

COMPOUND INTEREST / PRESENT VALUE

Learning Goals

- distinguish between present and future value
- learn the future value formula
- use the formula for real life examples

Present Value

- the amount of money that would have to be invested Now to get a specific value in the future

The present value formula is

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

Present Value →

future amount ↙

Mason wants to buy a car for \$10000 at the end of high school (2 years from now). He puts his money into the bank at 3% interest compounded semi-annually.

How much money does he need to put in today to have enough money for the car?

$$\begin{aligned}
 PV &= A (1 + i)^{-n} \\
 &= 10000 \left(1 + \frac{0.03}{2}\right)^{-2(2)} \\
 &= 9421.84
 \end{aligned}$$

\therefore he needs to invest \$9421.84

Justin wants to have \$5000 in 3 years. He can put money into the bank at 2% compounded monthly.

How much money does need to put in today so he can have the \$5000?

$$\begin{aligned}
 PV &= A (1 + i)^{-n} \\
 &= 5000 \left(1 + \frac{0.02}{12}\right)^{-3(12)} \\
 &= 4709.06
 \end{aligned}$$

\therefore he needs to invest \$4709.06

How do you know which formula to use?

$$I = Prt$$

Simple \rightarrow no compounding

\rightarrow must be added to original amount

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

Compound \rightarrow future

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

Compound \rightarrow present

On the Boards...

Mr. James wants to send his son to college. College costs \$8000 in the first year. He can invest at 6% compounded bi-weekly. How much should he invest now to cover 1st year fees if the son starts college in 5 years?

$$PV = 8000 \left(1 + \frac{0.06}{26} \right)^{-5(26)}$$

$$= 5928.59$$

\therefore he needs to invest \$5928.59

Niki invests \$2000 at 4% for 8 years.

How much will she have at the end of 8 years?

Simple \rightarrow no compounding

$$\begin{aligned} I &= Prt \\ &= 2000(0.04)(8) \\ &= 640 \end{aligned}$$

$$\begin{aligned} \text{Total} &= 2000 + 640 \\ &= 2640 \end{aligned}$$

\therefore She will have \$2640.00

Carter invests \$4000 at a 7% interest compounded monthly for 10 years. How much money will he have at the end of 10 years?

$$\begin{aligned} A &= P(1+i)^n \\ &= 4000\left(1 + \frac{0.07}{12}\right)^{10(12)} \\ &= 8038.65 \end{aligned}$$

\therefore he will have \$8038.65

HW pg 439 # 4 - 7