Growth and Decay Problems

Remember for increases the multiplier is 1.?, if it's a decrease the multiplier is 0.?

Example 1. If property is increasing by 7% per year, what is the multiplier?

$100\% + 7\% = 107\%$

$107\% = \frac{107}{100} = 1{\cdot}07$

$\therefore$ The multiplier $= 1{\cdot}07$

Example 2. What is the first term in the geometric progression 3, 6, 12, 24 which will exceed one million?

$a = 3,\ r = 2 \qquad u_n > 1000000 \quad n = n$

$$using \quad ar^{n-1} > 1000000$$

$$3 \times 2^{n-1} > 1000000$$

$$2^{n-1} > \frac{1000000}{3}$$

To solve unknown powers we use logs

$$\log 2^{n-1} > \log \frac{1000000}{3}$$

$$(n-1)\log 2 > \log \frac{1000000}{3}$$

$$n - 1 > \frac{\log 333333{\cdot}33}{\log 2}$$

$$n - 1 > 18{\cdot}35 \ (2dp)$$

$$n > 19{\cdot}35$$

$$\therefore \ n = 20$$

The 20th term is the first term to exceed 1 million