



**Al-Ayen University**

College of Petroleum Engineering

**Lecture(13) : Types of interest rate**

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## Lecture(13)

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### Types of Interest

Simple (regular) interest, accrued interest, and compounding interest.

الفائدة البسيطة (العادية) والفائدة المتراكمة والفائدة المركبة.

#### What are the Different Types of Interest?

The three types of interest include [simple \(regular\) interest](#), [accrued interest](#), and [compounding interest](#). When money is borrowed, usually through the means of a [loan](#), the borrower is required to pay the [interest](#) agreed upon by the two parties.

تشمل الأنواع الثلاثة للفائدة البسيطة (العادية) والفائدة المتراكمة والفائدة المركبة. عندما يتم اقتراض الأموال ، عادة عن طريق القرض ، يتعين على المقرض دفع الفائدة المتفق عليها بين الطرفين.

#### 1-Simple (Regular) Interest فائدة بسيطة (عادية)

[Simple or regular interest](#) is the amount of interest due on the loan, based on the principal loan outstanding.

الفائدة البسيطة أو العادية هي مقدار الفائدة المستحقة على القرض ، بناءً على القرض الأساسي القائم.

#### Example:

For example, if an individual borrows \$2,000 with a 3% annual interest rate, the loan would require a \$60 interest payment per year ( $\$2,000 * 3\% = \$60$ ).

## 2- Accrued Interest الفائده المتراكمه

Accrued interest is accumulated interest that is unpaid until the end of the period. If a loan requires monthly payments (at the end of each month), interest steadily accumulates throughout the month.

الفائده المتراكمة هي الفائده المتراكمة غير المدفوعة حتى نهاية الفترة. إذا كان القرض يتطلب دفعات شهرية (في نهاية كل شهر) ، فإن الفائده تتراكم بشكل ثابت طوال الشهر.

### Example:

If \$30 is the interest expense each month, the loan is accruing \$1 of interest each day that requires payment once the end of the month is reached. In this example, by day 15, the loan will have accumulated \$15 in accrued interest (but require payment once \$30 is reached).

### Key Difference (Simple Interest vs. Accrued Interest):

The difference between these two types of interest are that regular interest is paid periodically (determined by the loan agreement), and accrued interest continues to be owed to the lender over time.

الفرق بين هذين النوعين من الفائده هو أن الفائده المنتظمة تُدفع بشكل دوري (تحددها اتفاقية القرض) ، وتستمر الفائده التراكمه للمقرض بمرور الوقت.

## 3-Compound Interest

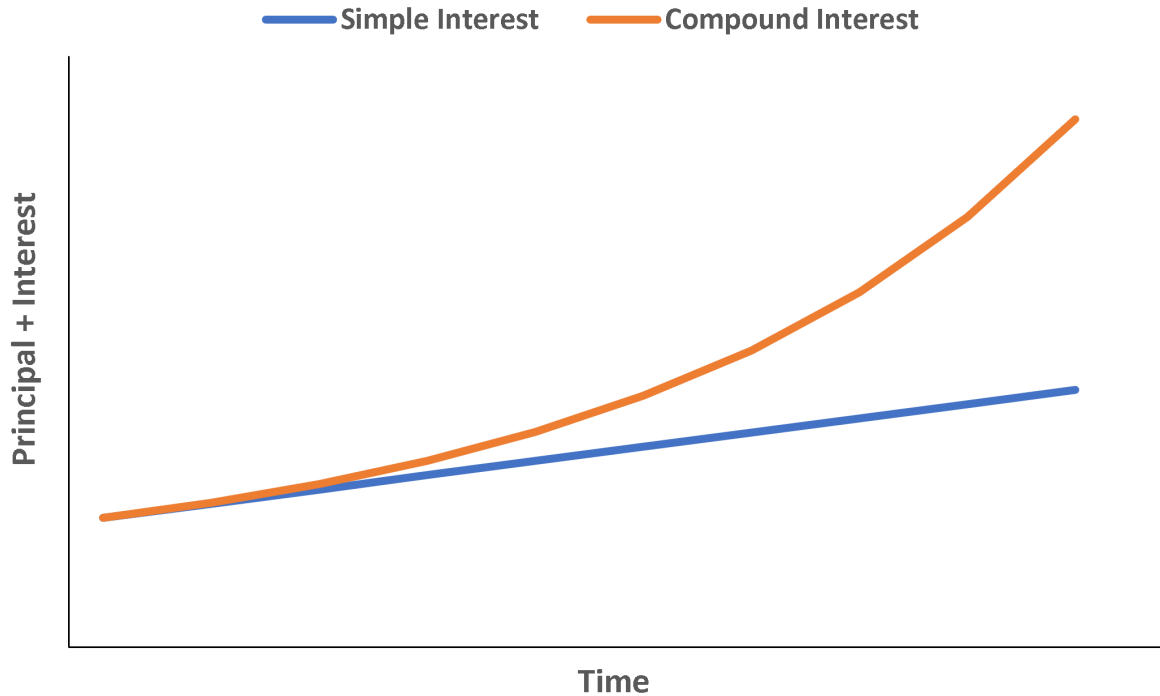
Compounding interest essentially means “interest on interest.” The interest payments change each period instead of staying fixed. Simple interest is based solely on the principal outstanding, whereas compound interest uses the principal and the previously earned interest.

### Example:

If a person borrowed \$1,000 with 2% interest and has \$100 of accrued interest, then that year’s interest would be \$22. It is because the interest is paid on the principal (\$1000) and the accrued interest (\$100), for a total of \$1100. 2% of \$1100 is \$22.

### Key Difference (Simple Interest vs. Compound Interest)

## Simple vs. Compound Interest



If you put \$5,000 in a bank account that earns 4% interest a year, you will have \$5,200 by the end of the year. Now, if you keep the \$5,200 in the bank for another year, you will have \$5,408.

$$5,000 + 5,000 \times 0.04 = 5200$$

$$5200 + 5200 \times 0.04 = 5408$$

### Simple

Simple interest would be the equivalent of receiving \$5,200 after the first year, withdrawing the \$200, and then having \$5,000 before the next period. Every period the individual will receive \$200.

### Compounding

Compounding interest would increase the interest payments since you are receiving interest on your interest. If the individual left the \$5,200 in their bank account, they would have \$5,408 by the end of

the next period (which is a \$208 gain instead of the \$200 with simple interest). This shows the power of compounding interest.

## Compound Interest Formula:

**How to calculate compound interest?**

### What is the Compound Interest Formula?

To start, it's important to understand first what compound interest is. Compound interest is taken from the initial – or principal – amount on a loan or a deposit, plus any interest that already accrued. The compound interest formula is the way that such compound interest is determined.

ما هي صيغة الفائدة المركبة؟

للبدء ، من المهم أن نفهم أولاً ما هي الفائدة المركبة. يتم أخذ الفائدة المركبة من المبلغ الأولي - أو الأساسي - على قرض أو وديعة ، بالإضافة إلى أي فائدة مستحقة بالفعل. صيغة الفائدة المركبة هي الطريقة التي يتم بها تحديد هذه الفائدة المركبة

Compound interest accrues over the period a [loan](#) or a deposit is outstanding. How it accrues depends on how often it compounds. The compound interest will be higher, the more compounding periods there are. What exactly does that mean? If, for example, a \$1,000 loan comes with a 2% semi-annual compounding interest rate, it will generate a more accrued compound interest than the same loan amount that is compounded at 4% annually.

تراكم الفائدة على مدى فترة القرض أو الوديعة المستحقة. تعتمد كيفية تراكمها على عدد مرات تراكمها. ستكون الفائدة المركبة أعلى ، وكلما زادت فترات التعقيد. بالضبط ما الذي يعنيه ذلك؟ إذا كان ، على سبيل المثال ، قرض بقيمة 1000 دولار يأتي بمعدل فائدة مركب نصف سنوي بنسبة 2٪ ، فسوف ينتج عنه فائدة مركبة مستحقة أكثر من نفس مبلغ القرض الذي يتراكم بنسبة 4٪ سنويًا.

### How to Calculate Compound Interest

The compound interest formula is as follows:

$$T = PA\left(1 + \frac{roi}{t}\right)^{ty}$$

Where:

- **T** = Total accrued, including interest
- **PA** = Principal amount
- **roi** = The annual rate of interest for the amount borrowed or deposited
- **t** = The number of times the interest compounds yearly
- **y** = The number of years the principal amount has been borrowed or deposited

### Practical Example:

Let's put some numbers into the above formula to make it clearer. For this example, let's say that a \$1,000 loan **قرض** is offered **تقديم**, with an [interest rate](#) of 5%, which is compounded semi-annually **نصف سنويه**. If the loan is extended for five years, what would the balance for repayment be?

$$T = 1,000 \left(1 + \frac{0.050}{2}\right)^{2(5)}$$

After five years, the total amount owed would be \$1,280.08. The calculation would work in the same way when speaking of a \$1,000 amount deposited into a bank receiving the same compounded interest. After five years, the total would be valued at \$1,280.08.

It should be noted that in solving only for compound interest, the principal amount of the loan or [deposit](#) would need to be subtracted from the total.

Compound interest is of great importance for those who have deposited money or made an investment because it enables them to

earn an increasing amount of income off of an initial investment. It is valuable to [lenders](#) المقرضين because it adds additional income on top of the amount lent to a borrower المستعير.