All problems on growth & decay - full name 'exponential growth & decay' use the formula below, where the time variable 'n' is in the index.

$$A = A_o\left(1 \pm \frac{r}{100}\right)^n$$

A_o - initial amount

A - new amount

r - % change

n - time(seconds, hours, days etc.)

$\pm$ - '+' for growth, '-' for decay

Example #1 - £5000 is invested in a savings bond, which pays 7% p.a.

How much will the bond be worth after 5 years?

$$A = A_o\left(1 + \frac{r}{100}\right)^n$$

A_o - £5000

A - new amount

r - 7%

n - 5 years

$\pm$ - '+' for growth

$$A = 5000\left(1 + \frac{7}{100}\right)^5$$

$$A = 5000(1.07)^5$$

$$A = £7,012.76$$

Example #2 - The level of activity of a radio-active source decreases by 5% per hour. If the activity is 1500 counts per second, what will it be 12 hours later?

$$A = A_o\left(1 - \frac{r}{100}\right)^n$$

A_o - 1500 counts/sec.

A - new amount

r - 5%

n - 12 hours

$\pm$ - '-' for decay

$$A = 1500\left(1 - \frac{5}{100}\right)^{12}$$

$$A = 1500(0.95)^{12}$$

$$A = 1500(0.540)$$

$$A = 810.5 \text{ counts/sec.}$$

Example #3 - A bee-hive increases its population of bees by 8% per year.

How many bees will there be in the hive in 5 years time?

$$A = A_o\left(1 \pm \frac{r}{100}\right)^n$$

A_o - 6,500 bees

A - new amount

r - 8%

n - 5 years

$\pm$ - '+' for decay

$$A = 6500\left(1 + \frac{8}{100}\right)^5$$

$$A = 6500(1.08)^5$$

$$A = 9550.63$$

$A = 9550$ bees (rounding down)