7.3 Percent Change

ALGEBRA 2

Write your questions here!

Percent Change:

Start with "*a*" amount and grow or decay with a % increase. Convert to decimals!

$$F(x) = a(1 \pm \% \text{ change})^x$$

Growth if BASE > 1

Decay if BASE < 1

For each problem, create a function that models each scenario.

Ex 1. A Lego set is worth $100 and increases by 23% per year.	Ex 2. A home is worth $200,000 and increases by 1.5% per year.	Ex 3. Mr. Bean's pants are currently 25 inches long. Each week, they decrease in length by 0.5%.

For each equation, identify the initial value and the % change.

Ex 4. $y = -6(1.516)^x$	Ex 5. $y = 8(0.912)^x$
Initial Value: _____ % Change : _____	Initial Value: _____ % Change: _____

Given the following table of values, create an equation that fits these points.

Ex 6.

x	0	1	2	3
$F(x)$	150	153.75	157.59	161.53

Ex 7.

x	0	1	2	3
$F(x)$	6	5.1	4.335	3.68475

Initial Value: _____ % Change : _____

Function:_____

Initial Value: _____ % Change : _____

Function:_____

Ex 6. Sully needs some cash! He decides to start a mobile phone service called Sullular Express. His first month, he sold 190 cell phones! ***Boom***! Since then, he has observed a 3.5% growth in sales each month.

Find how many cell phones Sully sold 6 months after the month he sold 190.

If the growth continues, which month will Sully first sell more than 1000 cell phones per month.

Ex 7. The enrollment at the University of Mathechusettes is currently 12,500 and increases at a rate of 2.25% each year. The population can be modelled by a function of the form $F(x) = ab^x$, where x represents the number of years since 2012.

What are the values of a and b?

Describe what the value of the x intercept represents.

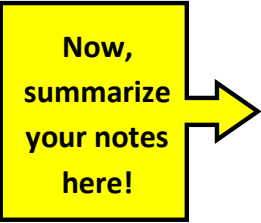Describe what the value of the y-intercept represents.

Ex 8. Mr. Brust purchases a new fancy car, a Mercedes-Beanz! He knows the value of the car will depreciate each year by 12.25%. After 5 years, the car is worth about $3400.

Find the initial value of the car.

When is the car going to be worth 20% of its initial value?

SUMMARY:

Now, summarize your notes here!

7.3 Percent Change

For each equation, identify the initial value (I.V.) and the percent change.

1. $f(x) = 7(0.65)^x$	2. $f(x) = 0.2(4.505)^x$	3. $f(x) = 0.79(1.4)^x$	4. $f(x) = 304(0.7)^x$
I.V. _____	I.V. _____	I.V. _____	I.V. _____
% change: _____	% change: _____	% change: _____	% change: _____
5. $f(x) = 4.3(0.248)^x$	6. $f(x) = 42(1.752)^x$	7. $f(x) = 90(1.85)^x$	8. $f(x) = 0.728(0.983)^x$
I.V. _____	I.V. _____	I.V. _____	I.V. _____
% change: _____	% change: _____	% change: _____	% change: _____

Exponential Modeling: Identifying Multipliers Many ways of changing a number can be accomplished through a single multiplication. Fill in this chart with the multiplier that would accomplish each of the described changes. Three examples are shown to get you started.

If you want to make this change to a number….	then you should multiply by…..	If you want to make this change to a number….	then you should multiply by…..
increase by 6%	1.06	double it	
decrease by 6%		triple it	
increase by 20%		quadruple	
decrease by 20%		half as much	
increase by 7.89%		increase by $\frac{1}{4}$ of the original number	
decrease by 7.89%	0.9211	decrease by $\frac{1}{4}$ of the original number	
increase by 0.015%		increase by $\frac{2}{3}$ of the original number	1.67
decrease by 0.015%		decrease by $\frac{2}{3}$ of the original number	
	2.521		0.1
	0.521		1.5

9. a. You purchase a Mr. Sullivan Algebro rookie trading card for $12.50. Three years later, its value is $13.07. Create an exponential model that represents the value of the trading card.

   b. Find the value of the card in ten years.

   c. In how many years will the value of the card be $100?

10. Mr. Brust bought an authenticated antique Ikkey-Shuffle football for $500 in 2015. At the time of purchase, an appraiser estimated that the value would increase by 10% per year.

   a.   Select all of the following statements that are true:

   A.   The value will increase by $50 in the first year.
   B.   After 2years the value will be $605.
   C.   The value will increase 30% in the first 3 years.
   D.   The rate of change of the value will decrease over time.
   E.   A linear model provides the best fit of the estimated values.

   b.   Create a function, $F(x)$, that models the value of the football over time. Tell what $F(7)$ represents.

   c.   Estimate the value of the football in the year 2025 to the nearest dollar.

REVIEW…..Solve each equation. Check for extraneous solutions.	
11. $$8 = \frac{5}{3x - 5}$$	12. $$\frac{6}{a - 3} = \frac{5}{a^2 - 3a} + \frac{1}{a - 3}$$
13. $\sqrt[3]{11k - 1} = \sqrt[3]{10k}$	14) $\sqrt{6 - a} = a$

11. The cost of goods and services in a particular city increased by 1.5% last month. If this rate continues, what will be the annual rate of increase?

12. Mr. Brust is diagnosed with Dysania and prescribed medication. When the drug enters the blood stream, it gradually dilutes, decreasing exponentially. He takes a 200 mg dose at 5:00 am, and by 8:00 am, there is 150 mg remaining.

   a. If the drug is only effective with at least 65 mg in the blood stream, about what time should he take another dose?

   b. Assuming he doesn't take another dose after 5:00 am, how much would be left in his blood stream after 10 days?

13. Mr. Bean likes making new friends, but unfortunately, he tends to make more enemies. Before the start of the school year, he only had 5 enemies. Each week of school, the number of enemies that he has increases by 10%.

   a. What are the variables in this problem situation? $x =$ _____ $F(x) =$ _____

   b. Write an exponential equation that relates x and $f(x)$, using the given information.

   c. How many enemies did Bean have at the end of the first semester (20 weeks)? The end of the school year (40 weeks)?

7.3 Percent Change   WRAP UP

1. Sully buys a new gold chain to accentuate his neckline. Luckily, the value increases by 1.45% each year. After 4 years, the value is about $84. How much did Sully purchase the gold chain for?

2. Find the percent change: $f(x) = 7.2(5.015)^x$

3.   When Brust is ready to retire, he has plans of moving to New York City to become a Grill Sargent. In fact, he wants to open his own Deli, "The New York Metzgerei," where he can sell his signature product: **Brustwurst**! Brust cooks the meat and then lets it cool while recording the temperature during the cooking process. One day, he observes the following temperatures when he takes a Brustwurst of the grill:

Time (min)	10	14	20	22	26	30	36	40	42	44
Temperature (degrees above room temp in F)	61	47	30	26	21	17	11	8	6	5

a. Plot the data in your calculator. If you need help, watch the calculator video under the 7.3 lesson video.

b. Transfer the graph from your calculator to the graph on the right. Be sure to label the axes.

c. Find the equation of an exponential model using your ExpReg function of your calculator. If you need help, watch the calculator video under the 7.3 lesson video.

_____

Diff from Room Temp (°F)

10°

0°

10
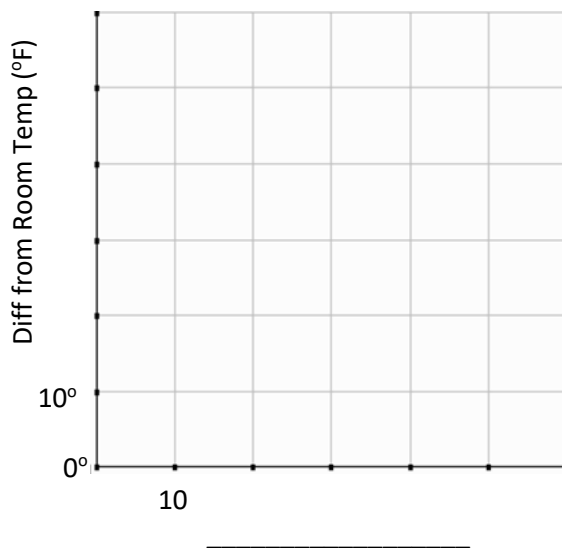
d. How hot was the **Brustwurst** when it came off of the grill if his kitchen is 80°F?

e. According to the model, when will the **Brustwurst** be room temperature? Is this realistic?

EXIT TICKET –

If the price of KTown Basketball tickets increases at 8% per year, about how long will it take to double the price?