

Exponential Growth and Decay

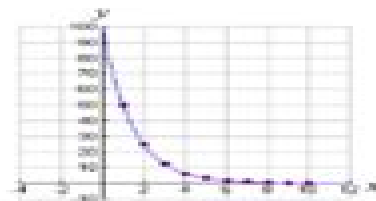
Observe how the graphs of exponential functions change based upon the values of a and b :

$$y = a \cdot b^x$$

Example: $y = 100 \cdot (0.5)^x$

when $a > 0$ and the b is between 0 and 1, the graph will be decreasing (decaying).

For this example, each time x is increased by 1, y decreases to one half of its previous value.



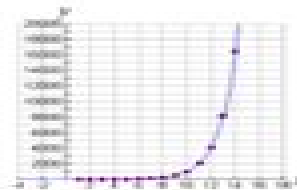
Such a situation is called **Exponential Decay**.

$$y = a \cdot b^x$$

Example: $y = 1 \cdot (2)^x$

when $a > 0$ and the b is greater than 1, the graph will be increasing (growing).

For this example, each time x is increased by 1, y increases by a factor of 2.



Such a situation is called **Exponential Growth**.

When a quantity grows by a fixed percent at regular intervals, the pattern can be represented by the functions,

Growth:

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

Decay:

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

a = initial **amount** before measuring growth/decay
 r = growth/decay **rate** (often a percent)
 x = number of **time** intervals that have passed

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Xiaolong Qi



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