

Valuation tables

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1 Amount of Re 1 and amount of Re 1 per annum: compound interest tables

The Amount of Re 1 table tells you what one rupee invested today grows to after n years at compound interest, $(1 + i)^n$; the Amount of Re 1 per annum table tells you what one rupee saved at the end of every year grows to, $[(1 + i)^n - 1] / i$.

Core facts

- **Symbols** used in all valuation tables:
 - i = rate of interest per year, written as a **decimal** (6% → 0.06)
 - n = number of years
- **Amount of Re 1** (compound interest factor): $A = (1 + i)^n$
 - Re 1 at 10% for 3 years → $(1.10)^3 = 1.331$
 - ₹100 at 10% for 5 years → $100 \times 1.6105 = \text{₹}161$ (ATP 2026)
- **Amount of Re 1 per annum** (future value of an annuity): $[(1 + i)^n - 1] / i$
 - Re 1 p.a. at 5% for 10 years = **12.578**
 - Instalments are paid at the **end of each year**, so the **last instalment earns no interest** (ATP 2013).
- **Reciprocals** (exam favourite):
 - Amount of Re 1 ↔ **Present value of Re 1**: $1/(1 + i)^n$
 - Amount of Re 1 p.a. ↔ **Annual sinking fund**: $i/[(1 + i)^n - 1]$
- Both tables are always **more than 1** (for $n \geq 1$ and $i > 0$); the Amount of Re 1 p.a. is always **at least n** .

Explained

Why compound interest? A valuer compares money at different dates. A rupee today is worth more than a rupee later, because it can be invested and earn interest on interest. All six standard valuation tables are built from one expression, $(1 + i)^n$.

Amount of Re 1

- After year 1: $1 \times (1 + i)$. After year 2: $(1 + i)^2$. After n years: $(1 + i)^n$.
- Use it to find the **future value of a lump sum**: future value = present sum $\times (1 + i)^n$.
- Example (ATP 2018 pattern): ₹100 invested now at 10% for 2 years = $100 \times 1.21 = \text{₹}121$.

Amount of Re 1 per annum

- Re 1 is put aside at the **end** of each year for n years and left to accumulate.
- The first rupee earns interest for $(n - 1)$ years; the last rupee earns **nothing**.
- Sum of the series $1 + (1 + i) + (1 + i)^2 + \dots + (1 + i)^{(n-1)} = [(1 + i)^n - 1] / i$.
- Short cut: **Amount of Re 1 p.a. = (Amount of Re 1 - 1) / i**.

Worked example 1: two-year check

- Re 1 p.a. at 5% for 2 years.
- Formula: $(1.1025 - 1)/0.05 = 2.05$.
- Long hand: first rupee grows to 1.05; second rupee (paid at the end of year 2) is 1.00. Total **2.05**.

Worked example 2: regular savings

- An owner puts aside **₹10,000 at the end of each year** for **10 years** at **6%**.
- $(1.06)^{10} = 1.7908$. Amount of Re 1 p.a. = $0.7908/0.06 = 13.181$.
- Fund after 10 years = $10,000 \times 13.181 = \text{₹}1,31,810$ (about).

Worked example 3: lump sum

- ₹1,00,000 invested for 5 years at 8%.
- $(1.08)^5 = 1.4693$. Future value = **₹1,46,933**.

Specimen values (recomputed; round to four decimals)

i	n	Amount of Re 1	Amount of Re 1 p.a.
4%	10	1.4802	12.0061
5%	10	1.6289	12.5779
6%	20	3.2071	36.7856
10%	5	1.6105	6.1051

Where these tables are used in valuation

- Growing a **sinking fund** (see VAL-VT-03): accumulated fund after m years = annual instalment $\times$ Amount of Re 1 p.a. for m years.
- **Depreciation by the sinking fund method** (see VAL-VM-08) uses exactly this product.
- **Cost of holding land**: the cost of land bought now, carried to a future date, is cost $\times (1 + i)^n$.
- Deriving the **present value of an annuity** (YP): Amount of Re 1 p.a. $\div$ Amount of Re 1 (ATP 2026: 18.286 $\div 2.00 = 9.143$).

Common traps

✗ "Amount of Re 1 = $1/(1 + i)^n$." ✓ That is the **present value** of Re 1. Amount of Re 1 = $(1 + i)^n$.

✗ "Amount of Re 1 p.a. = $i/[(1 + i)^n - 1]$." ✓ That is the **annual sinking fund**. Amount of Re 1 p.a. = $[(1 + i)^n - 1]/i$.

✗ "In the Amount of Re 1 p.a. table the last instalment earns a full year's interest." ✓ Payments are at the **end** of each year, so the last instalment earns **no interest**.

✗ "₹100 at 10% for 3 years = ₹130." ✓ That is simple interest. Compound: $100 \times 1.331 = \text{₹}133.10$.

✗ "Amount of Re 1 and Amount of Re 1 p.a. are reciprocals." ✓ Amount of Re 1 ↔ PV of Re 1; Amount of Re 1 p.a. ↔ annual sinking fund.

Quick revision

- Amount of Re 1 = $(1 + i)^n$.
- Amount of Re 1 p.a. = $[(1 + i)^n - 1]/i$.
- Amount of Re 1 p.a. = (Amount of Re 1 - 1)/i.
- $(1.10)^3 = 1.331$; $(1.10)^5 = 1.6105$; $(1.05)^{10} = 1.6289$.
- Re 1 p.a. at 5% for 10 years = 12.578.
- Last instalment earns no interest (end-of-year payments).
- Reciprocals: Amount ↔ PV of Re 1; Amount p.a. ↔ sinking fund.
- Sinking fund growth uses the accumulative (safe) rate.
- Rule of 72: 7.2% doubles money in about 10 years.