

1.5 – INVESTMENT INVOLVING REGULAR PAYMENTS

Goal: Determine the future value of an investment that earns compound interest involving regular payments.

Example 1: Determining the future value of an investment involving regular deposits.

Darva is saving for a trip to Australia in 5 years. 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 = number of periods

I% = interest rate / year

PV = present value

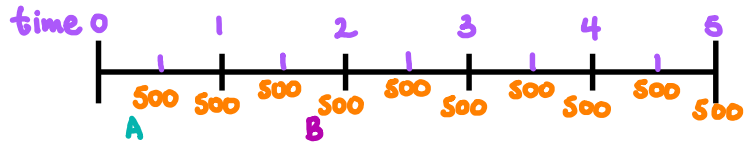
PMT = payment / periods

FV = future value

P/Y = periods / year

C/Y = compounds / year

always END!



If no interest, she will have \$5000.

$$500 \left(1 + \frac{0.038}{2}\right)^9 = 592.29$$

$$500 \left(1 + \frac{0.038}{2}\right)^6 = 559.78$$

total: \$5449.90 interest: 5449.90 - 5000 = \$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.

1. What was their future value?
2. What principal amount did Blake invest 5 years ago?
3. Who earned more interest? Why?

Adam
N = 5

I% = 5

PV = 0

PMT = -200

FV = ? \$1105.13

P/Y = 1

C/Y = 1

Blake
N = 5

I% = 5

PV = ? \$865.90

PMT = 0

FV = 1105.13

P/Y = 1

C/Y = 1

interest: 1105.13 - 1000 = \$105.13

1105.13 - 865.90 = \$239.23

All of Blake's money earned interest all 5 years.

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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 compound quarterly, the term is 3 years, and the future value is 10 059.07/ What annual rate of interest does Jeremiah’s investment earn?

$$N = 4 \times 3 = 12 \qquad FV = 10\,059.07$$

$$I\% = ? \ 8.00\% \qquad P/Y = 4$$

$$PV = 0 \qquad C/Y = 4$$

$$PMT = -750$$

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.

- What regular payments must Celia make at the end of each year to meet her goal of \$300 000?
- How much interest will she earn over the 20 years?

$$N = 20 \qquad FV = 300\,000$$

$$I\% = 10.8 \qquad P/Y = 1 \qquad b. \ 300000 - 4781.09 \times 20$$

$$PV = 0 \qquad C/Y = 1 \qquad = \$204\,378.20$$

$$PMT = ? \ \$4781.09$$

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?

$$N = ? \ 15.78... \ 16 \text{ (half-years)} \qquad FV = 18000$$

$$I\% = 3.5 \qquad P/Y = 2 \qquad \text{Luis will be 28.}$$

$$PV = 0 \qquad C/Y = 2$$

$$PMT = -1000$$