Future Value of a Single Amount

(Cheat Sheet)

Accounting Coach®

Future Value of a Single Amount

The future value of a single is commonly known as the future value of 1. It begins with one amount (a single, one-time deposit) at time period 0, which is the *beginning of period 1*. It is also common to assume that the interest earned is added at the *end of each time period* at the specified rate of interest.

Compounding of Interest

In the future value of a single amount, it is assumed that the interest added at the end of a time period will also earn interest in the next time period. When the interest also earns interest, it is known as the *compounding of interest*. A single deposit that remains invested for *many years* at a *high rate of interest* will result in a very large amount.

Example 1. Let's assume that someone inherits $100,000 and the amount is deposited in an investment that is not taxed until the money is withdrawn. Let's also assume the money is never withdrawn and the investment earns a consistent 10% per year compounded annually. The following table illustrates how the single deposit of $100,000 will grow as a result of the compounding at 10% per year. (The amounts are approximate due to rounding.)

	Interest Earned During the Year *	Future Value at End of Year
Year 0		$ 100,000
Year 1	$ 10,000	$ 110,000
Year 2	$ 11,000	$ 121,000
Year 3	$ 12,100	$ 133,100
Year 4	$ 13,310	$ 146,410
Year 5	$ 14,641	$ 161,051
Year 6	$ 16,105	$ 177,156
Year 7	$ 17,716	$ 194,872
Year 10	$ 23,580	$ 259,374
Year 20	$ 61,159	$ 672,750
Year 30	$ 158,631	$ 1,744,940
Year 40	$ 411,448	$ 4,525,926

* The interest earned during a *one-year period* is 10% of the future value at the start of that year, (which is also the ending balance of the previous year). For example, the interest earned in Year 4 is $13,310 (10% of $133,100 the balance at the end of Year 3). In year 40, the interest earned during that year single year is $411,448 (10% of $4,114,479 which is the balance at the end of Year 39 which is not shown).

Rule of 72

The *rule of 72* is a quick way to approximate either:

- the *number of years* needed for an amount to double, or
- the *interest rate* needed in order for an amount to double

Example 2. To illustrate how to approximate the *number of years needed* for an amount to double using the rule of 72, let's assume that the amount (or deposit) will earn 10% per year with the interest compounded at the end of each year. To determine the approximate *number of years needed* for the amount to double, you divide 72 by the interest rate to be earned. Hence 72 divided by 10 (the annual interest rate) = *7.2 years*.

In the table from Example 1, you will see that at the end of 7 years the future value is $194,872. This is nearly double the initial deposit of $100,000. At 7.2 years, the amount will be extremely close to $200,000 or double the $100,000 deposit.

Example 3. To illustrate how to approximate the *interest rate needed* for an amount to double using the rule of 72, let's assume you want an amount to double in 7 years. Assuming compound interest, the approximate annual interest rate will need to be 10.3% (72 divided by 7 years).

Future Value of 1 Tables

In a classroom setting, future value of 1 (FV of 1) table which displays the *future value factors* is often used for instruction purposes. For instance if you looked at an FV of 1 table, under the column with the heading of 10% and selected the row where the number of periods is 7, you would see the factor "1.94872". This tells you that if $1 is invested at 10% and the interest is compounded annually for 7 annual periods, the $1 will grow to $1.95. Therefore, if you invest $100,000 at 10% interest for 7 years, it will grow to a future value of $194,872 ($100,000 X 1.94872). Note that this is the same as the amount we have in the table above.

Frequency of Compounded Interest

If the compounding of interest is done quarterly (instead of annually) for 7 years, the annual rate of 10% would be restated to be 2.5% per quarterly period; and the 7 annual periods will be restated to be 28 quarterly periods. The more frequent the compounding, the greater will be the future value.

Calculators

Instead of using a *future value table* or the *rule of 72*, it will be more precise and faster to search for and use an online financial calculator. Electronic handheld financial calculators are also available.