



How does \$100 become \$200 without working?

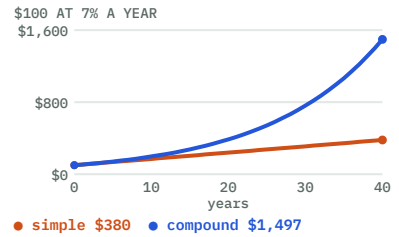
Simple against compound interest; the formula one year at a time; the rule of 72 for money and for prices; why the start age matters; the real return and where the 7% comes from.

1

Simple vs compound

interest on interest

- **Interest** = what a bank pays you for keeping your money → 10% a year on \$100 = \$10
- **Simple interest**: “interest paid only on the original amount, the same each year”
- **Compound interest**: “interest earned on the original amount and on the interest added before”
- \$100 at 10%: year 1 → \$110 both · year 2 → simple \$120 vs compound **\$121** (10% of \$110 = \$11) · year 3 → \$130 vs \$133
- \$1,000 at 10%: \$1,100 → \$1,210 → **\$1,331** vs simple \$1,300 → gap \$31 = interest on interest
- \$100 at 7% for 40 years: simple **\$380** vs compound **\$1,497** → about **4 x**; gap tiny at first, then ever wider



2

The formula

× 1.07 per year

- Rule in words: each year total × **1.07** = the 100% you had + 7% more
- $100 \times 1.07 = 107 \rightarrow 100 \times 1.07 \times 1.07 \approx 114 \rightarrow \text{after } t \text{ years } 100 \times 1.07^t$
- \$100 at 7%: 10 years ≈ **\$197** · 20 ≈ \$387 · 30 ≈ \$761 · 40 ≈ **\$1,497**

3

Rule of 72

years to double

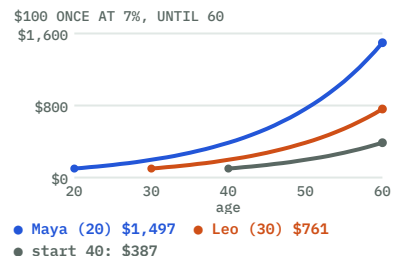
- $\text{years to double} \approx 72 \div \text{yearly rate in \%}$ → rule of thumb, close enough for everyday sums · cousin of the rule of 70 (Macro Lesson 10)
- 6% → 12 years · 7% → about 10 · 8% → 9 · 9% → 8
- Forwards: \$500 at 6% for 36 years → $36 \div 12 = 3$ doublings → $1,000 \rightarrow 2,000 \rightarrow \approx \$4,000$ (exact \$4,074)
- Backwards, prices: **inflation** (prices rising) 3% a year → $72 \div 3 \approx 24$ years to double → \$500 in a shoebox then buys what \$250 buys today

4

Time

the ingredient

- \$100 once, 7%, until 60: **MAYA** starts 20 → **\$1,497** · **LEO** starts 30 → **\$761** → 10 years = one doubling → about **2 x**
- Leo at 40 → 20 years → two doublings → **\$387** → Maya ≈ 4 x
- Catch up = put in more: 10 years late → ≈ **\$200** · 20 years late → ≈ **\$400** · same \$100, fewer years → cannot catch up by 60
- Every 5 years of waiting: $1.07^5 \approx 1.4$ → close to 30% of the result lost ($1 - 1 \div 1.4$)
- **Time horizon**: “how long money stays invested; at the same rate, a longer one grows far more” · your start age → $100 \times 1.07^{(60 - \text{age})}$



5

Where it works

interest stays in

- **COMPOUND** interest added and left in: savings account · an unpaid card bill → compounds **against** you (Lesson 3)
- **SIMPLE** interest always on the same first amount: interest paid out and spent · friend pays 5% of \$1,000 each year
- **NO GROWTH** shoebox · 0% account → dollars same, **buying power** (what money can buy) shrinks as prices rise

6

The evidence

where 7% comes from

- Aswath Damodaran (finance professor, New York University): US **stocks** (small shares of a company) of the 500 biggest firms (S&P 500) + **dividends** (profits paid to owners) put back in, 1928-2025 → ≈ **10%** a year in money terms · inflation ≈ **3%**
- **Real return** = $\text{return} - \text{inflation}$, roughly → $10 - 3 \approx 7\%$ · bank at 2% with prices +3% → $2 - 3 \approx -1\%$: more dollars, less to buy (Lesson 5)
- **Average** over almost a century ≠ promise: single years from big gains to losses of more than a third (Lesson 6) · nothing sure about the future

Watch out: “a small start can wait” → 10 years late ≈ half the result · and compound ≠ adding the same 7% of the first \$100: each year multiplies the **whole** total