



Math Help Sheet: Interest

Interest is the cost of borrowing money, or the money earned when saving or investing.

If you have ever taken out a loan from a bank, they charged you interest on the money you borrowed. If you have a savings account, you are lending the bank your money and they pay you interest on the money they borrowed from you. When you use a credit card, you are borrowing money from the credit card company, and they charge you interest for that money. Interest is usually calculated as a percentage of the amount borrowed. There is simple interest and there is compound interest. We will look at both.

There is a big difference between simple and compound interest.

Simple interest is interest that is calculated on the original principal or investment. With simple interest the amount charged per day, month, or year stays the same. There is a formula for simple interest, which is shown below:

$$\text{Interest} = \text{Principal} \times \text{Interest Rate} \times \text{Time}$$

or $I = prt$

Simple Interest

Example: Find the amount of simple interest on a \$2500 loan with an annual interest rate of 6% for 4 years.

Step 1: List what we are given.

Principal = \$2500

Interest Rate = 6% = .06

Time = 4 years

Step 2: Substitute the given values into the formula.

Interest = Principal x Interest Rate x Time

Interest = \$2500 x .06 x 4 = \$600

Answer: The amount of interest = \$600

To find the final amount that will be paid on the loan, add the principal and the interest.

Final Amount = Principal + Interest

Final Amount = \$2500 + \$600 = \$3100

So, if we borrow \$2500 we will have to pay back a total of \$3100.

For interest rates that are a portion of a year you must adjust the time when using the formula. For example, if interest is 6% for 1 month, time = 1/12. For 2 months, time = 2/12, for 3 months, time = 3/12, and so on.

Compound interest is interest calculated on the original principal or investment plus the accumulated interest. With compound interest, the amount charged changes each new day, month, or year.

Let's look at the same loan as in the example above, but using compound interest instead of simple interest.

Compound Interest

Example: Find the amount of compound interest on a \$2500 loan with an annual interest rate of 6% for 4 years.

Step 1: List what we are given.

Principal = \$2500

Interest Rate = 6% = .06 (compounded annually)

Time = 4 years

Step 2: Calculate the interest for each year, then add the interest to the principal to find the new principal amount.

First Year Interest: $\$2500 \times .06 \times 1 = \150

Principal + Interest = $\$2500 + \$150 = \$2650$

Second Year Interest: $\$2650 \times .06 \times 1 = \159

Principal + Interest = $\$2650 + \$159 = \$2809$

Third Year Interest: $\$2809 \times .06 \times 1 = \168.54

Principal + Interest = $\$2809 + \$168.54 = \$2977.54$

Fourth Year Interest: $\$2977.54 \times .06 \times 1 = \178.65

Principal + Interest = $\$2977.54 + \$178.65 = \$3156.19$

Note that our result is the final amount owed. To find the compound interest we must subtract the principal from the final amount.

Interest = Final Amount – Principal

Answer: Interest = $\$3156.19 - \$2500 = \$656.19$

Notice the difference between the simple and the compound interest in our example.

Compound interest is \$56.19 greater than the simple interest. $\$656.19 - \$600 = \$56.19$

So is simple interest or compound interest better? It depends on the situation. If you are saving, compound interest allows your money to grow at a faster rate, so compound interest is better. If you are borrowing, compound interest will have you paying more interest on the money you borrow. So when borrowing money, simple interest is better.