

Future Value of a Lump Sum Investment

$$\text{Future Value} = \text{Principal} * (1 + \text{Rate})^{\text{Time}}$$

Future Value of a Series of Investments

$$\text{Future Value} = \text{Deposit} * \frac{(1 + \text{Rate})^{\text{Time}} - 1}{\text{Rate}}$$

1) Your grandaunt, Isabelle Ringing, just recently passed away and left you, her favorite grand-neice/grand-nephew, \$10,000. She always told you how important it was to save money for a rainy day. Resisting the urge to blow the entire amount on durable and non-durable consumer items, you put the money into an investment that earns 10% over 10 years. How much will you have at the end of 10 years? Is this enough for a car or a down payment on a house?

\$10000
10%
10 years

Single investment
lump sum investment
lump sum principal
"Top Table"

10%
10 years
"future value multiplier"

\$10000 single investment
* 2.594
\$25,940 after 10 years

2) Ben Dover is thirty years old. This year, he plans to start putting \$5,000 per year into a Roth IRA (What's a Roth IRA? It's a retirement account.) and will continue to do so until age sixty, a total of 30 years. At 10% annually, how much will Ben have in his Roth IRA?

\$5000 per year
10%
30 years

Series of deposits
stream of investments
stream of payments
"Bottom table"

10%
30 years
"future value multiplier"

\$5000 per year
* 164.494
\$822,470 after 30 years

How much did he invest over 30 years?
\$5000 per year
* 30 years
\$150,000 invested

3) Eileen Forward, Ben's cousin, is 20 years old. She puts \$5,000 into a Roth IRA until age 30, only 10 years and then stops making contributions. With the same 10% annual rate, how much will Eileen have at age 60? (Hint: You'll need both future value tables.) Since Ben is saving \$5,000 for 30 years while Eileen is only saving \$5,000 for 10 years, Ben is sure that he'll have much more money than Eileen. Is he right?

\$5000 per year
10%
10 years, then stop and hold for 30 years

① age 20
age 30

Series of deposits
\$5000 per year
10% - 10 years
\$5000
* 15.937
\$79,685 after 10 years

② holds for 30 years
lump sum principal
\$79,685
10% - 30 years
\$79,685
* 17.449
\$1,390,423.50

How much did she invest?
\$5000 per year
* 10 years
\$50,000 invested

4) Neil Downe, their friend, is 18 years old. He is already a Fourbucks, uh, Fivebucks, sorry, Starbucks addict. He stops by there at least once a day. Ben & Eileen are trying to get him to give up his habit and place the money into a Roth IRA. If he puts just \$2 per day, \$60 per month, into the same Roth IRA, how much will he have at age 68? What if he saves \$5 per day, \$150 per month?

\$5 per day
\$150 per month
\$1800 per year
10% - 50 years

Series of deposits
\$1800 per year
10% - 50 years

\$1800
* 1163.909
\$2,095,036.20!

How much did he invest?
\$1800 per year
15 years
\$9000 invested

5) Now try some other compound rates of return. Recalculate the above problems for 5%, 8%, 12% and 13%.