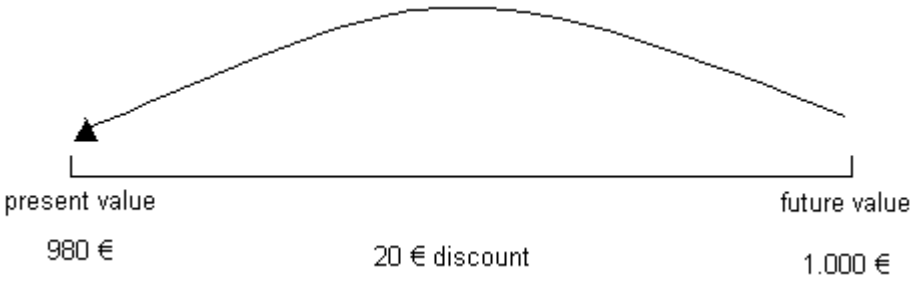
Simple Discount - Basics

In the Simple discount situation, there is an amount of money (**future value**) due on a certain future date, usually within a year; the debtor can ask for paying in advance and, if the creditor agrees with him, the money to be paid today (**present value**) is less than the due capital; in fact the future value is subtracted by the **discount** calculated in proportion to time and rate of discount



The creditor receives the proceeds (present value) of the loan today

Finding the present value or discounting, as it is commonly called, is not simply the reverse of finding the future value by the interest formula

A simple discount rate, **r**, is applied to the final amount **FV** and results in the formula

$$D = \frac{FV \times r \times t}{100}$$ where,

D = simple discount on an amount FV

r = simple discount rate (in percentage)

t = period of time (in years)

Seemingly the formulae of Interest and Simple Discount look similar; but there is a substantial difference: the amount on which the formula is applied, is the initial capital in the interest formula whereas the corresponding amount is the final capital in the discount formula.

The present value to be paid in advance by the borrower, can be expressed as a difference between the Future Value and the Simple Discount

$$PV = FV - D$$

substituting D with the formula, we have

$$PV = FV - \frac{FV \times r \times t}{100}$$

therefore

$$PV = \frac{FV \cdot 100 - FV \cdot r \cdot t}{100}$$

and finally, collecting FV

$$PV = \frac{FV(100 - r \times t)}{100}$$

The term (100 - rt) is called the *discount factor* under simple discount

English version

Time expressed in years $D = \frac{FV \cdot r \cdot t}{100}$ **PV = FV - D** $PV = \frac{FV(100 - r \times t)}{100}$	**D:** discount after **t** years. **FV: future value,** the amount that should be paid on the original maturity date **r:** annual discount rate in percentage (%) **PV: present value,** is the discounted amount to pay in advance of the original maturity date

Italian version

Time expressed in years $Sc = \frac{C \cdot r \cdot t}{100}$ **Vc = C - Sc** $Vc = \frac{C \cdot (100 - r \cdot t)}{100}$	**Sc:** discount after **t** years (**sconto commerciale**) **C:** future value**,** the amount that should be paid at the original maturity date (**capitale**) **r:** annual discount rate in percentage (%) **Vc:** present value, is the discounted amount to pay in advance of the original maturity date (**valore attuale commerciale**)

Simple Discount - Period of time is a fraction of the year

The **Simple Discount** formula applies to short-term investments (less than a year).

Time expressed in months	
$D = \frac{FV \cdot r \cdot m}{1{,}200}$ English $Sc = \frac{C \cdot r \cdot m}{1.200}$ Italian **PV = FV - D** $PV = \frac{FV \cdot (1{,}200 - r \cdot m)}{1{,}200}$ English $Vc = \frac{C \cdot (1.200 - r \cdot m)}{1.200}$ Italian	**D:** discount before **m** months. the amount that should be paid on the original maturity date **r:** annual discount rate in percentage (%) **PV: present value,** is the discounted amount to pay in advance of the original maturity date

Time is expressed in days according to the calendar year we are referring to **exact simple discount** and the fraction of the year is based on 365 days	**ANNO CIVILE** **D:** discount before **d** days. **FV: future value,** the amount that should be paid on the original maturity date **r:** annual discount rate in percentage (%)
$D = \frac{FV \cdot r \cdot d}{36{,}500}$ English $Sc = \frac{C \cdot r \cdot g}{36{,}500}$ Italian **PV = FV - D** $PV = \frac{FV \cdot (36{,}500 - r \cdot d)}{36{,}500}$ English $Vc = \frac{C \cdot (36.500 - r \cdot g)}{36.500}$ Italian	**PV: present value,** is the discounted amount to pay in advance of the original maturity date

Time is expressed in days according to the commercial year	**ANNO COMMERCIALE**
we are referring to **ordinary simple discount** and the fraction of the year is based on 360 days $D = \frac{FV \cdot r \cdot d}{36{,}000}$ English $Sc = \frac{C \cdot r \cdot g}{36{,}000}$ Italian **PV = FV - D** $PV = \frac{FV \cdot (36{,}000 - r \cdot d)}{36{,}000}$ English $Vc = \frac{C \cdot (36.000 - r \cdot g)}{36.000}$ Italian	**D:** discount before **d** days. **FV: future value,** the amount that should be paid on the original maturity date **r:** annual discount rate in percentage (%) **PV: present value,** is the discounted amount to pay in advance of the original maturity date

Example 1:

Michelle invested a certain amount of money in a bank; at the maturity date she will receive € 5,000.00. Applying the discount rate of 4.8%, what amount would she get asking to be paid in advance of 3 months?

Answer :

FV = € 5,000.00
r = 4.8%
m = 3

D = (FV × r ×m)/1,200
D = (€ 5,000.00 x 4.8 x 3)/1,200 = € 60.00

PV = FV - D = € 5,000.00 - € 60.00

Hence, Michelle would get € 4,940 3 months earlier.

Example 2.

Jeff O'Sullivan has sold goods to a customer for € 350 that are due on 30 April. If Mr O'Sullivan grants an advance payment by the customer on 15 March using a discount rate of 2.5%, what amount would he get? Use the direct formula and a 365 day year

Answer:

FV = € 350.00
r = 2.5%
d = 46

PV = [FV × (36,500 - r x d)]/36,500
PV = [350.00 × (36,500 - 2.5 x 46)]/36,500

Hence, Mr O'Sullivan will have € 348,90 46 days beforehand.

Calculating the Number of Days of a Loan or Investment

Steps for determining the Number of Days of a Loan are the same of those used in case of Simple Interest: (see Simple Interest chapter)

Inverse Formulae

	the unknown		
TIME	**Future Value**	**rate of discount**	**time**
years	$FV = \frac{D \cdot 100}{r \cdot t}$	$r = \frac{D \cdot 100}{FV \cdot d}$	$t = \frac{D \cdot 100}{FV \cdot r}$
months	$FV = \frac{D \cdot 1{,}200}{r \cdot m}$	$r = \frac{D \cdot 1{,}200}{FV \cdot m}$	$m = \frac{D \cdot 1{,}200}{FV \cdot r}$
days/365	$FV = \frac{D \cdot 36{,}500}{r \cdot d}$	$r = \frac{D \cdot 36{,}500}{FV \cdot d}$	$d = \frac{D \cdot 36{,}500}{FV \cdot r}$
days/360	$FV = \frac{D \cdot 36{,}000}{r \cdot d}$	$r = \frac{D \cdot 36{,}000}{FV \cdot d}$	$d = \frac{D \cdot 36{,}000}{FV \cdot r}$

Inverse Formula of FV from PV:

	year	**months**	**days/365**	**days/360**
Future Value	$FV = \frac{PV \times 100}{(100 - r \cdot t)}$	$FV = \frac{PV \times 1{,}200}{(1{,}200 - r \cdot m)}$	$FV = \frac{PV \times 36{,}500}{(36{,}500 - r \cdot d)}$	$FV = \frac{PV \times 36{,}000}{(36{,}000 - r \cdot d)}$

GLOSSARY – Simple discount

English	Italian	Notes
due	dovuto, scaduto	riferito a un capitale
in advance	in anticipo	
proceeds	incasso	
reverse	contrario, opposto	
should be paid	dovrebbe essere pagato	
rate of discount	tasso di sconto	e.g.: 5% per year
grant	concedere	
customer	cliente	
simple discount	sconto commerciale	$D = \frac{FV \times r \times t}{100}$ $Sc = \frac{C \cdot r \cdot t}{100}$
whence	da cui	
calendar year	anno civile	365 days per year
commercial year	anno commerciale	360 days per year
unknown	incognita	
beforehand	in anticipo	
e.g.	per esempio	dal latino *exempli gratia*