
What is Compound Interest and How Does it Work?

### Description

Compound interest is simply “earning interest on top of interest.” It’s one of the most powerful ways for ordinary Canadians to accumulate extraordinary wealth over long periods of time.

Below we’ll help you understand the difference between compound and simple interest, as well as how to harness the power of compounding for your own savings and investments.



## What is compound interest?

Compound interest is the notion of earning interest on the money you’ve saved plus *all* accrued interest.

For example, let’s say you put $1,000 into a savings account with a 1.5% compounding interest rate. At the end of your first year, you’ll earn $15 on that $1,000.

Now here’s where it gets interesting: in the second year, your bank will calculate interest based on your initial deposit (the $1,000) *plus* the money you earned in the first year (the $1,015). In your second year, you’ll earn $15.23 — $0.23 more than your first year.

A $0.23 difference may not seem like much. But let’s raise the stakes. Let’s say you’re going to put $10,000 into an investment that earns 5% with interest that compounds annually. If you left that money sitting for 25 years, here’s how it would grow:

| Year | Principal Amount at the Start of the Year | Principal + Interest Accrued at the End of the Year |
|---|---|---|
| 0 | $10,000 | $10,000 |
| 1 | $10,000 | $10,500 |
| 2 | $10,500 | $11,025 |
| 5 | $12,155 | $12,763 |
| 6 | $12,763 | $13,401 |

| | | |
|---|---|---|
| 10 | $15,513 | $16,289 |
| 11 | $16,289 | $17,103 |
| 20 | $25,270 | $26,533 |
| 21 | $26,533 | $27,860 |
| 25 | $32,251 | $33,864 |

For larger principal amounts (with monthly contributions), those earnings could grow immensely. For instance, if you started with $100,000, and you contributed $1,000 monthly to an investment account that earned 6%, you would be a millionaire in 25 years.

### Simple vs. compound interest

Simple interest accumulates *only* on your contributions (what's called your "principal"). With an account that has a simple interest rate, you won't earn interest on top of accrued interest.

Let's go back to our first example above: you deposit $1,000 into an account that has an interest rate of 5%. Instead of a compounding rate, let's say it's a simple one. After the first year, you'll earn $15.

If you don't contribute any more money to the account, you'll earn $15 the second year, too. And the third year, and the fourth, onward. Whereas the compounding interest rate allows you to earn more money each year than the year before, with a simple rate, you earn the same amount.



To be fair, almost all bank accounts and investments have compounding rates (some bank products, such as GICs, have simple interest rates). Often, you'll find simple interest rates offered with certain loans, such as car or personal loans. When you're borrowing money, simple interest rates are more favourable to you, as interest accumulates only on the amount you borrowed, not interest you've already accrued.

## How does compound interest work?

Perhaps the most important part of compound interest is the *compounding period,* or the number of times your money compounds per year.  Generally speaking, the more compounding periods within a year, the faster your money will grow.

In the examples above, we compounded annually, meaning interest was calculated once per year. But compound interest can be calculated semi-annually (twice per year), quarterly (four times a year), monthly (12), even daily. To see how this works in practice, let's compare the growth of $10,000 with a 5% interest rate that compounds annually, quarterly, and monthly.

| Year | Annually @ 5% | Quarterly @ 5% | Monthly @5% |
|---|---|---|---|
| 0 | $10,000 | $10,000 | $10,000 |
| 1 | $10,500 | $10,509 | $10,512 |
| 5 | $12,762 | $12,820 | $12,833 |
| 10 | $16,289 | $16,436 | $16,470 |

# How to calculate compound interest

A compound interest calculator can help you determine how much you'll earn with four simple inputs: your principal amount, interest rate, compound period, and length of time. But if you want to understand how these calculators compute "behind the scenes," here's the compound interest formula:

$A = P \times (1 + r/n)^{n \times t}$

Here "A" is the future value amount, "P" is your principal amount "r" is the interest as a decimal, "n" is the compounding period, and "t" is the years your money is compounding. Here's a closer look at each of these:



- **Future value (A):** Your starting balance (the principal amount) plus interest accrued.
- **Principal (P)**: This is the money you contribute to your investments and savings accounts.
- **Rate (r):** Your compounding interest rate, expressed as a decimal. For instance, if your interest rate is 5%, then you'd use 0.05.
- **Compounding period (n):** This is the number of times your money is compounded per year.This can be annually (n=1), semi-annually (n=2), quarterly (n=4), monthly (12), weekly (52), or daily (365).
- **Time.** This is the length of time you let your money grow, expressed in years. For example, if you're growing your money over 25 years, then your "t" would be 25. For months, be sure to convert into years (6 months = 0.5 years).

# How to take advantage of compound interest

Here are four steps to getting the full benefit of compound interest:

## 1. Start investing when you're young

The longer you leave your money invested, the more *times* it will be compounded. For instance, if you're in your twenties, you could easily have 40 years of compounding ahead of you. That can turn a seemingly meagre amount into a million dollars or more.

As an example, here's what can happen to $10,000 left in an account that compounds annually at 7% , 9%, and 10% over 5, 10, 25, 35, and 40 years.

| Year | 5% | 7% | 10% |
|---|---|---|---|
| 0 | $10,000 | $10,000 | $10,000 |

| | | | |
|---|---|---|---|
| 5 | $12,762 | $14,025 | $16,105 |
| 10 | $16,288 | $19,671 | $25,937 |
| 25 | $33,863 | $54,274 | $108,347 |
| 35 | $55,160 | $106,765 | $281,024 |
| 40 | $70,399 | $149,744 | $452,592 |

That's *if* you don't contribute to your investments. Most investors will contribute frequently to their accounts over their lifetime. The more money you contribute — and the longer you let it sit — the more likely you'll accumulate vast amounts of wealth.

To see the real power of compound interest, let's look at an example with contributions. Let's say you contribute $1,000 every month to an investment portfolio that yields on average 8% annually. Here's how that money would grow over a 30-year period.

| Invest for This Long | With This Much Per Month | Compounded Annually at This Rate | Here's How Much You'll Have |
|---|---|---|---|
| 15 Years | $1,000 | 8% | $325,825 |
| 20 Years | $1,000 | 8% | $549,143 |
| 25 Years | $1,000 | 8% | $877,271 |
| 30 Years | $1,000 | 8% | $1,359,398 |



With compound interest, you'd have over a million after 30 years. What's even better: your contributions would equal $360,000. Your investment earnings would cover the rest ($999,398!)

## 2. Invest in stocks and funds

You won't get an 8% interest rate off savings accounts, GICs, or other bank products. To harness the full potential of compound interest, you'll want to invest in stocks and funds.

To get the highest rate, focus on building a portfolio that reduces market risks and maximizes returns. That might mean combining stocks with other assets, such as bonds.

It will also include diversification. Find a balance between high-risk investments and low-risk ones, and don't feel tempted to chase short gains through risky investment strategies.

Based on your time horizon, here are some types of stocks you might want to consider:

**Longer time horizon (10 years or more):**

- Growth stocks
- Value stocks
- Small-caps
- Micro-caps

**Shorter time horizon (10 years or less):**

- Large-caps
- Blue chips
- Exchange-traded funds (ETFs)
- Index funds
- Safe stocks

## 3. Check APY on savings vehicles

APY (annual percentage yield) is the actual rate of return on an investment or savings account that you'll earn within a year. Assuming you leave your money invested for at least a year, APY packages the compounding frequency of an account (quarterly, monthly, daily) into a simple percentage.

When you're comparing different savings vehicles (like GICs), be sure to compare APYs.

## 4. Avoid carrying debts with compound interest

You'll want to avoid debts on things like credit cards and certain personal loans. A credit card, for instance, usually has a high APR, such as 19.99%. If you don't pay off what you borrow on a credit card before the due date, the amount that you borrow will compound daily. It's an investment in reverse: you'll owe more the longer the wait to pay off your balance.



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