

Warm Up

February 6, 2019

1.) What is the value of y in the system of equations shown below?

$$y = 1 - (-3)$$

$$y = 4$$

$$5x + 4y = 1$$

$$y = 1 - x$$

$$5x + 4(1-x) = 1$$

$$5x + 4 - 4x = 1$$

$$x + 4 = 1$$

$$x = -3$$

2.) A function is shown below.

$$g(x) = 19.60 + 1.74x$$

What is the value of $g(30)$?

$$19.60 + 1.74(30)$$

$$g(30) = 71.8$$

3.) Find the explicit and recursive formulas for the sequence: 256, 64, 16, ...

$$\begin{array}{c} \cup \quad \cup \\ \cdot \frac{1}{4} \quad \cdot \frac{1}{4} \end{array}$$

explicit

$$a_n = a_1 \cdot r^{n-1}$$

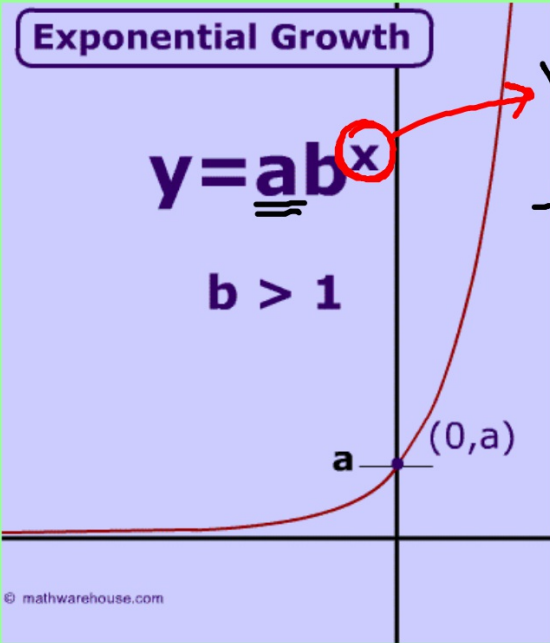
$$a_n = 256 \cdot \left(\frac{1}{4}\right)^{n-1}$$

recursive

$$a_n = a_{n-1} \cdot r$$

$$a_n = a_{n-1} \cdot \frac{1}{4}$$

Exponential Growth



where
"x" is
the exponent!

Exponential Growth

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

Key Words

increases
doubles

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

a = initial value

r = rate(as a decimal)

t = time

$1 + r =$ growth factor

HOW MANY TIMES
CAN YOU FOLD
A PIECE OF PAPER?



greater
than 1

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.

$$t = 25$$

Step 1: Identify a, r, and t.

$$A = 1400$$

$$R \text{ (percents to decimals)} = 9\%$$

$$T = 25$$

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

$$y = 1400(1 + 0.09)^t$$

$$y = 1400(1.09)^t$$

growth factor

Step 3: Solve for y.

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

$$y = \$12,072.32$$

The cost of tuition at a college is \$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 .

$$A = 12,000$$

$$R \text{ (percents to decimals)} = 6\%$$

$$T = 4$$

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

$$y = 12000(1 + 0.06)^t$$

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

growth factor

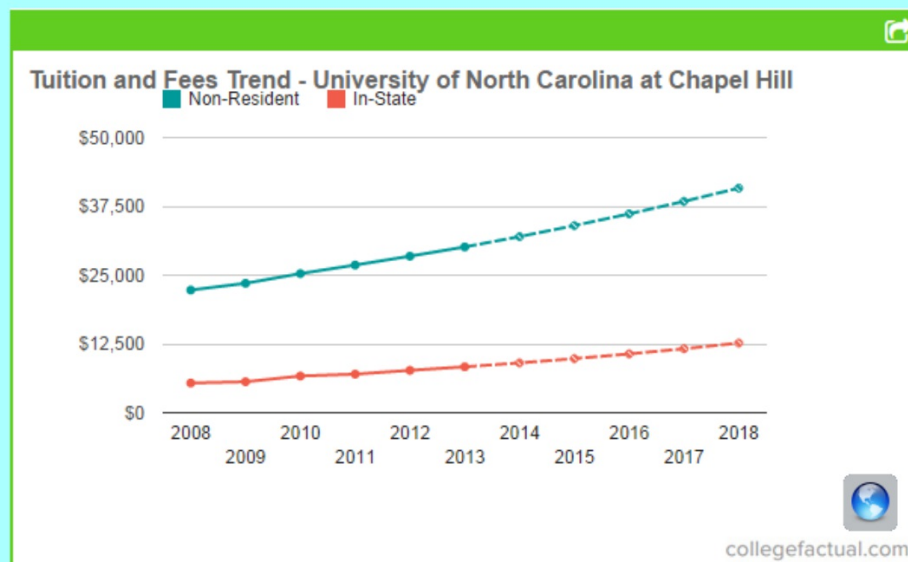
Step 3: Solve for y .

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

$$y = \$15,149.72$$

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

Zombie Takeover

<https://www.youtube.com/watch?v=F5h7t71G0VE>

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.

$$t=5$$

Step 1: Identify a , r , and t .

$$A = 300$$

$$R \text{ (percents to decimals)} = 8\%$$

$$T = 5$$

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

$$y = 300(1 + 0.08)^t$$

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

growth factor

Step 3: Solve for y .

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

$$y = 440.8$$

441 student athletes

You Try:

4. Annual sales for a company are \$149,999 and are increasing at a rate of 6% per year. Write an exponential growth function to model this situation. Then, find the annual sales after 7 years.

$$149,999(1.06)^7$$
$$\$225,543.04$$

5. The population of a small town is 1600 and is increasing at a rate of 3% per year. Write an exponential function to model this situation. Then, find the population of the town after 10 years.

$$1600(1.03)^{10}$$

about 2150 people

6. In 1985, there were 285 cell phone subscribers in Mayville. The number of subscribers increased by 75% per year after 1985. How many subscribers were in Mayville in 2008?

t = years since 1985 \rightarrow t = 23

$$\begin{array}{r} 2008 \\ - 1985 \\ \hline 23 \end{array}$$

$$y = 285(1.75)^{23}$$
$$= 285(1.75)^{23}$$
$$= 110,845,988.3$$

= 110,845,988 subscribers

Classwork:
Complete Exponential Growth WS #1-14

Not in order!

Answer Options

Not in order!

$$y = 270$$

$$y = \$4241.01$$

$$y = \$1461.64$$

$$y = 924; y = 8838; y = 1.716 \times 10^{13}$$

$$y = \$9421.83; y = \$16,968.18$$

$$y = \$1264.30$$

$$y = 188.96; y = 13382588.45; y = 7.69 \times 10^{43}$$

$$y = \$3517.88$$

$$x = 15; x = 20-25; x = 35$$

$$y = \$232810.20$$

$$y = \$53.76$$

$$y = \$888.15$$

$$y = \$1519.38$$

$$y = \$424.36$$