

# Compound Interest

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

A = Future Value

P = principle (original amount)

r = interest rate (as a decimal)

n = # of times the rate is compounded per year

t = # of years (term)

\$1000 investment, rate of 12%  
compounded daily for  
one year. Find F.V. (A)

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

$$A = \$1000 \left( 1 + \frac{0.12}{365} \right)^{365-1}$$

$$A = \$1127.47$$

\$1000 investment at 6% for 5 years, compounded quarterly. Find Future Value.

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

$$A = 1000 \left( 1 + \frac{0.06}{4} \right)^{4 \cdot 5}$$

$$A = \$1346.86$$

Find the future value of a  
\$100 000 investment that  
is compounded semi-annually  
for 3 years at 9%

Hand in your answer  
😊

Find the amount of interest gained on a \$5000 investment at a rate of 6% per annum, compounded semi-annually for 5 years.

Step 1 find F.V. (A)

Step 2  $A - P = \text{Interest amount}$

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

$$A = 5000 \left( 1 + \frac{0.06}{2} \right)^{2 \cdot 5}$$

$$A = \$6719.58$$

$$\text{Interest} = A - P$$

$$= 6719.58 - 5000$$

$$= \$1719.58$$

Find the amount of interest earned on a \$2000 investment at a rate of 7% per annum, compounded bi-weekly for 3 years.

To be handed in

Your investment is currently worth \$29 252.63. If your original principle was compounded quarterly for 20 years at 8% what was the original principle?

$$A = P(1 + \frac{r}{n})^{n \cdot t}$$

$$29\ 252.63 = P \left( 1 + \frac{0.08}{4} \right)^{4 \cdot 20}$$

$$\frac{29\ 252.63}{(1.02)^{80}} = \frac{P (1.02)^{80}}{(1.02)^{80}}$$

$$P = \$6000$$

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Example for you to hand in  
Your investment is  
currently worth  
\$6162.93. If the  
original principle was  
compounded daily for 12  
years at 6% what was  
the original principle?

You invest \$1500 for 3 years compounded semi-annually. The F.V. of your investment is \$2127.79. What was the annual interest rate?

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

$$\frac{2127.79}{1500} = \frac{1500 \left( 1 + \frac{r}{2} \right)^{2 \cdot 3}}{1500}$$

$$\left( 1.418527 \right)^{\frac{1}{6}} = \left[ \left( 1 + \frac{r}{2} \right)^6 \right]^{\frac{1}{6}}$$

$1.06 \approx 1 + \frac{r}{2}$   
 $0.06 = \frac{r}{2}$

mult. both sides by 2  
 $0.12 = r$   
 $\frac{2(0.06) = \left( \frac{r}{2} \right)^2}{0.12 = r}$   
 $\times 100\%$   
 $r = 12\%$

You invest \$10 000 for 16 years compounded daily. The future value is \$18 964.14. What was the annual interest rate?