# Financial Calculator Logic & Examples

This document outlines the mathematical formulas and verification data for the proposed website calculators.

## 1. SIP Calculator (Wealth Creation) with Step Up

**Purpose:** Calculate the future value of monthly investments assuming a fixed annual return, with an optional feature to increase the investment amount annually (Step Up).

### Logic & Formula

#### A. Standard SIP (Fixed Contribution)

Used to determine the maturity amount ($A$) when the investment remains constant.

* **Formula:**$$A = P \times \left[ \frac{(1 + i)^n - 1}{i} \right] \times (1 + i)$$

#### B. Step Up SIP (Annual Top-up)

Used when the user increases their monthly investment by a fixed percentage every year to match income growth.

* **Logic:**
  + The Monthly Investment ($P$) remains constant for months 1-12.
  + At month 13, $P$ becomes $P\_{prev} \times (1 + \text{StepUpRate})$.
  + This repeats every 12 months.
* Calculation Method for Development:  
  Since the principal ($P$) changes annually, the calculation should be performed iteratively or by summing the future value of each year's specific cash flow series.

### Variables

* **A:** Estimated Maturity Amount
* **P:** Monthly Investment Amount (Initial)
* **n:** Total number of months (Years \* 12)
* **i:** Monthly Interest Rate (Annual Rate / 12 / 100)
* **s:** Annual Step Up Percentage (e.g., 10%)

### Validation Example

**Scenario Inputs:**

* **Initial Monthly Investment:** 10,000
* **Duration:** 10 Years (120 months)
* **Expected Return:** 12% p.a. (Monthly rate = 0.01)
* **Step Up:** 10% (Annually)

#### 1. Standard Result (0% Step Up)

* **Calculation:**$$10,000 \times 230.038 \times 1.01$$
* **Result:** ~23.23 Lakhs

#### 2. Step Up Result (10% Annual Increase)

* **Mechanism:**
  + Year 1: Invests 10,000/mo
  + Year 2: Invests 11,000/mo
  + Year 3: Invests 12,100/mo... up to Year 10.
* **Result:** By increasing the contribution by just 10% a year, the total corpus increases significantly.

### Results to Display (Comparison)



| **Metric** | **Standard SIP (Fixed)** | **Step Up SIP (+10% Yearly)** | **Impact of Step Up** |
| --- | --- | --- | --- |
| **Total Invested** | 1,200,000 | 1,912,491 | + 712,491 |
| **Wealth Gained** | 1,123,391 | 2,019,573 | + 896,182 |
| **Maturity Value** | **2,323,391** | **3,932,064** | **+ ~16 Lakhs** |

## 2. Goal Planner

**Purpose:** Determine how much a user needs to invest per month **today** to achieve a specific financial target in the future.

### Logic & Formula

Reverse calculation of the Standard SIP formula.

* **Formula:**$$P = \frac{\text{Target}}{ \left[ \frac{(1 + i)^n - 1}{i} \right] \times (1 + i) }$$

**Variables:**

* **P:** Required Monthly Investment
* **Target:** Desired Goal Amount
* **n:** Months to goal
* **i:** Monthly Interest Rate

### Validation Example

**Scenario:**

* **Goal Target:** 5,000,000 (50 Lakhs)
* **Time to Goal:** 15 Years (180 months)
* **Expected Return:** 10% p.a. (Monthly rate approx 0.00833)

**Result to Display:**

| **Metric** | **Value** |
| --- | --- |
| Target Amount | 5,000,000 |
| **Required Monthly SIP** | **11,904** |

## 3. Cost of Delay Calculator

**Purpose:** Show the financial loss incurred by delaying the start of an investment.

### Logic

Compares two scenarios:

1. **Scenario A:** Start Investing Today for duration $T$.
2. **Scenario B:** Start Investing after delay of $D$ years (Investment duration becomes $T - D$).

* **Formula:**$$\text{Cost of Delay} = \text{SIP\\_Value(Today)} - \text{SIP\\_Value(Delayed)}$$

### Validation Example

**Scenario:**

* **Monthly Investment:** 5,000
* **Target Duration:** 25 Years
* **Expected Return:** 12%
* **Delay Period:** 5 Years (Comparing 25-year growth vs 20-year growth)

**Step 1: Start Today (25 Years)**

* Invested: 1,500,000
* Final Value: 9,488,175

**Step 2: Delay by 5 Years (Invest for remaining 20 Years)**

* Invested: 1,200,000
* Final Value: 4,995,740

**Result to Display:**

| **Metric** | **Value** |
| --- | --- |
| Corpus if started today | 9,488,175 |
| Corpus if delayed 5 years | 4,995,740 |
| **Cost of Delay (Loss)** | **4,492,435** |

*Note: A 5-year delay costs nearly 50% of the potential corpus in this example.*