Annuities Due

An **Annuity Due** has payments at the beginning of each payment period, so the first payment is a present value and the remaining \( n - 1 \) payments make up an ordinary annuity. You can get the same result by multiplying the Present Value of an ordinary annuity by \((1 + i)\) since there is one more compounding period in the annuity due.

General Formula:

**Example 1**
Dodi pays rent of R2800 at the beginning of each month. His uncle says, "Dodi, if you can work out the cash equivalent of one year's rent, I'll pay it for you!" What should Dodi tell his uncle, assuming an interest rate of 10% p.a. compounded monthly.

**Example 2**
Zip buys a scooter with a R6 000 price tag. He signs an agreement to pay off the scooter over 2 years with monthly payments made at the beginning of each month. If interest is charged at 15% p.a. compounded monthly, how much are the monthly payments?
Deferred Annuities
When an annuity starts at a future date, link the present value of the annuity, found with
\[ PV = R \left( \frac{1 - (1 + i)^{-n}}{i} \right), \]
to the present time using \[ S = PV (1 + i)^n. \]

Example 3
At the beginning of February 2010, Nomsa takes a student loan for R80 000 at 12% p.a. compounded monthly. She must pay off the loan in 60 monthly payments, starting at the end of February 2012.
(a) What is the value of Nomsa’s loan on 1 February 2012?
(b) How big are her monthly payments?
(c) How much interest does she pay in total?

Perpetuities
A perpetuity is an annuity that continues indefinitely. Perpetuities are used to value property, shares, and life membership fees. The value of the perpetuity is the present value that gives the required interest (or income) per period. General formula Interest = \( Pi \)

Example 4
The Liberty Midlands Mall receives about R6 250 000 in rent each month. What should a buyer pay for the mall if interest is 11% p.a. compounded monthly?

Example 5
Life membership of a running club is R20 000. What is the annual membership fee, if interest is 9% p.a.?