CHEAT SHEETS HERO

Real Estate Math Essentials

A practical, formula-focused cheat sheet for real estate students and professionals, covering essential calculations for loans, valuations, closing costs, taxes, and investments. Master the numbers that drive successful real estate transactions and investments.

Core Real Estate Calculations

LOAN CALCULATIONS

Monthly Mortgage Payment (P&I)

$M = P [i(1 + i)^n] / [(1 + i)^n - 1]$

- **M:** Monthly Payment
- **P:** Principal Loan Amount
- **i:** Monthly Interest Rate (Annual Rate / 12)
- **n:** Total Number of Payments (Loan Term in Years * 12)

Example: Loan $200,000, 4.5% annual interest, 30 years.
- $i = 0.045 / 12 = 0.00375$
- $n = 30 \text{ years} \times 12 \text{ months/year} = 360$
- $M = \$200,000 [0.00375(1 + 0.00375)^{360}] / [(1 + 0.00375)^{360} - 1] \approx 1,013.37$

Principal & Interest Breakdown (Amortization)

- **Interest Payment:** `Outstanding Principal Balance * Monthly Interest Rate`
- **Principal Payment:** `Monthly Payment - Interest Payment`

Example (Month 1): Using prior example:
- Interest Payment: $\$200,000 \times 0.00375 = 750.00$
- Principal Payment: $\$1,013.37 - \$750.00 = 263.37$
- New Principal Balance: $\$200,000 - \$263.37 = 199,736.63$

Interest Rate Conversions

- **Annual to Monthly Rate:** `Annual Rate / 12`
- **Decimal to Percentage:** `Decimal * 100`
- **Percentage to Decimal:** `Percentage / 100`

Example:
- 4.5% Annual Rate $\rightarrow$ 0.045 (Decimal)
- Monthly Rate: $0.045 / 12 = 0.00375$ (Decimal)
- Monthly Rate: $0.00375 \times 100 = 0.375\%$

PRO TIP: Making even a small extra principal payment early in the loan term can save tens of thousands in interest over the life of the loan due to amortization.

COMMON MISTAKE: Forgetting to convert the annual interest rate to a monthly rate and the loan term to total months before using the mortgage payment formula. Always use 'i' as monthly and 'n' as total months.

PROPERTY VALUE ANALYSIS

Capitalization Rate (Cap Rate)

`Cap Rate = Net Operating Income (NOI) / Property Value`

- **NOI:** Gross Rental Income - Operating Expenses (excluding mortgage P&I and depreciation).
- **Purpose:** Measures the rate of return on a real estate investment property based on the income that the property is expected to generate.

Example: Property Value $500,000, NOI $40,000.
- `Cap Rate = $40,000 / $500,000 = 0.08` or `8%`
- To find Value: `Value = NOI / Cap Rate`

Gross Rent Multiplier (GRM)

`GRM = Property Price / Gross Annual Rental Income`

- **Purpose:** Estimates the value of an income-producing property based on its gross rental income. Best for comparing similar properties in the same market.

Example: Property A sold for $300,000 with $36,000 annual gross rent. Property B has $40,000 annual gross rent.
- Property A's GRM: `$300,000 / $36,000 = 8.33`
- Estimated Value of Property B: `$40,000 \times 8.33 = $333,200`

Comparative Market Analysis (CMA) Basics

- **Purpose:** Provides an estimate of a property's value by looking at recent sales of comparable properties (comps).
- **Key Factors:** Location, size (sq ft), number of beds/baths, age, condition, lot size, features (pool, garage).

Adjustment Process:

- **If comp is superior to subject:** Subtract value from comp's sale price.
- **If comp is inferior to subject:** Add value to comp's sale price.
- *Rule of Thumb:* "Always Adjust the Comparables, Never the Subject."

PRO TIP: When doing a CMA, aim for at least 3-5 recently sold (within 3-6 months) comparable properties within a 1-mile radius. Adjustments should reflect market value, not just cost.

COMMON MISTAKE: Using GRM for properties with significant differences in operating expenses. GRM doesn't account for expenses, making it less reliable than Cap Rate for detailed investment analysis.

Advanced Metrics & Practical Math

CLOSING COSTS & COMMISSIONS

Buyer/Seller Cost Estimate (Per Diem Calculations)
- **Daily Rate:** `Annual Cost / 365 days`
- **Proration:** `Daily Rate \times Number of days owed`

Common Prorated Items: Property taxes, HOA dues, mortgage interest (for buyer's first payment).

Example: Annual property taxes $3,650. Closing on April 15 (assume seller pays up to and including closing day).
- Daily Tax: `$3,650 / 365 = $10/day`
- Seller's Share (Jan 1 - Apr 15): `105 days \times $10/day = $1,050`
- Buyer receives credit for seller's share and pays from April 16 onwards.

Commission Split Math
- **Total Commission:** `Sale Price \times Commission Rate`
- **Brokerage Share:** `Total Commission \times Brokerage Split %`
- **Agent Share:** `Total Commission - Brokerage Share` (or `Total Commission \times Agent Split %`)

Example: Sale Price $400,000, 6% total commission. Listing Brokerage (LB) and Buyer Brokerage (BB) split 50/50. Agent's split with their brokerage is 70/30 (agent/brokerage).
- Total Commission: `$400,000 \times 0.06 = $24,000`
- BB's Share: `$24,000 \times 0.50 = $12,000`
- Agent's Share (from BB's share): `$12,000 \times 0.70 = $8,400`

PRO TIP: Always clarify who pays for what closing costs in your region (e.g., buyer pays title insurance vs. seller). This varies significantly by state/county.

COMMON MISTAKE: Miscalculating prorations for the correct number of days. Remember to account for the actual closing date and whether it's a 360-day or 365-day year for calculations.

INVESTMENT METRICS

Return on Investment (ROI)

`ROI = (Net Profit / Total Investment Cost) \times 100`

- **Net Profit:** Sale Price - (Purchase Price + Total Expenses)
- **Total Investment Cost:** Purchase Price + Closing Costs + Renovation Costs.

Example: Bought for $200k, spent $20k on rehab/closing, sold for $250k.

- Net Profit: `$250,000 - ($200,000 + $20,000) = $30,000`
- Total Investment: `$200,000 + $20,000 = $220,000`
- ROI: `($30,000 / $220,000) \times 100 \approx 13.64%`

Cash-on-Cash Return

`Cash-on-Cash = (Annual Before-Tax Cash Flow / Total Cash Invested) \times 100`

- **Purpose:** Measures the annual return on the actual cash invested, not the total property value. Excellent for leveraged properties.

Example: Purchased with $50,000 down payment (total cash invested). Property generates $5,000 annual before-tax cash flow.

- Cash-on-Cash: `($5,000 / $50,000) \times 100 = 10%`

Break-Even Ratio

`Break-Even Ratio = (Operating Expenses + Debt Service) / Gross Operating Income`

- **Purpose:** Indicates the percentage of income needed to cover all operating expenses and debt service. Lower is better.

Example: Gross Operating Income $50,000. Operating Expenses $15,000. Annual Debt Service $20,000.

- Break-Even Ratio: `($15,000 + $20,000) / $50,000 = $35,000 / $50,000 = 0.70` or `70%`

Debt Coverage Ratio (DCR)

`DCR = Net Operating Income (NOI) / Annual Debt Service`

- **Purpose:** Used by lenders to assess a property's ability to cover its mortgage payments. Lenders typically look for a DCR of 1.2 or higher.

Example: NOI $40,000. Annual Debt Service $30,000.

- DCR: `$40,000 / $30,000 = 1.33` (This would be acceptable to most lenders).

PRO TIP: Don't rely on just one metric. Use a combination of ROI, Cash-on-Cash, and DCR to get a comprehensive picture of an investment's potential and risk.

COMMON MISTAKE: Confusing Cash Flow with Net Operating Income (NOI). NOI is before debt service; Cash Flow is after debt service (and often before tax).

UNIT CONVERSIONS

Acres to Square Feet

- `1 Acre = 43,560 Square Feet (sq ft)`

Purpose: Essential for valuing land or calculating total buildable area.

Example: A 2.5-acre lot.

- `2.5 \text{ acres} \times 43,560 \text{ sq ft/acre} = 108,900 \text{ sq ft}`

Cost Per Square Foot

- **Price Per Sq Ft:** `Property Price / Total Square Feet`
- **Sq Ft:** Often refers to heated/cooled living space.

Example: A 1,500 sq ft home sold for $300,000.

- Price Per Sq Ft: `$300,000 / 1,500 \text{ sq ft} = $200 \text{/sq ft}`

PRO TIP: Always confirm if square footage includes basements, garages, or unheated spaces when comparing properties. Consistency is key for accurate per-square-foot analysis.

COMMON MISTAKE: Not using consistent units. Ensure all values (e.g., land size, building size) are in the same unit (e.g., square feet) before performing calculations.

TAXES & INSURANCE

Property Tax Calculation

- **Property Tax:** `Assessed Value \times Tax Rate`
- **Tax Rate:** Often expressed in mills ($ per $1,000 of assessed value) or percentage.
  - 1 mill = $0.001 (or $1 per $1,000)

Example: Assessed Value $250,000, Tax Rate 15 mills.

- `Tax Rate = 15 \times $0.001 = $0.015` (as decimal)
- Annual Property Tax: `$250,000 \times $0.015 = $3,750`

Annual to Monthly Insurance Calculation

- **Monthly Premium:** `Annual Premium / 12`

Purpose: Used to determine the monthly escrow payment for insurance included in mortgage payments.

Example: Annual homeowner's insurance premium $1,200.

- Monthly Premium: `$1,200 / 12 = $100/month`

PRO TIP: Verify tax assessment values and rates. They can change annually and impact affordability. Some states offer homestead exemptions which reduce assessed value.

COMMON MISTAKE: Confusing market value with assessed value. Taxes are based on assessed value, which may be different and often lower than market value.