SUMMARY OF FINANCE FORMULAS

SIMPLE INTEREST
To calculate the amount of simple interest, I, or the accumulated amount, A, we must know the principal, P, the amount of time of the deposit or loan in years, t, and the annual interest rate, r (expressed as a decimal).

The formula for calculating the amount of simple interest is

\[ I = Prt \]

The formula for calculating the future value of a simple interest deposit or loan is

\[ A = P + I = P(1+rt) \]

When to use simple interest formulas: (1) the problem mentions 'simple interest' or (2) no sort of compounding is mentioned in the problem.

COMPOUND INTEREST
To calculate the accumulated amount (also called future value or compound amount), A, we must know the principal, P, the amount of time of the deposit or loan in years, t, the annual interest rate, r, and the number of compounding periods per year, m.

(To find just the amount of compound interest accrued, find A above & then subtract P. In other words, use the formula \( I = A - P \).)

The formula for calculating the accumulated amount (or future value) of a compound interest deposit or loan is:

\[ A = P(1+i)^n \quad \text{where} \quad i = \frac{r}{m} \quad \text{and} \quad n = mt \]

When to use the compound interest formula: if a lump sum of money is deposited or borrowed and it pays some sort of compound interest AND no periodic payment is involved. (If a problem mentions a periodic payment, this is NOT the formula to use.)

FUTURE VALUE OF AN ANNUITY
The formula for calculating the future value of an ordinary annuity is:

\[ S = R \left[ \frac{(1+i)^n - 1}{i} \right] \quad \text{where} \quad i = \frac{r}{m}, \quad n = mt \quad \text{and} \quad R = \text{the periodic payment} \]

When to use the future value formula: (1) if the term ‘sinking fund’ appears or (2) if the problem mentions periodic payments and you want to know how much the annuity will be worth later (the future value). [A variation would be if you know the future value & want to find the periodic payment.]

PRESENT VALUE OF AN ANNUITY
The formula for calculating the present value of an ordinary annuity is:

\[ P = R \left[ \frac{1-(1+i)^{-n}}{i} \right] \quad \text{where} \quad i = \frac{r}{m}, \quad n = mt \quad \text{and} \quad R = \text{the periodic payment} \]

When to use the present value formula: (1) if you must find the lump sum amount (Present Value) equivalent to an annuity with a known periodic payment, rate, compounding period & term or (2) if you must find the amt of a loan payment needed to amortize a loan (to buy a car/house, etc).

Note: In all the formulas above, \( t \) is time in years, \( r \) is the annual interest rate, \( i \) is the interest rate/period, \( m \) is the # of compounding periods/yr, and \( n \) is the total # of compounding periods over \( t \) years.