

Worksheet 6-6: TVM Solver

A graphing calculator can be used to make calculations using the compound interest formula: $FV = PV(1+i)^n$. The **TVM Solver**, or the Time-Value-Money Solver, allows you to enter the value of each variable and solve for the unknown value.

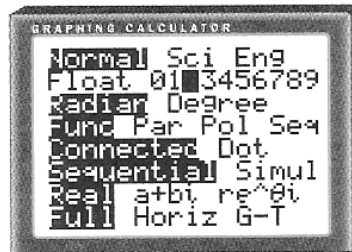
Finance Applications of Graphing Calculator:

The TVM Solver is used to work with loans or investments.

Important Points before Using the TVM Solver:

- ☉ Set the number of decimal places to 2

Press **MODE** **▼** **▶** **▶** **▶** **ENTER**.



- ☉ A value must be entered for each variable
- ☉ Money paid out (Cash Outflow) is **negative**, such as loan repayment and investment principal
- ☉ Money received (Cash Inflow) is **positive**, such as final amount of investment and loan

- ☉ **To open** the TVM Solver

On the TI-83 Plus, press **APPS** **1: Finance**, then **1: TVM Solver**

or

On the TI-83, press **2nd** **x⁻¹** **1 1**.

- ☉ **To quit** the TVM Solver and return to the Home Screen

Press **2nd** **MODE**

What the TVM Solver Variables Represent:

N = Number of Years

I% = Annual Interest Rate as a Percent

PV = Principal, or Present Value

PMT = Always set **PMT = 0**

FV = Amount, or Future Value

P/Y = Always set **P/Y = 1**

C/Y = Number of Compounding Periods per Year

PMT: END BEGIN Choose **END** as interest is calculated at the end of the compounding period

Assigned Work: WS 6-6; p. 444 #1-4, #10, #13

1. Future Value of Investment

Samir invested \$500 at 6% per year, compounded quarterly. What will the investment be worth after three years?

Step 1: Open the TVM Solver

On the TI-83 Plus, press $\boxed{\text{APPS}}$ **1: Finance**, then **1: TVM Solver**

or

On the TI-83, press $\boxed{2\text{nd}}$ $\boxed{x^{-1}}$ **1 1.**

Step 2: Enter the values.

N = 3
I% = 6
PV = 500
PMT = 0
FV = 0 (a temporary value)
P/Y = 1
C/Y = 4
PMT: END BEGIN Highlight END

Step 3: Use the arrow key to move the cursor to **FV**.

Press $\boxed{\text{ALPHA}}$ [SOLVE]. (Press [ENTER] for [SOLVE])

N=3
I%=6
PV=500
PMT=0
▪ FV= -597.8090857
P/Y=1
C/Y=4
PMT: $\boxed{\text{END}}$ BEGIN

Step 4: What was Samir's investment worth after three years?

2. Present (Discounted) Value of Investment (Loan)

An investment will be worth \$4000 in four years. If the interest rate is 5% per year, compounded monthly, what is the present value of the investment?

Step 1: Open the TVM Solver

On the TI-83 Plus, press $\boxed{\text{APPS}}$ **1: Finance**, then **1: TVM Solver**

or

On the TI-83, press $\boxed{2\text{nd}}$ $\boxed{x^{-1}}$ **1 1.**

Step 2: Enter the values.

```
N = 4
I% = 5
PV = 0 (a temporary value)
PMT = 0
FV = 4000
P/Y = 1
C/Y = 12
PMT: END BEGIN Highlight END
```

Step 3: Use the arrow key to move the cursor to **PV**.

Press $\boxed{\text{ALPHA}}$ [SOLVE]. (Press [ENTER] for [SOLVE])

```
N=4
I%=5
P/V=0
PMT=0
FV=4000
P/Y=1
C/Y=12
PMT: [ ] BEGIN
```

Step 4: What is the present value of the investment?

3. Determine Term Length:

Maria deposited \$1000 into an account paying interest at 4.2% per year, compounded monthly. How long will it take for the money to grow to \$1500?

Step 1: Open the TVM Solver

On the TI-83 Plus, press $\boxed{\text{APPS}}$ **1: Finance**, then **1: TVM Solver**

or

On the TI-83, press $\boxed{2\text{nd}}$ $\boxed{x^{-1}}$ **1 1**.

Step 2: Enter the values. * Either PV or FV must be a **negative** value.

N = 0 (a temporary value)
I% = 4.2
PV = 1000
PMT = 0
FV = -1500
P/Y = 1
C/Y = 12
PMT: END BEGIN Highlight END

Step 3: Use the arrow key to move the cursor to N.

Press $\boxed{\text{ALPHA}}$ [SOLVE]. (Press [ENTER] for [SOLVE])

▪ N=0
I%=4.2
PV=1000
PMT=0
FV=-1500
P/Y=1
C/Y=12
PMT: [] [] [] BEGIN

Step 4: How long will it take for the money to grow to \$1500?

***Round to the next compounding period. (Check compounding frequency!)**

4. Determine Interest Rate:

What interest rate, compounded semi-annually, is needed for \$2000 investment to grow to \$2500 after 3 years?

Step 1: Open the TVM Solver

On the TI-83 Plus, press **APPS** **1: Finance**, then **1: TVM Solver**

or

On the TI-83, press **2nd** **x⁻¹** **1 1**.

Step 2: Enter the values. * Either PV or FV must be a **negative** value.

```

N = 3
I% = 0 (a temporary value)
PV = 2000
PMT = 0
FV = -2500
P/Y = 1
C/Y = 2
PMT: END BEGIN Highlight END

```

Step 3: Use the arrow key to move the cursor to **I**.

Press **ALPHA** [SOLVE]. (Press [ENTER] for [SOLVE])

```

N=3
I%=0
PV=2000
PMT=0
FV=-2500
P/Y=1
C/Y=2
PMT: [ ] [ ] [ ] BEGIN

```

Step 4: What interest rate, compounded semi-annually, is needed for \$2000 investment to grow to \$2500 after 3 years?

5. You want to be a millionaire by the time you are 55 years old. If you invest \$20 000 on your eighteenth birthday at 8% per year, compounded semi-annually, will you meet your goal? If not, what interest rate would you require?
6. A no-interest \$5000 loan is due in four years. If the creditor were to sell the loan to another creditor, discounted at 9% per year, compounded monthly, how much would the new creditor pay?
7. Keenan invested \$2000 in a term deposit that pay 6% per year, compounded semi-annually. How long will it take to double the value of his investment?

Answers: 1. \$597.81; 2. \$3276.28; 3. 9 years and 9 months (**Exact:** 9.67 years or 9 years and 8.04 months);
4. 7.58%; 5. No ($FV = \$364331.82$), 10.86%; 6. \$3493.07;
7. 12 years (**Exact:** 11.72 years or 11 years 9 months).