Unit 6 · Investing & Compound Growth Cheat Sheet

Unit 6 focus: model compound growth and regular deposits

1 INVESTMENT VOCABULARY

Term	Meaning / quick example
Stock	Ownership share; value and dividends can change.
Bond	Debt issued by a borrower; interest and default risk.
Fund	Basket of holdings; breadth and fees vary.
Diversification	Spread exposure; reduces concentration, not all risk.

2 GROW A LUMP SUM

$$A = P\left(1 + \frac{r}{m}\right)^{mt}$$

P = initial dollars; A = ending dollars; r = nominal annual decimal return; m = compounds per year; t = years.

$1,000 at a hypothetical 6%, annually for 10 years: $1{,}000(1.06)^{10} \approx 1{,}790.85$

About $1,790.85

No deposits, fees or taxes; a constant return is a model, not a promise.

3 REGULAR DEPOSITS

$$F = D\frac{(1+i)^N - 1}{i}$$

D = dollars deposited at each period's end; i = decimal return per period; N = deposit count; F = future dollars. For monthly deposits: $i = \frac{r}{12}$, $N = 12t$.

Assumes no initial balance, fixed return, no fees or tax. At 0% return, $F = DN$.

Beginning-of-period deposits grow one extra period: multiply by $1 + i$.

4 LONG-TERM DEPOSIT EXAMPLE

Hypothetical 7% nominal annual return, monthly compounding; month-end deposits; no fees or tax.

Example: $200 monthly for 35 years.
Periods: $N = 420, \quad i = \frac{0.07}{12}$
Future value: $F \approx 360{,}210.92$
Contributions: $200(420) = 84{,}000$

Answer: $276,210.92 modeled growth

5 DEPOSIT NEEDED FOR A GOAL

$$D = \frac{Fi}{(1+i)^N - 1}$$

F = goal in future dollars; i = decimal return per period; N = deposits.

Goal $10,000; 60 month-end deposits; hypothetical 6% nominal return:
$D = \frac{10{,}000(0.005)}{(1.005)^{60} - 1}$

About $143.33 monthly

No starting balance, fees or tax; plan extra margin because actual returns vary.

6 MATCH RISK TO THE GOAL

Need the money	What to consider
Soon / essential goal	Accessible cash or suitable insured deposits.
Several years away	Balance growth potential with possible losses.
Decades away	Diversified investments may fit; losses still occur.

Time horizon, ability to absorb loss and willingness to take risk all matter. A long horizon does not guarantee a gain.

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More practice: compare risk, fees and investment horizons

1 WHICH FUND COSTS LESS?

Same gross 7% return assumed, 20 years, $10,000 initial; approximate net return = gross − annual fee. No tax; difference uses unrounded balances.

Example: A fee 0.2%; B fee 1.0%.
A: $10{,}000(1.068)^{20} \approx 37{,}275.64$
B: $10{,}000(1.06)^{20} \approx 32{,}071.35$

Answer: A ends about $5,204.28 higher

2 COMPARE BEYOND THE FEE

The fee comparison favors A **if risk, holdings and services are otherwise equal**. Ask what each fund owns and whether advice or restrictions differ.

Expense ratio: annual fund cost as a percent of assets.
0.2% of $10,000 = $20 for one year at a constant balance.

Small recurring costs can compound into a large difference. Compare like with like.

3 RETURN & PURCHASING POWER

$$\text{Return} = \frac{\text{end} - \text{start}}{\text{start}}$$

No added or withdrawn cash; add distributions to the ending value when measuring total return.

$$\text{Real return} = \frac{1+r}{1+f} - 1$$

r = nominal return; f = inflation, both annual decimals.

7% return, 3% inflation:
$\frac{1.07}{1.03} - 1 \approx 3.88\%$ real gain.

Subtracting inflation is only an approximation.

4 A LOSS NEEDS A BIGGER GAIN

Percent changes apply to the new balance, not always the original amount.

Example: $1,000 falls 20% to $800.
A 20% recovery: $800(1.20) = 960$
Gain needed: $\frac{1{,}000 - 800}{800} = 25\%$

Answer: Need 25% to recover a 20% loss

5 RULE OF 72

Approximate doubling time:

$$\text{years} \approx \frac{72}{\text{annual rate in percent}}$$

At hypothetical 6% growth:
$\frac{72}{6} = 12$ years (approximate).
Exact factor after 12 years: $1.06^{12} \approx 2.012$.

Use 6 in the shortcut, not 0.06. Best as a rough estimate for moderate positive rates; actual market paths differ.

6 REMINDERS & MISTAKES

✓ Do remember

- State return, deposit timing, fees and time period.
- Keep money for near-term essential needs accessible.

✗ Common mistakes

- Average return = guaranteed: real results fluctuate.
- Diversification eliminates risk: it cannot prevent all losses.
- Future dollars = today's value: adjust for inflation.
- Higher past return proves better: compare risk and costs too.