

Warm Up

3/28/19

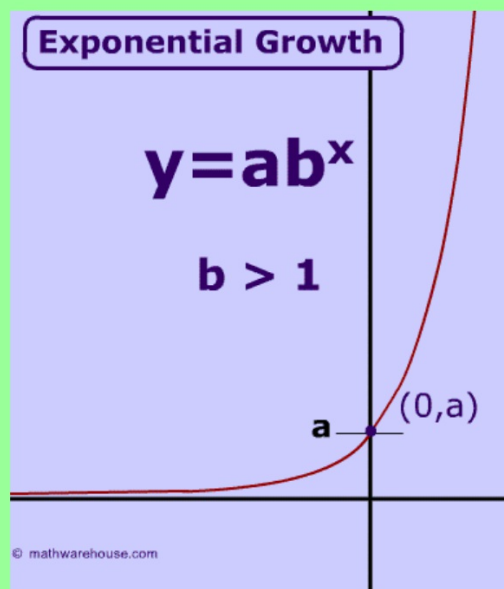
PICK UP ON THE STOOL

- 1.) Two functions are shown: $f(x) = 1/2(2)^x$
 $g(x) = 5x + 2$

What is the largest integer value of x such that $f(x) \leq g(x)$?

- 2.) The width of a rectangle is $3/4$ its length. The perimeter of the rectangle is 420 ft. What is the length, in feet, of the rectangle?

Exponential Growth



Exponential Growth

Occurs when a quantity increases by the same rate over time.

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

a = initial value

r = rate

t = time

Examples:

1. The original value of an investment is \$1400 and the value increases by 9% each year. Write an exponential growth function to model this situation. Then, find the value of the investment after 25 years.

t

a

r

Step 1: Identify a , r , and t .

$$A = \$1400$$

$$R \text{ (percent to decimal)} = 9\% \rightarrow 0.09$$

$$T = 25$$

Step 2: Plug values into formula $y = a(1 + r)^t$.

$$y = 1400(1.09)^{25}$$

Step 3: Solve for y .

$$\$12,072.31$$

The cost of tuition at a college is $\overset{a}{\$12,000}$ and is increasing at a rate of 6% each year. Write an exponential growth function to model this situation. Then, find the tuition cost after 4 years.

Step 1: Identify a, r, and t.

$$A = \$12,000$$

$$R \text{ (percent to decimal)} = 6\% \rightarrow 0.06$$

$$T = 4$$

Step 2: Plug values into formula $y = a(1 + r)^t$.

$$y = 12000(1.06)^4$$

Step 3: Solve for y.

$$\boxed{\$15,149.72}$$

3. The number of student athletes at a local high school is 300 and is increasing at a rate of 8% per year. Write an exponential growth function to model this situation. Then, find the number of student athletes after 5 years.

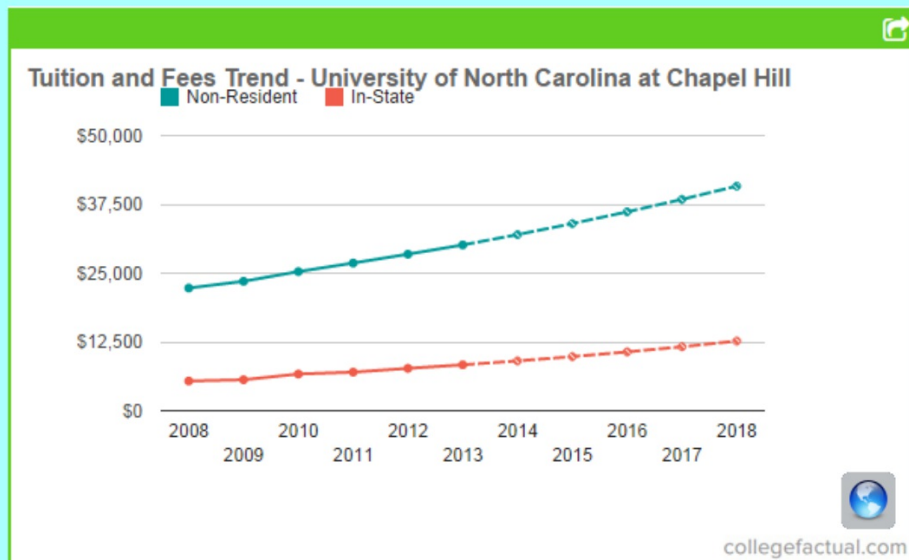
$$y = 300(1.08)^5$$

440.8

440 athletes

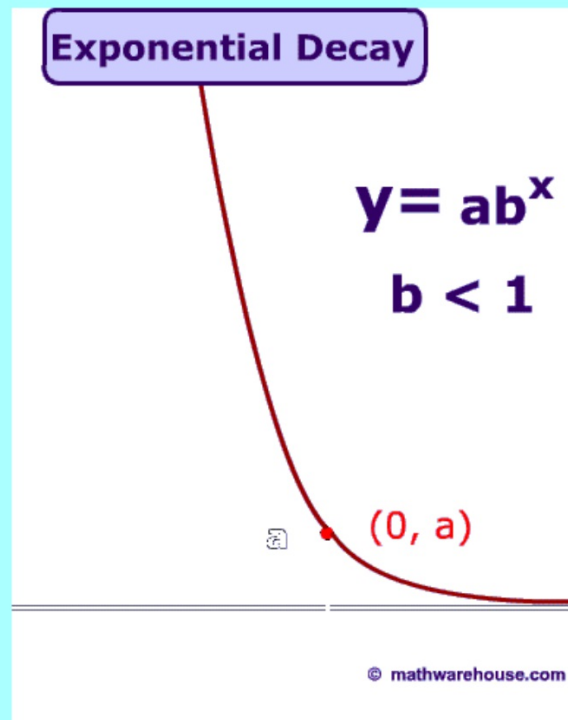
Real World Model

The cost to attend the University of North Carolina at Chapel Hill increases on average 6.5% per year.



Costs from 2008 - 2018

Exponential Decay



Exponential Decay

Occurs when a quantity decreases by the same rate over time.

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

a = initial value

r = rate

t = time

Key Words:

Decreasing, depreciates, loses

less than 1

7. The population of a town is decreasing at a rate of 1% per year. In 2000 there were 1300 people. Write an exponential decay function to model this situation. Then, find the population in 2008.

Step 1: Identify a, r, and t.

$$A = 1300$$

$$R \text{ (percents to decimals)} = 1\% \Rightarrow 0.01$$

$$T = 8$$

Step 2: Plug values into formula-- $y = a(1 - r)^t$

$$y = 1300(1 - 0.01)^8$$
$$1300(0.99)^8$$

Step 3: Solve for y.

$$1199 \text{ people}$$

8. The value of a car is $\overset{a}{\$18,000}$ and $\overset{r}{\text{depreciating}}$ at a rate of 12% per year. Write an exponential decay function to model this situation. Then, find the value of the car after $\overset{t}{10}$ years.

Step 1: Identify a, r, and t.

$$A = \$18,000$$

$$R \text{ (percents to decimals)} = 0.12$$

$$T = 10$$

Step 2: Plug values into formula-- $y = a(1 - r)^t$

$$y = 18000(0.88)^{10}$$

Step 3: Solve for y

$$\boxed{\$5013.02}$$

9. A farmer buys a tractor for \$50,000. If the tractor depreciates 10% per year, write an exponential decay function to find the value of the tractor in 7 years.

$$y = 50,000(0.9)^7$$

$$\text{\$ } 23,914.85$$