

Appreciation and Depreciation

Created by

Graduate Bsc (Hons) MathsSci (Open) GIMA

Appreciation is a term used to indicate a value is **increasing**.
Depreciation is a term used to indicate a value is **decreasing**.

Common questions that use appreciation/depreciation are:-

Rises in house prices.

Falling price of a car from new.

Growth in bacteria culture.

Drop in populations.

There is a very useful formula that makes these questions less time consuming.

$$\text{Value} = I_{\text{initial}} \cdot \left(1 + \frac{\%}{100}\right)^n \quad \text{Appreciation}$$

$$\text{Value} = I_{\text{initial}} \cdot \left(1 - \frac{\%}{100}\right)^n \quad \text{Depreciation}$$

I_{initial} = starting value

% = Percentage increase / decrease

n = term of the calculation e.g. years, months, days etc.....

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1. A holiday home is bought in 1985 for £30,000. If it increases in value by 5% each year how much is it worth in 1989.

Long Way

$$1986 \quad 30000 + 30000 \cdot 0.05 = 31500$$

$$1987 \quad 31500 + 31500 \cdot 0.05 = 33075$$

$$1988 \quad 33075 + 33075 \cdot 0.05 = 34728.75$$

$$1989 \quad 34728.75 + 34728.75 \cdot 0.05 = 36465.188$$

Short Way

$$30000 \cdot (1 + 0.05)^4 = 36465.188$$

2. A car is bought for £12,000. If it decreases in value by 1% each month how much is it worth after a year.

Long Way

Month

Value

$$1 \quad 12000 - 12000 \cdot 0.01 = 11880.00$$

$$2 \quad 11880 - 11880 \cdot 0.01 = 11761.20$$

$$3 \quad 11761.2 - 11761.2 \cdot 0.01 = 11643.59$$

$$4 \quad 11643.59 - 11643.59 \cdot 0.01 = 11527.15$$

$$5 \quad 11527.15 - 11527.15 \cdot 0.01 = 11411.88$$

$$6 \quad 11411.88 - 11411.88 \cdot 0.01 = 11297.76$$

$$7 \quad 11297.76 - 11297.76 \cdot 0.01 = 11184.78$$

$$8 \quad 11184.78 - 11184.78 \cdot 0.01 = 11072.93$$

$$9 \quad 11072.93 - 11072.93 \cdot 0.01 = 10962.20$$

$$10 \quad 10962.20 - 10962.20 \cdot 0.01 = 10852.58$$

$$11 \quad 10852.58 - 10852.58 \cdot 0.01 = 10744.05$$

$$12 \quad 10744.05 - 10744.05 \cdot 0.01 = 10636.61$$

Short Way

$$12000 \cdot (1 - 0.01)^{12} = 10636.62$$