

SOME FORMULAE

1. Compound interest formula for interest paid once a year

$$A = P \times (1 + APR)^Y \quad \text{where} \quad \begin{cases} P = \text{starting principal} \\ APR = \text{annual percentage rate (as a decimal)} \\ Y = \text{number of years} \\ A = \text{accumulated balance after } Y \text{ years} \end{cases}$$

2. Compound interest formula for interest paid n times a year.

$$A = P \times \left(1 + \frac{APR}{n}\right)^{nY} \quad \text{where} \quad \begin{cases} P = \text{starting principal} \\ APR = \text{annual percentage rate (as a decimal)} \\ Y = \text{number of years (may be a fraction)} \\ A = \text{accumulated balance after } Y \text{ years} \\ n = \text{number of compounding periods per year} \end{cases}$$

3. Compound interest formula for continuous compounding.

$$\underline{A = P \times e^{APR \times Y}}$$

Any of these can be solved for P. If you know the interest rate, how often it is compounded, how much you need to accumulate and you want to know what principal you need, formula 2 becomes

$$P = \frac{A}{\left(1 + \frac{APR}{n}\right)^{nY}}$$

4. Loan payment formula (installment loan or *amortized* loan).

$$PMT = \frac{P \times \left(\frac{APR}{n}\right)}{1 - \left(1 + \frac{APR}{n}\right)^{-nY}} \quad \text{where} \quad \begin{cases} P = \text{starting loan principal (amount borrowed)} \\ PMT = \text{regular payment amount} \\ APR = \text{annual percentage rate} \\ n = \text{number of payment periods per year} \\ Y = \text{loan term in years} \end{cases}$$