TVM Solver Master Cheat Sheet

Your quick-reference guide to mastering the Time Value of Money.

1. The Golden Rule: Cash Flow Signs

The most common mistake when using a TVM solver is getting a "Domain Error" or a wrong answer because of incorrect negative/positive signs.

- **Negative (-) = Money OUT:** Money leaving your pocket (e.g., depositing money into savings, paying a monthly bill, buying an investment).
- **Positive (+) = Money IN:** Money coming into your pocket (e.g., receiving a loan from a bank, cashing out an investment, withdrawing money).

2. The Variables Explained

- **N**: Total number of payment periods (Years × Payments per year).
- **I/Y**: Annual Interest Rate (Enter as a whole number, e.g., 5 for 5%, *not* 0.05).
- **PV**: Present Value (Starting amount, loan amount, or current balance).
- **PMT**: Payment (The amount paid or received each period).
- **FV**: Future Value (The ending target amount, or 0 if paying off a loan).
- **P/Y & C/Y**: Payments per Year and Compounds per Year (Usually 12 for monthly).

3. How to Use the Solver

1. **Read the problem** and identify your known variables.
2. **Determine your signs** (Inflow vs. Outflow).
3. **Enter the known numbers** into the calculator.
4. **Set the unknown variable to 0.**
5. **Click "Solve"** next to the variable you are trying to find.

Practice more at: https://tvmsolver.com

Example 1: Solving for Present Value (PV)

The Scenario: You want to buy a boat. After looking at your budget, you realize you can afford a monthly payment of $300. The bank is offering a 5-year loan at an annual interest rate of 7%. How large of a loan can you afford to take out today?

How to set it up:

- **N = 60** (5 years × 12 months)
- **I/Y = 7** (7% annual interest)
- **PV = 0** *(Click Solve here)*
- **PMT = -300** (Money leaving your pocket every month)
- **FV = 0** (The loan is completely paid off at the end)
- **P/Y & C/Y = 12** (Monthly payments/compounding)

Result: PV = $15,150.36 *(Positive, because this is the loan money the bank gives to you today).*

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Example 2: Solving for Future Value (FV)

The Scenario: You currently have $5,000 in a savings account that earns 5% interest annually. You decide to start depositing an additional $100 at the end of every month. How much money will you have in the account in 10 years?

How to set it up:

- **N = 120** (10 years × 12 months)
- **I/Y = 5 * PV = -5000** (You deposited this into the account; outflow)
- **PMT = -100** (You are depositing this every month; outflow)
- **FV = 0** *(Click Solve here)*
- **P/Y & C/Y = 12**

  Result: FV = $23,763.28 *(Positive, because this is money you can withdraw and put back in your pocket at the end of 10 years).*

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Example 3: Solving for Payment (PMT)

The Scenario: You are buying a house for $250,000. You secure a 30-year fixed-rate mortgage at 6.5% interest. What will your required monthly principal and interest payment be?

How to set it up:

- **N = 360** (30 years × 12 months)
- **I/Y = 6.5**
- **PV = 250000** (The bank gave you this money to buy the house; inflow)
- **PMT = 0** *(Click Solve here)*
- **FV = 0** (The loan will be paid down to zero)
- **P/Y & C/Y = 12**

  Result: PMT = -$1,580.17 *(Negative, because you have to pay this amount out of pocket every month).*

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Example 4: Solving for Number of Periods (N)

The Scenario: You have accumulated $10,000 in credit card debt. The credit card company charges an aggressive 19% annual interest rate. If you aggressively pay $250 a month toward the card, how many months will it take to completely pay off the debt?

How to set it up:

- **N = 0** *(Click Solve here)*
- **I/Y = 19**
- **PV = 10000** (You spent this borrowed money; inflow)
- **PMT = -250** (Your monthly payment to the bank; outflow)
- **FV = 0** (Target balance is zero)
- **P/Y & C/Y = 12**

  Result: N = 62.26 *(It will take roughly 63 months, or a little over 5 years, to pay off the card).*

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Example 5: Solving for Interest Rate (I/Y)

The Scenario: Ten years ago, you bought a rare collectible coin for $500. Today, you sold it to a collector for $1,200. Assuming no additional money was put in, what was your average annual rate of return on this investment?

How to set it up:

- **N = 10** (10 years. Since there are no monthly payments, we use annual periods)
- **I/Y = 0** *(Click Solve here)*
- **PV = -500** (Money you spent to buy the coin; outflow)
- **PMT = 0** (No monthly payments were made)
- **FV = 1200** (Money you received when you sold it; inflow)
- **P/Y & C/Y = 1** (Compounding annually)

Result: I/Y = 9.14% *(Your investment grew at an average rate of 9.14% per year).*

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