Finding the time

Method 1: Trial and Error

Method 2: Calculator "log"

Using your calculator to find time...

Find the **log** button: it's the inverse of exponential... working backwards

To find an exponent

Example: $2^3=8$

On the calculator $\frac{\log 8}{\log 2} =$

$$y = \text{start} * \text{keep}^{\text{time}}$$

isolate: keep $^{\text{time}}$

$$\frac{y}{\text{start}} = \text{keep}^{\text{time}}$$

$$\text{time} = \frac{\log\left(\frac{y}{\text{start}}\right)}{\log \text{keep}}$$

Finding the time with the calculator

How many years before an investment of 2000 with an annual appreciation of 5% reaches $4365.75

Rule for time

$$\text{time} = \frac{\log\left(\frac{y}{\text{start}}\right)}{\log \text{keep}}$$

time= log(y/start)/log(keep)

time= $\dfrac{\log(\quad)}{\log(\quad)}$

time=

Ex . Farah purchased a new car five years ago for $25 000 and the car has depreciated in value by 15% per year. She would like to sell the car today in order to purchase a used vehicle for $10 000. The used car she is intending to purchase is anticipated to retain 90% of its previous year's value each year.

If Farah intends to sell the used car when it is worth $6561, how long will she own it for?

Ex. If the population of rabbits doubles every 4 months, when will there be 8192 rabbits if there were only 2 rabbits at the beginning?

Ex. A community of 90 penguins increases in population by 4% per year. When will there be a population of 144 penguins?

Ex. Jim bought a cottage a few years ago. He has been analyzing the water in the well every year.

$$f(x) = 16\,(1.5)^{x}$$

In 2012, there were 54 bacteria. In what year will there be more than 615 bacteria for the first time?

Ex. Linda and Donny each win a lottery

Linda wins 5000 and invests it at 5% interest. Donny wins 4000 and invests it at 10 % interest

When will Donny have the same amount as Linda ?

The times will match and so will the y's

$$5000(1.05)^{time} = 4000\ (1.10)^{time}$$

$$time = \frac{\log\left(\frac{y}{start}\right)}{\log keep}$$

The time when they will be the same:

time = log (start a/start b)/log (keep b/keep a)

Donny's	Linda's
start =	start=
keep =	keep =

$$\text{Time} = \frac{\log(\text{Donny's Start}/\text{Linda's start})}{\log(\text{Linda's keep}/\text{Donny's keep})}$$

3. A lab technician notes that the number of type A bacteria doubles every hour whereas the number of type B bacteria triples every hour. At the outset there are 1000 of type A bacteria and 500 of type B bacteria. Which of the two bacteria will be more numerous after five hours?