

Name: _____ Algebra 10 Unit 6 Lesson 3

Exponential Growth and Decay

DO NOW ~ Monday 9/23

Simplify.

$$(2a^4)^4 \cdot a^3$$

$$(2a^4)(2a^4)(2a^4)(2a^4)(1 \cdot a^3)$$



$$16 \cdot a^{19}$$

Classwork

Exponential Growth

After creating your Instagram account, the first week you have two new followers. Every week, the number of followers you have doubles. How many followers will you have after 2 weeks? 5 weeks? 8 weeks?

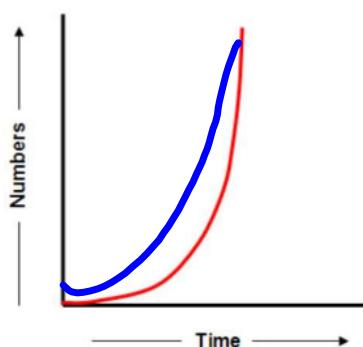
① week: 2

② week: 4

⑤ week: 32

⑧ week: 256

Exponential Growth: The number of friends is increasing at exponential rate over time.



Continue onto next page.

Exponential Decay

After buying your car for \$18,000, the value decreases by 15% each year. What will the value of your car be after 2 years? 5 years? 8 years?

$$y = a \cdot b^x$$

$$y = 18000(1 - .15)^2$$

$$y = 13005$$

$$y = a \cdot b^x$$

$$y = 18000(1 - .15)^5$$

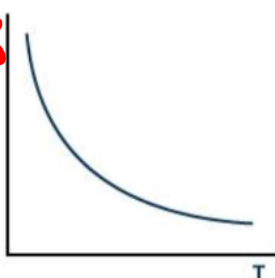
$$y = 7986.70$$

Exponential decay: The car value is decreasing at exponential rate over time.

$$y = a \cdot b^x$$

$$y = 18000(1 - .15)^8$$

$$y = 4904.83$$



Important FORMULA:

Answer $\rightarrow y = a \cdot b^x$

rate $\rightarrow$ (points to b)

time $\rightarrow$ (points to x)

Starting Amount $\rightarrow$ (points to a)

Growth:

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

Decay:

$$y = a(1 - r)^x$$

a = initial **amount** before measuring growth/decay

r = growth/decay **rate** (often a percent)

x = number of **time** intervals that have passed

Growth or Decay?

$$y = 3\left(\frac{1}{4}\right)^x$$

$$y = 4\left(\frac{5}{2}\right)^x$$

$$y = 8\left(\frac{2}{3}\right)^x$$

$$y = 0.5\left(\frac{3}{2}\right)^x$$

Decay

Growth

Decay

Growth

DO NOW ~ Tuesday 9/24

Identify whether the following equation is exponential growth or decay and how do you know?

$$f(x) = 125(1.5)^x$$

Growth



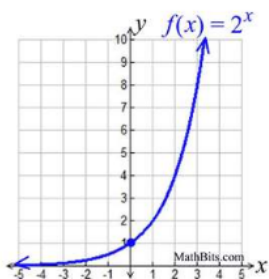
Classwork

You bought a sculpture for \$380. It increases in value by 8% each year. What is the value after two years?

$$y = a \cdot b^x$$
$$y = 380 \cdot (1 + .08)^2$$
$$y = 443.23$$

DO NOW ~ Wednesday 9/25

Identify whether the following graph is exponential growth or decay?



Growth



Classwork

A new car cost \$20,000. The value decreases 16% every year. What is the value after 8 years?

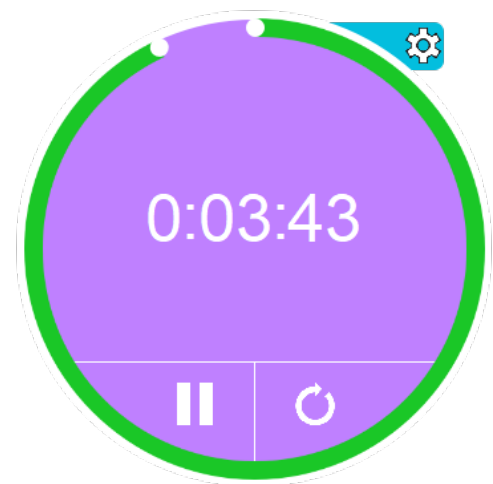
$$y = a \cdot b^x$$

$$y = 20000(1 - .16)^8$$

$$y = 4957.52$$

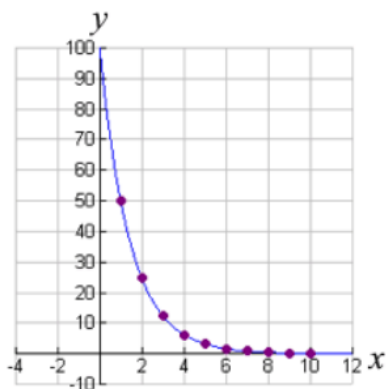
To earn your full participation point for the Do Now be sure to have completed all of the following by the time is up:

- 1) Be in your seat
- 2) Take out your calculator
- 3) Have last night's homework out
- 4) Complete the do now



DO NOW ~ Thursday 9/26

Identify whether the following graph is exponential growth or decay.



Decay



Classwork

A house originally cost \$120,000. The value increased 5% a year to 1995. What is the value after 25 years?

$$y = a \cdot b^x$$

$$y = 120,000(1 + 0.05)^{25}$$

$$y = 406,363.59$$

Mrs. Ferreri's Station ~ Exponential Growth and Decay

An element with mass 570 grams decays by 18% per minute. How much of the element is remaining after 13 minutes, *to the nearest 10th of a gram*?

3600 dollars is placed in an account with an annual interest rate of 9%. How much will be in the account after 25 years, *to the nearest cent*?

A new car is purchased for 18000 dollars. The value of the car depreciates at 13.5% per year. What will the value of the car be, *to the nearest cent*, after 14 years?

A town has a population of 7000 and grows at 4% every year. What will be the population after 13 years, *to the nearest whole number*?

Continue onto the next page.

An element with mass 590 grams decays by 19.5% per minute. How much of the element is remaining after 15 minutes, *to the nearest 10th of a gram*?

A town has a population of 14000 and grows at 3% every year. What will be the population after 14 years, to the nearest whole number?

An element with mass 910 grams decays by 16.6% per minute. How much of the element is remaining after 20 minutes, *to the nearest 10th of a gram*?

A town has a population of 17000 and grows at 4% every year. What will be the population after 5 years, to the nearest whole number?

Computer Station ~ Delta Math

If you were absent follow the directions below to log into Google Classroom and Delta Math.

1) Log into the computer and go to Google Classroom. Join the Algebra 10 class by entering the code: **u6kkzec**

2) Click on the Delta Math link. Click "Create Account" and then "Student" by entering the teacher code: **654562** Complete the assignment.

Log into Delta Math, complete the "Mixed Exponents" assignment.

Mrs. Kennedy's Station ~ Exponential Growth and Decay

6700 dollars is placed in an account with an annual interest rate of 8%. How much will be in the account after 24 years, *to the nearest cent*?

How about after 55 years?

An element with mass 970 grams decays by 27.7% per minute. How much of the element is remaining after 13 minutes, *to the nearest 10th of a gram*?

How about after just 2 minutes?

A new car is purchased for 19900 dollars. The value of the car depreciates at 7.5% per year. What will the value of the car be, *to the nearest cent*, after 8 years?

How about after 9 years?

2200 dollars is placed in an account with an annual interest rate of 7.25%. How much will be in the account after 29 years, *to the nearest cent*?

How about after just 2 years?

Continue onto the next page.

A town has a population of 17000 and grows at 3% every year. What will be the population after 10 years, to the nearest whole number?

How about after 15 years?

A new car is purchased for 21100 dollars. The value of the car depreciates at 10.5% per year. What will the value of the car be, *to the nearest cent*, after 6 years?

How about after 8 years?

An element with mass 210 grams decays by 8.3% per minute. How much of the element is remaining after 15 minutes, *to the nearest 10th of a gram*?

How about after just 5 minutes?

6400 dollars is placed in an account with an annual interest rate of 6.25%. How much will be in the account after 20 years, *to the nearest cent*?

How about after 8 years?

Independent Station ~ Rolling Review

- Partner A rolls the two dice. Find the two squares on the board which correspond to the numbers on the dice. For example, a (3, 1) would correspond to the following problems:

Column 3, Row 1 for Partner A

Column 1, Row 3 for Partner B

- Player A and B should get the same answer. If not, they work together to identify any mistakes. I always have them mark the board with the answer so they know which problems have been completed.

The Game board is on the next page.

PARTNER A: _____

PARTNER B

	1	2	3	4	5	6
1	$4x \cdot 14x^6$ $8x^3 \cdot 7x^4$	$\frac{(6k^5)^2 \cdot 5k^3}{12k^{12}}$	$(2ab)^3 \cdot 10a^3b^5$	$\frac{15m^5n^5 \cdot 3n^2}{5mn}$	$(2x^2y)^6 \cdot 3xy^9$	$\frac{(4m^3n^5)^4}{(2m^2n^2)^3}$
2	$\frac{10k^3 \cdot 9k^2}{6k^4}$	$\frac{18n^9}{2n^4}$ $\frac{72n^7}{8n^2}$	$\frac{(10xy)^2}{20x^2y}$	$(8c^4d^2)^2 \cdot (2c^3d)^2$	$\frac{(14a^9b^3)^2}{4a^{13}b^6}$	$\frac{15j^5k^2 \cdot 25j^2k^9}{(5jk)^3}$
3	$(4a^3b)^2 \cdot 5b^6$	$\frac{135x^6y^4}{(3x^2y)^3}$	$2a^3 \cdot 10a^7$ $4a^5 \cdot 5a^5$	$\frac{(6p^3q^2) \cdot (3pq^2)^4}{9p^5q^9}$	$\frac{12n^8 \cdot 5n^5}{4n^{11}}$	$5a^8b \cdot (3ab^5)^3$
4	$\frac{(6m^3n^5)^4}{(12m^4n^7)^2}$	$(16c^2d)^2 \cdot c^{10}d^4$	$\frac{(9p^3q^2)^2 \cdot 2p^8q^2}{3p^{12}q^5}$	$(2y^2)^3$ $8y \cdot y^5$	$\frac{(8x^2y^4)^3}{32xy^6 \cdot 2xy}$	$\frac{14x^5y^2 \cdot 5x^9y^7}{10x^{12}y^9}$
5	$(2xy)^5 \cdot 6x^8y^{10}$	$\frac{(7a^8b^6)^2}{a^{11}b^{12}}$	$\frac{(3n^3)^3 \cdot 5n^2}{9n^9}$	$\frac{(2x^2y)^7}{(4x^5y)^2}$	$25m^9 \cdot 4m^3$ $(10m^6)^2$	$(3ab^5)^2 \cdot 12b^7$
6	$\frac{(4m^4n^3)^2 \cdot 14m^3n^{12}}{7m^5n^4}$	$\frac{(3j^4k^2)^5}{(9j^8k)^2}$	$15a^9b^{12} \cdot (3ab^2)^2$	$\frac{9x^{11}y^3 \cdot 28xy^3}{(6x^5y^3)^2}$	$18ab^3 \cdot 6ab^{14}$	$(2x^3)^2 \cdot x^3$ $\frac{68x^{10}}{17x}$

Homework ~ Monday 9/23

A new car is purchased for 16500 dollars. The value of the car depreciates at 5.75% per year. What will the value of the car be, *to the nearest cent*, after 5 years?

3400 dollars is placed in an account with an annual interest rate of 8.25%. How much will be in the account after 25 years, *to the nearest cent*?

Homework ~ Tuesday 9/24

A town has a population of 2000 and grows at 4% every year. What will be the population after 15 years, *to the nearest whole number*?

A new car is purchased for 23200 dollars. The value of the car depreciates at 13.25% per year. What will the value of the car be, *to the nearest cent*, after 7 years?

Homework ~ Wednesday 9/25

A town has a population of 13000 and grows at 5% every year. What will be the population after 11 years, to the nearest whole number?

8300 dollars is placed in an account with an annual interest rate of 6.5%. How much will be in the account after 14 years, *to the nearest cent*?

Homework ~ Thursday 9/26

A town has a population of 13000 and grows at 4.5% every year. What will be the population after 13 years, to the nearest whole number?

An element with mass 210 grams decays by 8.3% per minute. How much of the element is remaining after 15 minutes, *to the nearest 10th of a gram*?