



# **Present Value Formulas**

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### **List of 19 Present Value Formulas**

#### Present Value **G**

#### 1) Annuity Due for Present Value

fx

Open Calculator 🗗

$$ext{PV}_{ ext{AD}} = ext{PMT} \cdot \left( rac{1 - \left(rac{1}{(1+ ext{r})^{ ext{n}_{ ext{Periods}}}}
ight)}{ ext{r}} 
ight) \cdot (1+ ext{r})$$

ex  $117.1429 = 60 \cdot \left( rac{1 - \left(rac{1}{(1+0.05)^2}
ight)}{0.05} 
ight) \cdot (1+0.05)$ 

### 2) Growing Annuity Payment using Present Value

fx

Open Calculator 🗗

$$ext{PMT}_{ ext{initial}} = ext{PV} \cdot \left( rac{ ext{r} - ext{g}}{1 - \left( \left( rac{1 + ext{g}}{1 + ext{r}} 
ight)^{ ext{n}} - \{ ext{Periods}\} 
ight)} 
ight)$$

ex 
$$53.26087 = 100 \cdot \left( \frac{0.05 - 0.02}{1 - \left( \left( \frac{1 + 0.02}{1 + 0.05} \right)^2 \right)} \right)$$





Open Calculator

# 3) Number of Periods using Present Value of Annuity

 $t = rac{\ln igg(ig(1-ig(rac{ ext{PVAnnuity}}{ ext{C}_{ ext{f}}}ig)ig)^{-1}igg)}{\ln (1+ ext{r})}$ 

ex  $74.28425 = rac{\ln\left(\left(1-\left(rac{1460}{1500}
ight)
ight)^{-1}
ight)}{\ln(1+0.05)}$ 

# 4) Present Value Continuous Compounding Factor

fx  $\left| \mathrm{F}_{\mathrm{PV}} = \left( e^{-\mathrm{r} \cdot \mathrm{t}} 
ight) 
ight|$ 

Open Calculator

 $0.67032 = (e^{-0.05 \cdot 8})$ 

5) Present Value Factor 💪

 $\mathbf{F}_{ ext{PVA}} = rac{1 - \left( \left( 1 + \mathbf{r} 
ight)^{- ext{np}_{ ext{eriods}}} 
ight)}{1 - \left( \left( 1 + \mathbf{r} 
ight)^{- ext{np}_{ ext{eriods}}} 
ight)}$ 

Open Calculator

Open Calculator

 $1.85941 = rac{1 - \left( \left( 1 + 0.05 
ight)^{-2} 
ight)}{0.05}$ 6) Present Value for Continuous Compounding 🗗

 $ext{FV} ext{PV}_{ ext{cc}} = rac{ ext{FV}}{e^{ ext{r}\cdot ext{n}_{ ext{Periods}}}}$ 



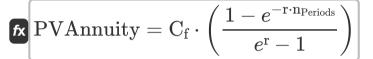
### 7) Present Value of Annuity

fx

Open Calculator

$$ext{PVAnnuity} = \left(rac{ ext{p}}{ ext{IR}}
ight) \cdot \left(1 - \left(rac{1}{\left(1 + ext{IR}
ight)^{ ext{n}}} - \{ ext{Months}\}
ight)
ight)$$

## 8) Present Value of Annuity with Continuous Compounding 🗗



Open Calculator

ex 
$$2784.1 = 1500 \cdot \left( \frac{1 - e^{-0.05 \cdot 2}}{e^{0.05} - 1} \right)$$

9) Present Value of Deferred Annuity

Open Calculator

$$PV_{DA} = P_O \cdot \frac{1 - \left(1 + \left(IR \cdot 0.01\right)\right)^{-n} - \left\{Periods\right\}}{\left(1 + \left(IR \cdot 0.01\right)^t - \left\{d\right\} \cdot \left(IR \cdot 0.01\right)\right)}$$

$$extbf{ex} 253.869 = 2500 \cdot rac{1 - \left(1 + \left(5.5 \cdot 0.01
ight)
ight)^{-2}}{\left(1 + \left(5.5 \cdot 0.01
ight)^9 \cdot \left(5.5 \cdot 0.01
ight)
ight)}$$



#### 10) Present Value of Deferred Annuity based on Annuity Due

fx

Open Calculator 🚰

 $ext{PV}_{ ext{DA}} = ext{P}_{ ext{D}} \cdot rac{1 - \left(1 + \left( ext{IR} \cdot 0.01
ight)
ight)^{- ext{n}} - \left\{ ext{Periods}
ight\}}{\left(1 + \left( ext{IR} \cdot 0.01
ight)
ight)^{ ext{t}_{ ext{d}} - 1} \cdot \left( ext{IR} \cdot 0.01
ight)}$ 

ex 
$$132.3366 = 110 \cdot rac{1 - \left(1 + \left(5.5 \cdot 0.01
ight)
ight)^{-2}}{\left(1 + \left(5.5 \cdot 0.01
ight)
ight)^{9-1} \cdot \left(5.5 \cdot 0.01
ight)}$$

# 11) Present Value of Future Sum given compounding periods

$$ext{FV} = rac{ ext{FV}}{\left(1 + \left(rac{\% ext{RoR}}{ ext{C}_{ ext{n}}}
ight)
ight)^{ ext{C}_{ ext{n}} \cdot ext{n}_{ ext{Periods}}}}$$

Open Calculator

ex 
$$17.45242 = rac{33000}{\left(1 + \left(rac{4.5}{11}
ight)
ight)^{11\cdot 2}}$$

### 12) Present Value of Future Sum given Number of Periods

$$ext{FV} = rac{ ext{FV}}{ ext{exp}(\% ext{RoR} \cdot ext{n}_{ ext{Periods}})}$$



#### 13) Present Value of Future Sum given Total Number of Periods

 $ext{FV} ext{PV} = rac{ ext{FV}}{\left(1+ ext{IR}
ight)^{ ext{t}}}$ 

Open Calculator 🚰

 $= \frac{33000}{\left(1 + 5.5\right)^8}$ 

### 14) Present Value of Growing Annuity

 $ext{PV}_{ ext{ga}} = \left(rac{ ext{II}}{ ext{r}- ext{g}}
ight) \cdot \left(1-\left(rac{1+ ext{g}}{1+ ext{r}}
ight)^{ ext{n}_{ ext{Periods}}}
ight)$ 

Open Calculator 🗗

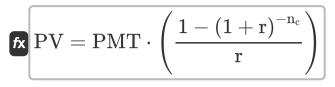
#### 15) Present Value of Lumpsum

 $ext{FV} ext{PV}_{ ext{L}} = rac{ ext{FV}}{(1+ ext{IR}_{ ext{P}})^{ ext{n}}} - \{ ext{Periods}\}$ 

Open Calculator 🗗



# 16) Present Value of Ordinary Annuities and Amortization



 $\left| \mathbf{ex} \right| 593.9185 = 60 \cdot \left( \frac{1 - \left( 1 + 0.05 \right)^{-14}}{0.05} \right)$ 

**'** 

Open Calculator 🚰

17) Present Value of Stock with Constant Growth

# D1

 $P = \frac{D1}{(\% RoR \cdot 0.01) - g}$ 

Open Calculator 🖒

 $10 = \frac{0.25}{(4.5 \cdot 0.01) - 0.02}$ 18) Present Value of Stock with Zero Growth

 $\mathbf{F} = \frac{\mathrm{D}}{\% \mathrm{RoR}}$ 

will

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# 19) PV of Perpetuity

 $ag{PV_{
m p}} = rac{
m D}{
m DR}$ 

Open Calculator



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#### Variables Used

- %RoR Rate of Return
- C<sub>f</sub> Cashflow per Period
- C<sub>n</sub> Compounding Periods
- D Dividend
- D1 Estimated Dividends for Next Period
- DR Discount Rate
- Fpv PV Continuous Compounding Factor
- FPVA Annuity Present Value Factor
- FV Future Value
- g Growth Rate
- II Initial Investment
- IR Interest Rate
- IR<sub>P</sub> Interest Rate per Period
- n<sub>c</sub> Total Number of Times Compounded
- n<sub>Months</sub> Number of Months
- nperiods Number of Periods
- p Monthly Payment
- P Price of Stock
- P<sub>D</sub> Annuity Payment Due
- Po Ordinary Annuity Payment
- PMT Payment made in Each Period
- PMT<sub>initial</sub> Initial Payment





- PV Present Value
- PV<sub>AD</sub> Annuity Due Present Value
- PV<sub>cc</sub> Present Value with Continuous Compounding
- PV<sub>DA</sub> Present Value of Deferred Annuity
- PV<sub>qa</sub> Present Value of Growing Annuity
- PV<sub>I</sub> Present Value of Lumpsum
- PV<sub>p</sub> PV of Perpetuity
- PVAnnuity Present Value of Annuity
- r Rate per Period
- t Total Number of Periods
- t<sub>d</sub> Deferred Periods



### Constants, Functions, Measurements used

- Constant: e, 2.71828182845904523536028747135266249
   Napier's constant
- Function: exp, exp(Number)

  n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- Function: In, In(Number)

  The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.





#### Check other formula lists

- Basics of Time Value of Money
   Future value Formulas Formulas
- - Present Value Formulas

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