7.2 Compound Interest

Present Value (P or PV):

- Principal that needs to be invested/borrowed now to achieve a future goal.
- PV can be calculated when the interest rate, compounding period and length of term are known.

Present Value Formula: Use compound interest formula, rearranged for "P".

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

$$\frac{A}{(1 + i)^n} = P$$

$$A(1 + i)^{-n} = P$$

where
A = Amount at end of investment ($)
P = Present value/principal ($)
i = Interest rate per compound pd.
n = # of compound periods

Ex. 1 Julia wants to have $5000 in 2 years to use as a down-payment for a car. How much does she need to invest now at 6.3%/a compounded monthly?

Ex. 2 David plans to put money into an RESP so that he has $9000 in 5 years. Which option is the best deal for David?

a) 7.2% compounded semi-annually

b) 6.5% compounded bi-weekly

The TVM Solver

A program on the graphing calculator used for financial calculations.

To find the TVM Solver program:

APPS , 1: Finance..., ENTER , 1: TVM Solver... ENTER

N = # of compounding periods (n) = # of years x comp. freq
I% = interest rate/a as a percent
PV = present value (P)
PMT = the payment amount (put as "0" if there are no payments)
FV = future value (A)
P/Y = number of payments per year
C/Y = number of compound periods per year
PMT: = choose END

Money that is paid (money out)- should be entered as a **negative** value
Money that is received (money inflow)- should be entered as a **positive** value

* ONE of PV / PMT / FV must be positive, one negative, one zero

To determine a value:

- Move the cursor to the appropriate line and press ALPHA ENTER

Ex. 3 Harriet invested $4 000 in an investment fund that pays 6.5%/a compounded monthly. How much money is in the account after 8 years?

Ex. 4 How much do you need to invest now at 8.2%/a compounded quarterly to have $20 000 in 5 years?

N=
I%=
PV=
PMT=
FV=
P/Y=
C/Y=
PMT: END BEGIN

Ex. 4 Graham deposits $4500 into an account paying 3.5%/a compounded monthly. How long will it take him to have $8000 to buy a motorcycle?

N=
I%=
PV=
PMT=
FV=
P/Y=
C/Y=
PMT: END BEGIN

Ex. 5 Jason invested $1200 in a fund that compounded interest semi-annually. At what rate did he invest at if he earned $500 interest in 6 years?

N=
I%=
PV=
PMT=
FV=
P/Y=
C/Y=
PMT: END BEGIN

Ex. 6 Which investment will reach $10 000 faster?

A: $7500 invested at 4.5%/a compounded monthly

OR

B: $8200 invested at 4.2% compounded semi-annually

N=
I%=
PV=
PMT=
FV=
P/Y=
C/Y=
PMT: END BEGIN

N=
I%=
PV=
PMT=
FV=
P/Y=
C/Y=
PMT: END BEGIN

Ex. 7 Go back to examples 1 and 2 and use the TVM solver to check your answers.

Ex. 8 Brian is investing $6800 at an interest rate of 7% per annum, compounded quarterly, for 2 years. Then, he will invest the amount plus additional money at 6.5%/a, compounded semi-annually, for 3 years. At the end of the second investment, he wants to have $15 000. How much extra must he invest for the second investment?