Time Value of Money Formula For:	Annual Compounding	Compounded (m) Times Per Year	Continuous Compounding
1. Future value of a single cash flow. (Future Value of a Lump Sum)	$FV = PV(1+i)^n$	$FV = PV\left(1+\frac{i}{m}\right)^{nm}$	$FV = PV(e)^{in}$
2. Present value of a single cash flow. (Present Value of a Lump Sum)	$PV = FV(1+i)^{-n}$	$PV = FV\left(1+\frac{i}{m}\right)^{-nm}$	$PV = FV(e)^{-in}$
3. Future value of a series of equal cash flows (PMT) at fixed intervals for a specified number of periods. (Future Value of an Annuity)	$FVA = PMT\left[\frac{(1+i)^n - 1}{i}\right]$	$FVA = PMT\left[\frac{\left(1+\frac{i}{m}\right)^{nm} - 1}{i/m}\right]$	$FVA = PMT\left[\frac{(e^{in} - 1)}{(e^{i} - 1)}\right]$
4. Present value of a series of equal cash flows (PMT) at fixed intervals for a specified number of periods. (Present Value of an Annuity)	$PVA = PMT\left[\frac{1-(1+i)^{-n}}{i}\right]$	$PVA = PMT\left[\frac{1-\left(1+\frac{i}{m}\right)^{-nm}}{i/m}\right]$	$PVA = PMT\left[\frac{(1-e^{-in})}{(e^{i}-1)}\right]$
5. Effective interest rate given simple (or quoted) interest rate.	$EAR = i$	$EAR = \left(1+\frac{i}{m}\right)^{m} - 1$	$EAR = e^{i} - 1$
6. Simple (or quoted) interest rate given effective interest rate.	$i = EAR$	$i = m\left[(1+EAR)^{1/m} - 1\right]$	$i = \ln(1+EAR)$
7. The length of time required for a single cash flow to grow to a specified future amount at a given rate of interest.	$n = \frac{\ln(FV/PV)}{\ln(1+i)}$	$n = \frac{\ln(FV/PV)}{m * \ln(1+\frac{i}{m})}$	$n = \frac{1}{i}\ln(FV/PV)$
8. The simple (or quoted) rate of interest required for a single cash flow to grow to a specified future cash flow.	$i = \left(\frac{FV}{PV}\right)^{1/n} - 1$	$i = m\left[\left(\frac{FV}{PV}\right)^{1/(nm)} - 1\right]$	$i = \frac{1}{n}\ln(FV/PV)$
9. The length of time required for a series of equal cash flows (PMT) to grow to a specific future amount.	$n = \frac{\ln\left[\frac{(FVA)(i)}{PMT} + 1\right]}{\ln(1+i)}$	$n = \frac{\ln\left[\left(\frac{i}{m}\right)\left(\frac{FVA}{PMT} + \frac{m}{i}\right)\right]}{m * \left[\ln\left(1+\frac{i}{m}\right)\right]}$	
10. Present value of a finite series of cash flows (CF) growing at a constant rate (g) for (n) periods with constant (i).	$PV = \frac{CF_o(1+g)}{(i-g)}\left[1-\left(\frac{1+g}{1+i}\right)^n\right], \quad \text{for } i \neq g$		

i = simple or quoted rate (nominal interest rate)
m = number of compounding periods per year
ln = natural logarithm
n = time period expressed in years (or portion thereof)
e = Euler's constant ≈ 2.71828...
EAR = effective annual rate