Present Value of an Annuity

The amount of money needed now, to be invested at a specific interest rate, in order to reach a target amount.

This is related to future value, except we want to invest all the money now in a lump sum rather than by making regular monthly payments.

$$A_p = R\frac{1-(1+i/n)^{-pt}}{i/n}$$

where:

- R is the amount of the payment
- i is the annual interest rate
- p is the number of payments per year
- n is the number of compounding periods per year
- t is the number of years
- A_p is the amount of the annuity

Installment Buying

The monthly payments to be made when an amount is borrowed for a specific amount of time at a set interest rate.

$$R = \frac{A_P(i/n)}{1-(1+i/n)^{-pt}}$$

where:

- i is the annual interest rate
- p is the number of payments per year
- A_p is the principal
- n is the number of compounding periods per year
- t is the number of years
- R is the amount of the payment

Cost of the Loan

$$C = Rnt$$

An amortization is most commonly used in mortgages. It is a schedule in the form of a table that shows the breakdown of each mortgage payment. Mortgage payments are a fixed total amount each month, but is divided into two parts:

1. The interest payment – the part of the payment that is applied to interest.

2. The principal payment – the part of the payment that is applied to the principal.

The amortization table also shows the principle balance, and sometimes the accrued amount of interest paid.

Before you can create an amortization table, you need the following information:

Principal	The amount of money being financed to purchase the house.
Term	The number of months the money is being financed.
Rate	The interest rate at which the money is being financed.
Monthly Payment	The amount to be paid each month. This can be calculated using the "Installment Buying" formula in the previous section.
Start Date	The date that payments begin, usually the first day of the month.

With this information, the amortization table can be set up. It contains the following columns:

Payment Number	A sequential numbering of the payments.
Payment Date	The date the payment is due.
Interest Payment	The amount of the payment being applied to interest. Take the "Rate" and divide by 12. Multiply that result by the "Principal Balance".
Principal Payment	The amount of the payment being applied to the principal. Subtract the "Interest Payment" from the "Monthly Payment".
Principal Balance	The new principal balance after the principal payment is applied. Subtract the "Principal Payment" from the previous "Principal Balance".
Cumulative Interest	Total-to-date interest paid. Add the "Interest Payment" to the previous "Cumulative Interest".