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## What is the Rule of 72?

The rule of 72 is a very easy way to calculate how long it takes for a variable [X] to double if it is growing at a given interest rate [r]. Here is how it works. Suppose that you have \$100 in a bank or other financial institution that pays 8 percent per year. The approximate doubling time of your money in years is given by:

$$\text{Doubling time} = \frac{72}{8} = 9 \text{ years.}$$

That is, whenever you want to estimate how long it will take for something to double when it is growing at r percent per year just divide 72 by r. A little rounding probably won't hurt you very much. If the growth rate (interest rate) were 7.8 percent, you still get a 'pretty good answer' if you round r=7.8 percent to an even 8.0 percent.

Here is another example. The world's population is growing at the rate of about 2 percent a year. How long will it take for the world's population to double? The answer is about 36 years, but be careful because not much of anything grows at a constant rate for that long.

You can also use the rule of 72 in reverse. If something (say the population of Las Cruces, NM) doubled in 24 years, at what percent per year was the population growing. The answer is about 3 percent per year.

The rule of 72 is a rule of thumb. It works fairly well for growth or interest rates that we might use frequently (that is values of r from 1 or 2 percent to 10 or 12 percent). The rule of 72 does not work very well for extremely large or small values of r.

Where does the rule of 72 come from? There is no proof for the rule of 72. Ultimately, the rule of 72 is related to the following formula for the future value (FV) of a given present value (PV).

$$FV = PV (1 + r)^n$$

If we set the future value at 2 and the present value at 1 (that is, the future value is double the present value), then the formula may be written as:

$2 = (1 + r)^n$  One way to 'solve this problem is to take the natural logarithm of both sides of the equation. Now, the natural log of 2 is very close to 0.70 (0.693147) –a number that when multiplied by 100 is 70. For our approximation, a lot of people found that 72 works pretty well (sometimes better than 70) but you will also find references to the rule of 70.