

## Interest Rate Calculation

The following is a description of how interest is calculated and credited to your **Voya Fixed Account**. This methodology does not apply to **Individual Single Premium Deferred Annuity Contracts**, which use a **New Money Rate methodology**. All rates and examples are purely illustrative.

**Rates:** The interest rates that you are quoted are annual effective yields. The amount of interest a single deposit earns for the period of one year is **equal** to your initial investment multiplied by this yield.

**For example:**

\$1,000 invested at an annual effective yield of 5.00%, after a one year period earns \$50.00 in interest.

$$\$1,000.00 \times 5.00\% = \$50.00$$

Your Voya Fixed Account option credits interest daily using compound interest based upon the annual yield. The account value can be found using the following formula:

$$V = P \times (1 + R)^{(D/Y)}$$

V = Account Value

P = Principal or Invested Funds

R = Stated Interest Rate

D = Total number of days where interest is earned

Y = Total Number of days in the calendar year (Normally 365, but 366 for Leap Years)

^ is an exponential symbol that indicates that the quantity (1 + R) is raised to the power of (D/Y)

Voya Retirement Insurance and Annuity Company (VRIAC) credits interest using this Compound Interest Rate formula. This formula is commonly confused with a Simple Interest Rate calculation. When crediting simple interest, the amount of interest earned is constant over time. In other words, interest is only earned on your invested principal. By using the compounding interest calculation, the interest your principal earns is always being reinvested to earn additional interest. See below for a description of how a Simple Interest calculation differs from a Compound Interest calculation.

### **Factors in the Formula and where to get this information:**

#### **Account Value (V):**

Your account value will be listed on your statement or accessible by our customer service team and available for comparison with the calculated Account Value (V).

#### **Principal or Invested Funds (P):**

These amounts and dates are accessible through our customer service team and may appear on transaction statements that you receive from us.

#### **Stated Interest Rate (R):**

Your statement will list the rate currently being credited to your account. Be sure to reflect changes in the credited rate during the calculation period. Example: If your rate was 5.00% as of January 1, 2014 and changed to 5.25% as of February 1, 2014 and you were calculating interest for January and February, then the calculation should reflect:

$$(1 + 5.00\%)^{(31/365)} \times (1 + 5.25\%)^{(28/365)}$$

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### Total number of days where interest is earned (D):

**Effective dates** - Your statement reflects interest earned up to and including the **last business day** of the reporting period in which the New York Stock Exchange is open. The last business day may not be **the last calendar day** of the month. If this is the case, interest for the remaining day(s) in the reporting period will be reported on the next business day and will be reported on your next statement. (Example: Friday falls on the 29<sup>th</sup> of the month, and there are 31 days in the month, the last two calendar days worth of interest will be reported on the next business day of the following month).

**Counting Days:** When counting days, be sure to begin counting with the first day since the balance listed is the beginning of day balance (or the end of the previous day's balance). Meaning the days between January 25<sup>th</sup> (beginning of day) and January 31<sup>st</sup> (end of day), is seven. You start counting with 25th etc...

**Days in a Month:** Because each month does not contain an equal number of days, interest for any given month can vary significantly.

For example:

1. Account A has \$10,000.00 of principal on the first day of a 30 day month, at an annual effective yield of 5.00%. The end of the month account balance would equal:  
Account Value =  $10,000.00 \times (1 + 5.00\%)^{(30/365)} = \$10,040.18$
2. Account A at the end of a 31 day month with the same principal would equal  
Account Value =  $\$10,000.00 \times (1 + 5.00\%)^{(31/365)} = \$10,041.52$

### Days in a Year (Y):

This is the number of days included in the current calendar year. Most years include 365 days, while a Leap Year includes 366 days.

### Example:

This example brings together a number of the concepts described above. It assumes a normal calendar year (365 days), the Compound Interest formula, and the following:

P = Mr. Smith has an account value on January 1st of \$10,000.00

R = The annual effective yield is 5.00%

Mr. Smith made two deposits for the entire year:

January 5th - \$150.00

January 25th - \$200.00

To calculate Mr. Smith's account value as of **January 31st**:

1. Take his initial account balance, accumulated with interest to the day of his first deposit:

$$P \times (1 + R)^{(D/Y)} = V$$

$$\$10,000.00 \times (1.050)^{(5/365)} = \$10,006.69$$

2. Add the deposit of \$150.00 on January 5th;

$$\$10,006.69 + \$150.00 = \$10,156.69$$

3. Accumulate the January 5th account value to the next deposit day, January 25th:

$$P \times (1 + R)^{(D/Y)} = V$$

$$\$10,156.69 \times (1.050)^{(20/365)} = \$10,183.88$$

4. Add the deposit of \$200.00:

$$\$10,183.88 + \$200.00 = \$10,383.88$$

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5. Mr. Smith's account value on **January 31st**:

$$P \times (1 + R)^{(D/Y)} = V$$
$$\$10,383.88 \times (1.050)^{(6/365)} = \$10,392.21$$

6. Mr. Smith's account value on **March 31st**:

$$P \times (1 + R)^{(D/Y)} = V$$
$$\$10,392.21 \times (1.050)^{(59/365)} = \$10,474.49$$

### Simple versus Compound Interest Calculations:

The following formulas illustrate the differences between the calculations (all examples assume a 365 day calendar year):

#### Simple Interest

$$V = P \times (1 + (D/Y) \times R)$$

#### Compound Interest

$$V = P \times ((1 + R)^{(D/Y)})$$

### 6 Month Example

For periods less than one year, simple interest credits an equal amount of interest daily. The amount of compound interest increases each day credited. Therefore, for time periods less than one year, simple interest credits a greater amount of interest on a daily basis, with both being equal at the end of one year.

$$V = \$100 \times (1 + (184/365) \times 5.00\%)$$
$$V = \$102.52$$

$$V = \$100 \times ((1 + 5.00\%)^{(184/365)})$$
$$V = \$102.49$$

### 1 Year Example

For periods of one year, simple and compound interest yield the same dollar amount of interest.

$$V = \$100 \times (1 + (365/365) \times 5.00\%)$$
$$V = \$105.00$$

$$V = \$100 \times ((1 + 5.00\%)^{(365/365)})$$
$$V = \$105.00$$

### 3 Year Example

With compound interest, the interest earned each day is reinvested to earn additional interest. This creates the compounding effect.

$$V = \$10,000 \times (1 + (1095/365) \times 5.00\%)$$
$$V = \$11,500.00$$

$$V = \$10,000 \times ((1 + 5.00\%)^{(1095/365)})$$
$$V = \$11,576.25$$

The long-term benefits of compounding interest can be easily seen in these illustrations.

Annuities issued by Voya Retirement Insurance and Annuity Company (VRIAC). For more complete information on the Voya Fixed Account, please refer to the appropriate information booklet.

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