

Compound Interest

Name: _____

How much will you have or pay?

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

Where:

A = Principle plus Interest (balance after t years)

P = principal (what you start with)

r = annual rate of interest (as a decimal)

n = number of compounding periods per year

t = number of years

NOTE: When the compounding period is large ($n > 365$), then our compound interest formula is very close to another more complex compound interest method, continuous compounding where: $A = Pe^{rt}$

We will not use this as continuous compounding is an exponential calculation that uses a special irrational number with a value of $e = 2.71828$ (approx.). It is computed on most calculator's e^x key. This goes beyond our Personal & Business Finance class and is typically taught in advanced math classes like calculus.

Example 1: If you have a bank account whose principal = \$1000, and your bank compounds the interest twice a year at an interest rate of 5%, how much money do you have in your account at the year's end?

A = Principal + Interest (What we solve for)

P = \$1,000

r = 5% or .05

n = 2 periods

t = 1 year

$$A = 1000\left(1 + \frac{.05}{2}\right)^{(2 \cdot 1)}$$

$$A = 1000(1 + .025)^{(2)}$$

$$A = 1000(1.025)^{(2)}$$

$$A = \$1050.63$$

Example 2: If you start a bank account with \$10,000 and your bank compounds the interest quarterly at an interest rate of 8%, how much money do you have at the year's end? Assume that you do not add or withdraw any money from the account.

A = Principal + Interest (What we solve for)

P = \$10,000

r = 8% or .08

n = 4 periods

t = 1 year

$$A = 10,000\left(1 + \frac{.08}{4}\right)^{(4 \cdot 1)}$$

$$A = 10,000(1 + .02)^{(4)}$$

$$A = 10,000(1.02)^{(4)}$$

$$A = \$10,824.32$$

Name: _____

1. Your 3 year investment of \$20,000 received 5.2% interest compounded semi annually. What is your total return?
2. You borrowed \$59,000 for 2 years at 11% which was compounded annually. What total will you pay back?
3. Your allowance of \$190 got 11% compounded monthly for $1\frac{2}{3}$ years. What's it worth after the $1\frac{2}{3}$ years?
4. Your $6\frac{1}{4}$ year investment of \$40,000 at 14% compounded quarterly is worth how much now?
5. You borrowed \$1,690 for $5\frac{1}{2}$ years at 5.7% compounded semi annually. What total will you pay back?

6. Your \$440 gets 5.8% compounded annually for 8 years. What will your \$440. be worth in 8 years?

7. Your \$54,200 2 year car loan is at 15.1% compounded annually. What will you have paid for your car after 2 years?

8. You invest \$55 at 10% compounded annually for 3 years. How much will your investment be worth in 3 years?

9. Your 8 year loan of \$12,200 is at 5.3% compounded annually. How much will you have paid in total for your loan?

10. You invest \$1,900 at 4% and it's compounded semi annually for 3 years. How much will your \$1,900 be worth in 3 years?