

Formula Reference Sheet — Full Edition

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This is the comprehensive formula sheet for AP Business with Personal Finance. The print book carries an essentials-only version (Appendix H). The full edition below adds worked sample numbers and exam-day tips for each formula.

1. Profitability

Formula	Plain English	Worked sample
Gross Profit = Revenue – Cost of Goods Sold (COGS)	What’s left after the <i>direct</i> cost of making the product.	Revenue \$480,000 – COGS \$312,000 = Gross Profit \$168,000
Gross Profit Margin = Gross Profit ÷ Revenue	Gross profit as a percentage of sales. Always a percent.	$\$168,000 \div \$480,000 = \mathbf{35\%}$
Operating Profit = Gross Profit – Operating Expenses	Profit after rent, salaries, utilities, etc.	$\$168,000 - \$124,000 = \mathbf{\$44,000}$
Operating Profit Margin = Operating Profit ÷ Revenue	How efficient core operations are.	$\$44,000 \div \$480,000 = \mathbf{9.2\%}$
Net Income = Pretax Income – Taxes	Bottom line.	$\$42,000 - \$9,240 = \mathbf{\$32,760}$
Net Profit Margin = Net Income ÷ Revenue	Bottom line as a percent of sales.	$\$32,760 \div \$480,000 = \mathbf{6.8\%}$

Exam tip — When a question gives you both COGS and operating expenses, do not subtract them from revenue at the same time. Subtract COGS first to get gross profit, then operating expenses to get operating profit, then taxes to get net income. The order matters because each margin uses a different numerator.

2. Percentage Change

Formula	Plain English	Worked sample
Percentage Change = (New – Old) ÷ Old × 100	How much did a number move, in percent? Sign matters.	$(150 - 200) \div 200 \times 100 = \mathbf{-25\%}$

Exam tip — Always divide by the **OLD** value, not the new one. Switching them silently flips the percentage.

3. Marketing Metrics

Formula	Plain English	Worked sample
Customer Acquisition Cost (CAC) = Total Marketing Costs ÷ Total New Customers	What it costs you to acquire one customer.	$\$48,000 \div 600 = \mathbf{\$80}$
Customer Lifetime Value (CLV) = Estimated Total Spend Over Customer Relationship	Total revenue from one customer over the whole relationship.	$\$50/\text{mo} \times 24 \text{ mo} = \mathbf{\$1,200}$
CLV : CAC ratio = CLV ÷ CAC	How many dollars you make per dollar spent acquiring a customer. $\geq 3:1$ is healthy.	$\$1,200 \div \$80 = \mathbf{15:1}$

4. Operations / Financial Capital

Formula	Plain English	Worked sample
Break-Even Point (units) = Fixed Costs ÷ (Price – Variable Cost per Unit)	How many units you must sell before profits start.	$\$24,000 \div (\$50 - \$30) = \mathbf{1,200 \text{ units}}$
Break-Even Point (dollars) = Fixed Costs ÷ Contribution Margin %	Same idea but expressed in revenue dollars.	$\$24,000 \div 0.40 = \mathbf{\$60,000}$

Formula	Plain English	Worked sample
Contribution Margin per Unit = Price – Variable Cost per Unit	Dollars each unit contributes to fixed costs and profit.	$\$50 - \$30 = \$20$
Rate of Return = (Gain – Cost of Investment) ÷ Cost of Investment × 100	How much an investment grew or shrank, in percent.	$(\$12,500 - \$10,000) \div \$10,000 \times 100 = 25\%$

5. Personal Finance

Formula	Plain English	Worked sample
Net Worth = Assets – Liabilities	Snapshot of household wealth.	$\$145,000 - \$89,000 = \$56,000$
Take-Home Pay = Gross Income – Taxes – Pre-tax Deductions	What lands in the bank.	$\$5,000 - \$1,150 - \$300 (401k) = \$3,550$
Rule of 72: Years to Double = 72 ÷ Annual Interest Rate	Mental-math shortcut for compounding. Use whole-number rate.	$72 \div 6 = 12 \text{ years at } 6\%$
50/30/20 Budget	50% needs, 30% wants, 20% savings/debt.	$\$3,000 \text{ take-home} \rightarrow \$1,500 / \$900 / \600
Debt-to-Income Ratio = Total Monthly Debt Payments ÷ Gross Monthly Income	Lender's quick read on your debt load.	$\$1,200 \div \$5,000 = 24\%$

6. Accounting Identity

Formula	Plain English	Worked sample
Assets = Liabilities + Owners' Equity	The balance sheet balances. Every transaction preserves the equation.	$\$400,000 = \$250,000 + \$150,000 \checkmark$

7. Time Value of Money (conceptual; AP allows 4-function calculator only)

The AP exam will not require complex TVM solving, but you should understand the **direction**:

- A dollar today is worth more than a dollar tomorrow (because you can invest it).
- Higher interest rate → present value falls.
- Longer time horizon → future value grows for savers, debt grows for borrowers.

Worked example: \$1,000 invested at 6% for 12 years roughly **doubles** (Rule of 72 $\rightarrow 72/6 = 12$). So future value $\approx$ **\$2,000**.

8. Decision Framework (no calculation required)

Framework	Plain English	Exam use
PACED = Problem $\rightarrow$ Alternatives $\rightarrow$ Criteria $\rightarrow$ Evaluation $\rightarrow$ Decision	The AP framework's named deliberative decision-making model.	The backbone of FRQ 4 (Business Decision): define the problem, set criteria before comparing options, evaluate with the scenario's numbers, then commit. Criteria should mix quantifiable costs/benefits (e.g., ROI) with intangible ones (reputation, mission, core values).

Quick-reference tips before exam day

- **Profit margins are always percentages.** If the formula name has "margin", express the answer as a percent.
- **Break-even is always in units or dollars.** Label the unit on your answer.
- **The Rule of 72 uses the rate as a whole number.** $72 \div 6 = 12$ years. Not $72 \div 0.06$.
- **Percentage change can be negative.** Don't take an absolute value silently.
- **CAC vs CLV is a pair.** A high CAC isn't bad if CLV is much higher.
- **Net worth (personal) $\approx$ owners' equity (business).** Same idea: what's owned minus what's owed.
- **Bluebook gives you a 4-function Desmos.** No graphing or finance keys. If a formula requires more than +, -, $\times$, $\div$, the AP exam will not require you to compute it from scratch — work conceptually.