

What is interest?

Interest: calculated as a percentage of a principal balance that is paid periodically to the lender or the investor.

(usually quoted as an annual rate but can be calculated for periods that are longer or shorter than one year.)

Paying Interest:

Interest means we repay (pay back) more than what was borrowed. This is because we need to repay the principal amount as well as interest to compensate the lender for the risk of them lending us money.

Earning Interest:

If you deposit money into a savings account, the bank can invest the funds and in exchange, you earn interest on the principal amount. However, this depends on how well the investment does.

Interest

How much we pay in interest depends on three things:

1. The Interest Rate
2. The Principal Amount
3. Time to Repay/Time sitting in investment

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An interest rate is usually an annual percentage of the balance, referred to as APR (annual percentage rate)

The **prime interest rate** is the rate financial institutions charge their most credit worthy (or prime) customers. This rate is largely determined by the national interest rate which is set by the Bank of Canada.

Currently, the prime rate is 2.45%. So if you apply for a loan, you may get an interest rate that says "prime +10%" which means 12.55% total.

Variable: A variable interest rate fluctuates over time. This is also called an adjustable interest rate or a floating interest rate.

Fixed: A fixed interest rate is unchanging.

How much we pay in interest depends on three things:

1. The Interest Rate

2. The Principal Amount

3. Time to Repay/Time sitting in investment

Principal Amount: the original amount of money borrowed or invested.

Total Accrued Amount: total amount over time (including principal and all interest)

The time to repay or time sitting in an investment is different with every situation.

How much we pay in interest depends on three things:

1. The Interest Rate
2. The Principal Amount
3. Time to Repay/Time sitting in investment

All of these factors are taken into consideration through formulas.

Interest

There are two different methods for calculating interest:

1. Simple Interest
2. Compound Interest

Simple Interest: interest is calculated a percentage of the principal amount multiplied by the number of periods.

% OF Principal * Time Periods

$$I = r \cdot p \cdot t$$

Simple Interest Formula

$$I = P \times R \times T$$

Where:

I = the Interest Money created in dollars
P = the "Principal" starting amount of money
R = the Interest Rate per year (in decimal form)
T = the Time the money is Invested,
or Borrowed, in Years

The total accrued amount is the principal amount plus the interest:

$$A = P + I$$

$$A = P + (p \cdot r \cdot t)$$

Theorem (Amount: Simple Interest)

$$\begin{aligned} A &= P + Prt \\ &= P(1 + rt) \end{aligned}$$

- A = amount, or future value
- P = principal, or present value
- r = annual simple interest rate (written as a decimal)

Simple Interest Example:

If simple interest is charged at 5% on a \$10 000 loan that is taken out for three years, what is the total amount of interest payable by the borrower?

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$$I = prt$$

$$I = (10000)(0.05)(3)$$

$$I = \$1500$$

this is the total interest over the three years. So per year:

$$\$1500/3 = \$500$$

Simple Interest Worksheets

Interest

There are two different methods for calculating interest:

1. Simple Interest
2. Compound Interest

Simple Interest: interest is calculated a percentage of the principal amount multiplied by the number of periods.

Compound Interest: interest is calculated on the principal amount and the interest earned in previous periods. (Interest is earned upon interest which allows for the amount of the loan, deposit, or investment to grow quicker than with simple interest.)

The Compound Interest Formula

The diagram shows the compound interest formula $A = P \left(1 + \frac{r}{n}\right)^{nt}$ centered in a light orange rounded rectangle. Five white rounded rectangles with arrows point to the variables: 'Amount' points to 'A', 'Interest Rate (decimal)' points to 'r', 'Time' points to 't', 'Principal' points to 'P', and 'Number of times interest is compounded per unit 't'' points to 'n'.

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

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If you want to calculate just the interest, you would do:

$I = A - P$, so use the equation above and subtract p .

Simple Interest Example (From Before):

If simple interest is charged at 5% on a \$10 000 loan that is taken out for three years, what is the total amount of interest payable by the borrower?

$$I = prt$$

$$I = (10000)(0.05)(3)$$

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this is the total interest over the three years. So per year:

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Compound Interest Example (Same numbers):

If **compound interest** is charged at 5% on a \$10 000 loan that is taken out for three years, what is the total amount of interest payable by the borrower?

$$I = p(1+r/n)^{nt} - p$$

$$I = 10\,000 (1+0.05/1)^{(1*3)} - 10\,000$$

$$I = 10\,000 (1.05)^3 - 10\,000$$

$$I = 10\,000 (1.157625) - 10\,000$$

$$I = 11576.25 - 10\,000$$

$$I = 1576.25$$

Interest

 <https://www.youtube.com/watch?v=jQg5Wt-VJpk>