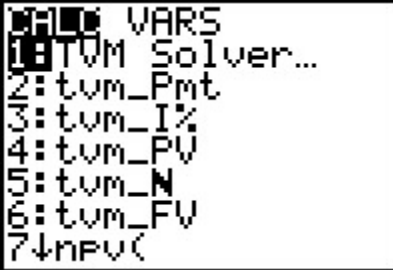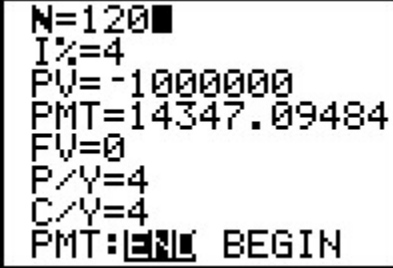Texas Instruments Graphing Calculators have a built in app that may be used to compute quantities involved in compound interest, annuities, and amortization. For the examples below, we'll utilize the screens from a TI-84. To use the app properly, we need to understand the terms used in the app and the signs used on the numbers. We'll do this by carrying out some of the examples from Sections 5.2 and 5.3. To use the app, called TVM Solver, follow the steps below.

1. Press ⬚ON⬚ to turn on the calculator if it is not already on.
 	
2. Press ⬚APPS⬚ to access the installed applications.
 	
3. We want the Finance application. Press ⬚ENTER⬚ or ⬚1⬚ to start the Finance application.
	`APPLICATIONS`
	`1:Finance…`
	`2:ALG1CH5`
	`3:ALG1PRT1`
	`4:AreaForm`
	`5:CabriJr`
	`6:CelSheet`
	`7↓Conics`

4. Press ⬚ENTER⬚ or ⬚1⬚ to start the TVM Solver.	`CALC VARS`
	`1:TVM Solver…`
	`2:tvm_Pmt`
	`3:tvm_I%`
	`4:tvm_PV`
	`5:tvm_N`
	`6:tvm_FV`
	`7↓npv(`

5. The screen in the TVM Solver shows several variables which may be changed by pressing the arrow keys to move to the line of the variable. Then the number on that line cam be edited.	`N=120`
	`I%=4`
	`PV=-1000000`
	`PMT=14347.09484`
	`FV=0`
	`P/Y=4`
	`C/Y=4`
	`PMT:END BEGIN`

The values in the TVM Solver are quantities involved in compound interest and annuities.

- N is the number of periods in the term.
- I% is the annual interest rate written as a percent (not as a decimal). This means 4 percent is 4, not 0.04.
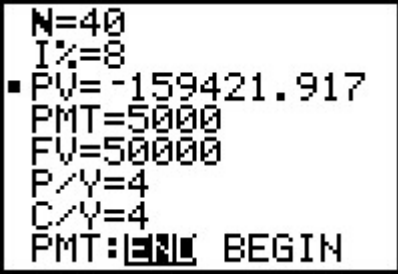
- PV is the present value.
- PMT is the payment.
- FV is the future value.
- P/Y is the number of payments per year.
- C/Y is the number of times interest is compounded in a year.
- PMT: END BEGIN indicates whether the payment is made at the end or the beginning of the period.

The TVM Solver has some interesting assumptions regarding the signs of the present value PV and the payment PMT. Amounts that are deposited like payments into an annuity or a deposit made into an account are negative. Amounts that you receive from an account, like the future value of a deposit, are positive.

Find the Amount Needed to Establish a Trust Fund

A wealthy individual wishes to create a trust fund for his grandson so that he may withdraw $5000 at the end of every quarter for ten years. At the end of ten years, the grandson will receive the rest of the trust which contains $50,000. If the trust earns 8% interest compounded quarterly, how much should be put into the trust initially?
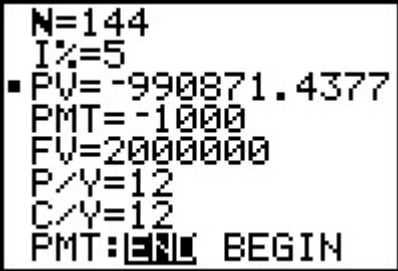
Solution Recall that amounts paid into an account are entered as negative amounts. Amounts received from the account are entered as positive amounts. In this example, the grandson is receiving money from an account instead of paying money into an account. This means the payment is entered as a positive number. The future value will also be received from the account so it is also entered as a positive number.

1. Edit the TVM Solver so it looks like the one on the right.. 2. Move the cursor to the PV line. The value on this line is irrelevant since it will be calculated in the next step.	N=40 I%=8 PV=■ PMT=5000 FV=50000 P/Y=4 C/Y=4 PMT:END BEGIN
3. Press [ALPHA][ENTER] to calculate the present value. Since the values is negative, the individual must deposit $159,421.92 in the trust fund.	N=40 I%=8 ▪PV=-159421.917 PMT=5000 FV=50000 P/Y=4 C/Y=4 PMT:END BEGIN

Reaching a Retirement Goal

A fifty-five year old investor wishes to retire at age 67. The investor has budgeted $1000 a month that she may deposit in an ordinary annuity that earns 5% interest compounded monthly. If she wishes to accumulate $2,000,000 for retirement, what must be in the account today to reach that goal?
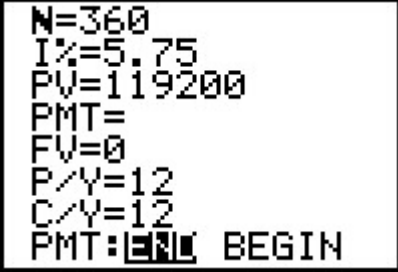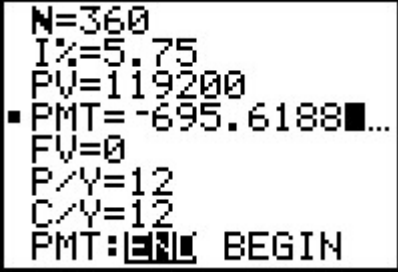
Solution Since the payment is being made into the account, the payment must be negative in the TVM Solver.

1. Edit the TVM Solver so it looks like the one on the right.. 2. Move the cursor to the PV line. The value on this line is irrelevant since it will be calculated in the next step.	N=144 I%=5 PV=■ PMT=-1000 FV=2000000 P/Y=12 C/Y=12 PMT:END BEGIN
3. Press ALPHA ENTER to calculate the present value. Since the values is negative, the individual must deposit $990,871.44 in the trust fund.	N=144 I%=5 ▪PV=-990871.4377 PMT=-1000 FV=2000000 P/Y=12 C/Y=12 PMT:END BEGIN

Payment on an Amortized Loan

A young professor purchases a home for $149,000. He plans to take out a 30 year mortgage at an annual interest rate of 5.75%. The mortgage requires a down payment of 20% of the purchase price. Find the monthly payment on this mortgage.

Solution Since the lender has given $119,200 to the professor for the purchase of the house, the present value is entered as a positive number.

1. Edit the TVM Solver so it looks like the one on the right.. 2. Move the cursor to the PMT line. The value on this line is irrelevant since it will be calculated in the next step.	```N=360 I%=5.75 PV=119200 PMT= FV=0 P/Y=12 C/Y=12 PMT:END BEGIN```
3. Press ALPHA ENTER to calculate the payment. Since the values is negative, the professor makes payments into the mortgage of $695.62.	```N=360 I%=5.75 PV=119200 ▪PMT=-695.6188█... FV=0 P/Y=12 C/Y=12 PMT:END BEGIN```