

Compounded interest | Interest on  
your interest

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

A = future value

P = principal

r = rate as a decimal

n = # times you are compounding in a year

t = # years or portion of a year

Annually = once a year

Semi annually = twice a year

Quarterly = 4 times a year

Monthly = 12 times a year

Bi weekly = 26 times a year

Weekly = 52 times a year

Daily = 365 times a year

Compounded monthly for 48  
months

$$n = 12$$

$$t = 4$$

You deposit \$7,500 at a rate of 6%. Interest is compounded monthly.

What's the value after

a) 8 mos

b) 5 yrs

c) 233 days

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

8 mos

$$A = 7500 \left( 1 + \frac{.06}{12} \right)^{\left[ 12 \cdot \frac{8}{12} \right]} (1.005)^8$$

7805.30

5 yrs

$$A = 7500 \left( 1 + \frac{.06}{12} \right)^{(12 \cdot 5)}$$

\$10,116.38

233  
days

$$A = 7500 \left( 1 + \frac{.06}{12} \right)^{\left( 12 \cdot \frac{233}{365} \right)}$$

\$ 7792.09

Deposit \$5000 for 10 years  
at 8%. Compounded daily

Ⓐ Calculate the future value.

Ⓑ Calculate future value if  
it was simple interest.

Ⓒ Compare the interest earned.

Comp

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

$$A = 5000 \left( 1 + \frac{.08}{365} \right)^{(365 \cdot 10)}$$

$$A = 11,267.3$$

$$I = 6,267.3$$

Simple

$$A = P(1 + rt)$$

$$A = 5000(1 + .08(10))$$

$$A = 9000$$

$$I = 4000$$



\$5,000 for 8 years @ 10%.  
Calculate future value and  
interest compounded:

Ⓐ semiannually

Ⓑ monthly

Ⓒ quarterly

$$A = P \left(1 + \frac{r}{n}\right)^{nt} \quad \left[ \begin{array}{l} \$5000 \\ @ 10\% \\ 8 \text{ yrs} \end{array} \right]$$

semi:  $A = 5000 \left(1 + \frac{.1}{2}\right)^{2 \cdot 8}$

$$A = 10914.37$$

$$I = 5914.37$$

monthly:  $A = 5000 \left(1 + \frac{.1}{12}\right)^{12 \cdot 8}$

$$A = 11,090.88$$

$$I = 6090.88$$

quarterly:  $A = 5000 \left(1 + \frac{.1}{4}\right)^{4 \cdot 8}$

$$A = 11,018.78$$

$$I = 6018.78$$

## APR = Annual Percentage Rate

Converts any compound interest rate to a simple interest rate so you can compare interest rate quotes.

① Use compound interest formula

② Calculate interest earned

$$I = A - P$$

③ Divide interest by principal

$$APR = \frac{I}{P}$$

Calculate the APR on a deposit of \$12,000 at a rate of 6.25% compounded monthly for 1 year.

$$A = P \left( 1 + \frac{r}{n} \right)^{nt}$$

$$A = 12,000 \left( 1 + \frac{.0625}{12} \right)^{12 \cdot 1}$$

$$① A = 12,771.86$$

$$② \text{Interest} = 12,771.86 - 12,000.00$$

$$= 771.86$$

$$③ \text{APR} = \frac{.771.86}{12,000.00} = 0.0643$$

$$= 6.43\%$$

Interest compounded  
continuously (instantaneously)

$$A = Pe^{rt}$$

A = future value

P = principal

e = exponential  
base (= 2.718)

r = interest rate as  
a decimal

t = years

