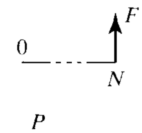
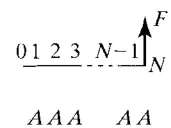
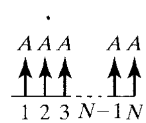
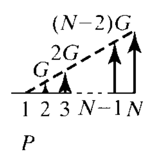
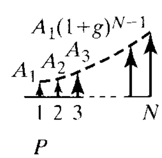
Summary of Discrete Compounding Formulas with Discrete Payments

Flow Type	Factor Notation	Formula	Excel Command	Cash Flow Diagram
SINGLE	Compound amount $(F/P, i, N)$	$F = P(1 + i)^N$	= FV(i, N, P, , 0)	
	Present worth $(P/F, i, N)$	$P = F(1 + \bar{i})^N$	= PV(i, N, F, , 0)	
EQUAL PAYMENT SERIES	Compound amount $(F/A, i, N)$	$F = A\left[\frac{(1+i)^N - 1}{i}\right]$	= PV(i, N, A, , 0)	
	Sinking fund $(A/F, i, N)$	$A = F\left[\frac{i}{(1+i)^N - 1}\right]$	= PMT(i, N, P, F, 0)	
	Present worth $(P/A, i, N)$	$P = A\left[\frac{(1+i)^N - 1}{i(1+i)^N}\right]$	= PV(i, N, A, , 0)	
	Capital recovery $(A/P, i, N)$	$A = P\left[\frac{i(1+i)^N}{(1+i)^N - 1}\right]$	= PMT(i, N, P)	
GRADIENT SERIES	Linear gradient Present worth $(P/G, i, N)$	$P = G\left[\frac{(1+i)^N - iN - 1}{i^2(1+i)^N}\right]$		
	Conversion factor $(A/G, i, N)$	$A = G\left[\frac{(1+i)^N - iN - 1}{i(1+i)^N - 1}\right]$		
	Geometric gradient Present worth $(P/A_1, g, i, N)$	$P = \begin{cases} A_1\left[\frac{1 - (1+g)^N(1+i)^{-N}}{i - g}\right] \\ A_1\left(\frac{N}{1+i}\right) \text{ (if } i = g) \end{cases}$		

Summary of Formulas

Effective Interest Rate per Payment Period

Discrete compounding $i = [(1 + r/(CK))]^C - 1$
Continuous compounding $i = e^{r/K} - 1$

where i = effective interest rate per payment period
r = nominal interest rate or APR
C = number of interest periods per payment period
K = number of payment periods per year
r/K = nominal interest rate per payment period

Market Interest Rate

$$i = i' + \bar{f} + i'\bar{f}$$

where i = market interest rate
i' = inflation-free interest rate
$\bar{f}$ = general inflation rate

Present Value of Perpetuities

$$P = \frac{A}{i}$$

Capital Recovery with Return

$$CR(i) = (I - S)(A/P, i, N) + iS$$

Book Value

$$BV_n = I - \sum_{j=1}^{n} D_j$$

Straight-Line Depreciation

$$D_n = \frac{(I - S)}{N}$$

Declining Balance Depreciation

$$D_n = \alpha I(1 - \alpha)^{n-1}$$

where α = declining balance rate, and $0 < \alpha \leq \frac{2}{N}$

Cost of Equity

$$i_e = r_f + \beta[r_M - r_f]$$

where i_e = cost of equity
r_f = risk-free interest rate
β = market related risk index
r_M = market rate of return

Modified ACRS Factors				
	Recovery Period (Years)			
Year	**3**	**5**	**7**	**10**
1	33.33	20.00	14.29	10.00
2	44.45	32.00	24.49	18.00
3	14.81	19.20	17.49	14.44
4	7.41	11.52	12.49	11.52
5		11.52	8.93	9.22
6		5.76	8.92	7.37
7			8.93	6.55
8			4.46	6.55
9				6.55
10				6.56
11				3.28

Cost of Debt

$$i_d = \left(\frac{c_s}{c_d}\right)k_s(1 - t_m) + \left(\frac{c_b}{c_d}\right)k_b(1 - t_m)$$

where i_d = cost of debt
c_s = the amount of term loan
c_b = the amount of bond financing
c_d = total debt = $c_s + c_b$
k_s = the before-tax interest rate on the term loan
k_b = the before-tax interest rate on the bond
t_m = the firm's marginal tax rate

Weighted—Average Cost of Capital

$$k = \frac{i_d c_d}{V} + \frac{i_e c_e}{V}$$

where k = cost of capital
c_e = total equity capital
$V = c_d + c_e$