

1. Hamster Zombies have invaded Sacramento! Currently there are 120,000 Zombie Hamster in Sacramento. The Governor has considered THREE different Zombie Hamster removal companies.
 - **HAMSTER BUSTERS.** If hired, the hamster population will be $f(t) = 120000(0.94)^t$ where "t" is time in year.
 - **BILL AND ERNIE'S HAMSTER REMOVAL.** If hired, the hamster population will be $f(t) = 120000(0.96)^{2t}$ where "t" is time in year.
 - **BACK THAT HAMSTER UP.** If hired, the hamster population will be $f(t) = 120000(0.989)^{6t}$ where "t" is time in year.

Given the options above, answer the following questions.

 - a. Which company would remove the most Zombie Hamster in the first three years? Show your work. Back your answer up mathematically.
 - b. Which company's DECAY/DECREASE more than 5% of the hamster population per year? Show your work. Back your answer up mathematically
2. On March 30th, 2010, the magazine "Abigail's Adventures" had 10,400 subscribers. On March 30th, 2014, the magazine had 26,200 subscribers. Assume growth is exponential. Given that information, answer the following....
 - a. What was the percent increase over the time period above?
 - b. What is the YEARLY percent increase (assume the increase is the same every year.)
 - c. Write a formula for number of subscribers with respect to time in years.
 - d. Use the formula to estimate the number of subscribers in 2012.
 - e. Use the formula to predict the number of subscribers in 2018.

3. FOUR Hamster acrobats are launched from a platform of different heights, each following different trajectories.

HAMSTER ONE: “The Flying Fuzzball” travels a trajectory of $h(t) = -\frac{1}{2}(t-5)^2 + 75$ where $h(t)$ is height in feet and “ t ” is time in seconds.

HAMSTER TWO: “The Squeaking Scorcher” travels a trajectory of $h(t) = -0.5(t-20)(t+5)$ where $h(t)$ is height in feet and “ t ” is time in seconds.

HAMSTER THREE: “The Wiggling Wonder” travels a trajectory of

t	$h(t)$
0	65
2	73
4	65
6	53

where $h(t)$ is height in feet and “ t ” is time in seconds.

HAMSTER FOUR: “AL” Started 42 feet in the air and jumped to a MAX height of 56 feet from the ground. It took him 3 seconds to reach the max height.

Answer the following questions about the FOUR hamsters below....

a. *What Hamster started the highest from the ground? Justify your work mathematically.*

b. *What Hamster reached their highest height the fastest? Justify your work mathematically.*

c. *What Hamster reached the highest height? Justify your work mathematically.*

4. It's a HAMSTER RACE! Three hamsters line up at the starting line. The first hamster to go 15 meters, wins. Below are the functions of the hamster's distance $d(t)$ in meters with respect to time in seconds. You may use DESMOS to aid you in your calculations/solutions.

HAMSTER ONE: $d(t) = 3t$

HAMSTER TWO: $d(t) = t^2$

HAMSTER THREE: $d(t) = 2^t - 1$

a. What Hamster is winning the race after 1 second? Justify your work mathematically.

b. What Hamster is winning the race after 3 seconds? Justify your work mathematically.

c. List the winners of the race in order... Justify your work mathematically.

FIRST PLACE: _____

SECOND PLACE: _____

THIRD PLACE: _____