponential Decay.**" Give the students a day or two to work on it. Go over the answers, discuss trends students notice.
4. Assign second worksheet, "**Exponential Growth and Decay - Review.**" Give students time to complete the worksheet, go over answers.
5. Big Take Away? Students will understand the depreciation tendency of different products enabling them to be knowledgeable consumers.

Exponential Decay

$$y = P(1 - r)^t$$



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Exponential Decay

Directions: Please write an exponential decay function to model each situation. Then find the value of the function after the given amount of time.

1. You buy a new Toyota Camry in 2013 for \$23,000. If you sell it in 7 years with an average rate of depreciation of 10% per year, how much will you be able to sell it for?

Function:

Value:

2. You bought a new Range Rover in 2015 for \$82,900. If you sell it in 5 years with an average rate of depreciation of 13% per year, how much will you be able to sell it for?

Function:

Value:

Other ways to apply Exponential Decay –

3. The population of a town is 2500 and is decreasing at a rate of 3% per year; 5 years

Function:

Value:

4. You own a T-shirt company. The value of your printing equipment is \$25,000 and decreases at a rate of 15% per year; 8 years

Function:

Value:

5. A population of 2,300 manatees in Florida is thought to be decreasing at a rate of 1.1%; 7 years

Function:

Value:

6. An app has a monthly user rate of 1,200 people. Participation is decreasing at a rate of 2% per month; 18 months.

Function:

Value:

Exponential Growth and Decay – Review

Directions: Determine if the given situation represents growth or decay and write the function to model the situation. Then find the value of the function after the given amount of time.

1. Annual sales at a clothing store are \$475,000 and increasing at a rate of 6.5% each year; 9 years

Function:

Value:

2. The population of a town is 1,600 residents and decreasing at a rate of 3.8 per year; 6 years

Function:

Value:

3. The population of a school is 850 students and is increasing at a rate of 2% per year; 6 years

Function:

Value:

4. Per capita income is the total income for a geographic area divided by the number of people in that area. In Oregon, our per capita personal income (PCPI) was \$49,908 in 2018. If it increases by 2.5% per year what will Oregon's (PCPI) be after 10 years?

Function:

Value:

5. Monthly car sales for a certain type of car are \$400,000 and are decreasing at a rate of 3% per month; 6 months

Function:

Value:

6. A condo in downtown Portland was worth \$80,000 in 1990. The value of the condo increased by an average of 3% each year. Find the value of the condo in 2020.

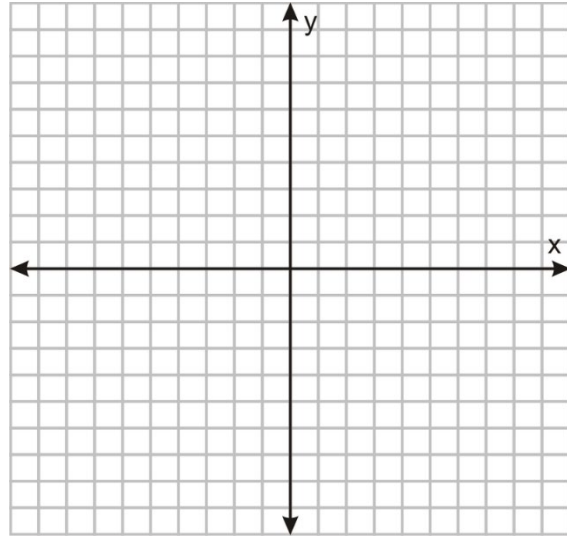
Function:

Value:

Exponential Models

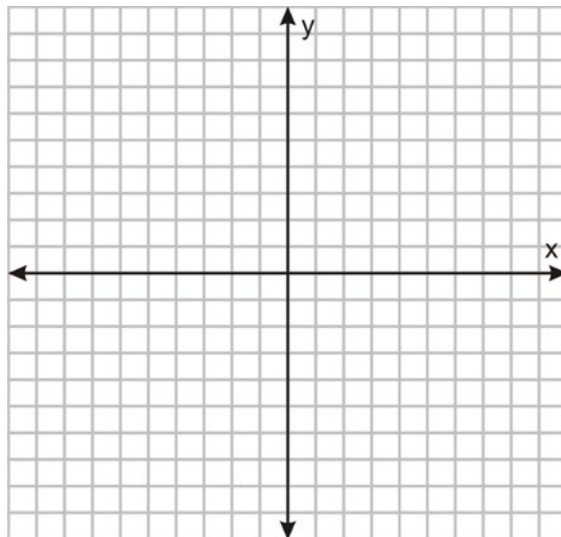
1. The sea lion population in a harbor is 85 and decreasing by 3% each year. Fill in the chart for the population after the given amount of time (t). Use your data set to graph the exponential decay.

t (x)	y
1	
3	
5	
7	



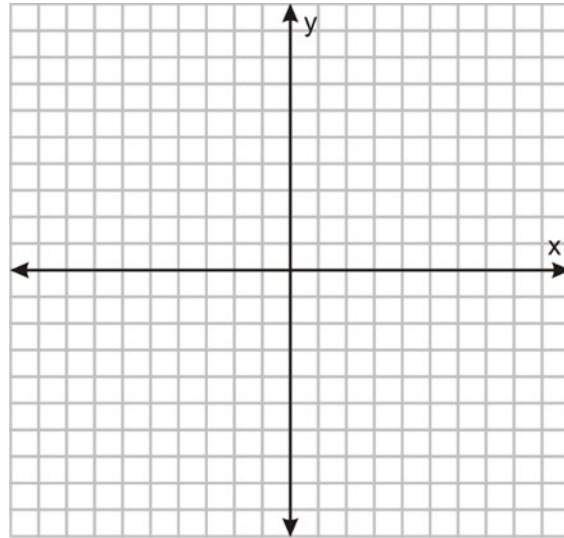
2. A small town, population 57, just had a large company open a new facility. After the grand opening the company said they plan to expand their workforce by 7% each year. Graph the growth after the given number of years.

t (x)	y
2	
4	
6	
8	
10	



3. The price of Honeycrisp Apples has been increasing steadily each year by 7%. If the price per pound in 2010 was \$1.27 find the price for each year after.

t (x)	y
2012	
2014	
2016	
2018	
2020	



4. What observations are you able to make from looking at your 3 graphs representing exponential functions?

5. Write you own exponential growth or decay story line. Include all the necessary information. Write a function, chart it and graph it.

Information:

Function: _____

Chart:

t (x)	y

