|  |
| --- |
| Exponential relations are modelled by the exponential equation \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, where**KEY WORDS**y = abxinitialgrowth/decaygrowthdecay*a* is the \_\_\_\_\_\_\_\_\_\_\_\_\_ amount*b* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ factorReal-world applications of exponentialgrowth or decay may require solving the equation for *x**b* > 1 models \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_0 < *b* < 1 models \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

***EXAMPLE 1***: ***Guess & Check***

A city’s population can be modelled by the equation $P=1.4(1.0415)^{t}$, where *P* represents the population in millions *t* years after 1985. In which year did the population first exceed 3 million?

![C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\5AABLPBI\MC900188477[1].wmf]()Beginning population: \_\_\_\_\_\_million Ending population: \_\_\_\_\_\_ million

Population is growing at a rate of: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Rate = Growth Factor - 1*

Sub in the info given:

Simplify:

Use a ***TABLE OF VALUES*** to ***GUESS & CHECK*** a solution *Simply try random t values.*

***TWO SPECIAL EXPONENTIAL GROWTH & DECAY EQUATIONS***

$$A=A\_{0}(2)^{^{t}/\_{d}}$$

$$A=A\_{0}(0.5)^{^{t}/\_{h}}$$

**DOUBLING: HALF-LIFE:**

![C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\5AABLPBI\MC900060304[1].wmf]()Initial Amount Initial Amount

Final Amount Final Amount

time (measured or calculated) time (measured or calculated)

time it takes to double time needed to reduce initial amount by half.

***EXAMPLE 3: Solving an Application Involving Doubling Time***

A bacteria culture doubles in size approximately every 14 hours. Suppose this bacteria culture started with 100 individual bacteria. How long will it take for the bacteria population to reach 1000 individuals? Give your answer to one decimal place.

***EXAMPLE 4: Solving Applications Involving Half-Life***

![C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\QK3E7K61\MC900239561[1].wmf]()Caffeine has a half-life of approximately 5 hours. Suppose you drink a cup of coffee that contains 200 mg of caffeine. How long will it take until there is less than 10 mg of caffeine left in your bloodstream?