

Successive changes and a moving base

Track how each percentage step updates the base before the next operation begins

• Successive Change Workflow

01 Convert Rates to Multipliers

- Write a +p% rise as factor $(1 + p/100)$ and a –q% fall as factor $(1 - q/100)$.
- Fractional changes work identically: +1/6 multiplies by 7/6 and –1/6 multiplies by 5/6.
- For example, +20% multiplies by 1.20 (or 6/5), while –20% multiplies by 0.80 (or 4/5).



02 Check Same-Base vs Sequential

- If two annual rates act on the same opening population, net them before compounding.
- If changes act one after another, multiply factors: $100 \times 1.10 \times 0.90 = 99$ (net –1%).
- With +2.5% growth and –0.5% migration on the same base, net yearly rate is 2.0%.



03 Compound Across Time Periods

- Two years at 2% net annual growth give multiplier $1.02^2 = 1.0404$, or a 4.04% rise.
- The extra $ab/100$ term is the second-period change acting on the first period's gain.
- Shortcut for two successive changes +a% and +b%: $\text{net \%} = a + b + (ab/100)$.



04 Recompute the Updated Base

- When Morning (250) rises 20% to 300, Evening (320) exceeds it by $20/300 \times 100 = 6\frac{2}{3}\%$.
- With 500 of 1200 bus users, 300 new bus users give a share of $800/1500 = 53\frac{1}{3}\%$.
- Halving Store S returns (120 → 60) raises net retained (480 → 540) by $60/480 = 12.5\%$.

REMEMBER Never add percentages across different bases; update the quantity first, then apply the new denominator.