ex// 6% compounded quarterly for 5 yrs, $P = 100$

$$FV = P(1+i)^n$$

$n = 5\text{yrs} \times 4 \text{ periods/yr} = 20$

$i = \frac{6\%}{4} = \frac{.06}{4} = 0.015$

$$FV = 100(1+0.015)^{20}$$

#6. $P = 1000\$$

$i = 0.05$

$n = 5$

$FV = 1000(1.05)^5$

$= 1276.28\$$

A) $P = 1050\$$

$FV = 1050(1.05)^5$

$= \underline{1340.10}$

B) $i \rightarrow 0.06$

$= \underline{1338.22}$

C) $n \Rightarrow 5 \times 12$

$i \Rightarrow \frac{0.05}{12}$

$= \underline{1283.36}$

D) $n \rightarrow 6$

$= \underline{1341.11}$

#6. $FV = 17500$

$t = 10$

$n = 10 \times 2$

$i = \frac{5.6\%}{2} = \frac{.056}{2} = .028$

$$FV = P(1+i)^n$$

$$PV = \frac{FV}{(1+i)^n}$$

$$= \frac{17500}{(1.028)^{20}}$$

$= 10073.39\$$

1.5 Investments involving regular payments

When a regular payment is made to an investment, we call that an annuity. Since this can be complicated to calculate, we'll use the TVM-solver on your calculators. It is important to know how it works.

N = # of compound periods

I% = annual interest rate in %

* PV = present value * money leaving your hands must be (-)

* PMT = regular payment

* FV = future value

P/Y = payments per year

C/Y = # of compound periods per year

PMT: end begin unless otherwise stated, investments happen at the end of a period

EXAMPLE 1 Determining the future value of an investment involving regular deposits

Darva is saving for a trip to Australia in 5 years. She plans to work on a student visa while she is there, so she needs only enough money for a return flight and her expenses until she finds a job. She deposits $500 into her savings account at the end of each 6-month period from what she earns as a server. The account earns 3.8%, compounded semi-annually. How much money will be in the account at the end of 5 years? How much of this money will be earned interest?

N = 5 X 2 = 10

I% = 3.8

PV = 0 → there is no Principal investment

PMT = −500 $

FV = Alpha Solve = 5449.90

P/Y = 2

C/Y = 2

END

— minus (−) negative

How much is interest?

→ she invested 10 X 500$ = 5000

∴ 5449.90 − 5000

I = 449.90

EXAMPLE 2 Comparing a regular payment investment with a single payment investment

Adam made a $200 payment at the end of each year into an investment that earned 5%, compounded annually. Blake made a single investment at 5%, compounded annually. At the end of 5 years, their future values were equal.

a) What was their future value?
b) What principal amount did Blake invest 5 years ago?
c) Who earned more interest? Why?

a) ADAM
N = 5
I = 5%
PV = 0
PMT = −200
FV = 1105.13
P/Y = 1
C/Y = 1
END
I = 1105.13 − 1000
= 1105.13 $

b) BLAKE
N = 5
I = 5
PV = Solve = −865.70
PMT = 0
FV = 1105.13
P/Y = 1
C/Y = 1
END

principal

must be equal if no PMTs are made

c) ADAM : I = 105.13 $
Blake : 1105.13 − 865.70
= 239.23 $

Blake earns more since his investment matured for longer ... he also invested all at the beginning

EXAMPLE 3 Determining the interest rate of a regular payment investment

Jeremiah deposits $750 into an investment account at the end of every 3 months. Interest is compounded quarterly, the term is 3 years, and the future value is $10 059.07. What annual rate of interest does Jeremiah's investment earn?

N = 4 × 3 = 12
I = 8.00%
PV = 0
PMT = −750
FV = 10059.07
P/Y = 4
C/Y = 4
END

EXAMPLE 4 Determining the regular payment amount of an investment

Celia wants to have $300 000 in 20 years so that she can retire. Celia has found a trust account that earns a fixed rate of 10.8%, compounded annually.

a) What regular payments must Celia make at the end of each year to meet her goal of $300 000?

b) How much interest will she earn over the 20 years?

a) N = 20
I = 10.8
PV = 0
PMT = -4781.10
FV = 300 000
P/Y = 1
C/Y = 1
END

b) She pays = (4781.10)(20)
= 95 622 $

I = 300 000 − 95 622
= $204 378

EXAMPLE 5 Determining the term of a regular payment investment

On Luis's 20th birthday, he started making regular $1000 payments into an investment account at the end of every 6 months. He wants to save for a down payment on a home. His investment earns 3.5%, compounded semi-annually. At what age will he have more than $18 000?

N = 15.78...
I = 3.5
PV = 0
PMT = −1000
FV = 18 000
P/Y = 2
C/Y = 2
END

Since Luis needs 16 periods to grow his investment, he actually need 8 yrs (semi-annually)
∴ Luis will be 28.

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