

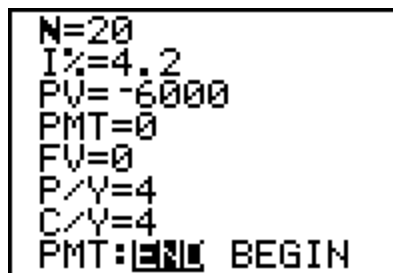
MA 110      **Using the TVM Solver to Solve Compound Interest Problems**  
 Section 3.2

The **TVM** (time value of money) menu can be used to solve a variety of problems involving compound interest. To get to this menu,

- TI-83+, TI 84+      Select APPS, Finance, TVM Solver  
 TI-83                Select 2<sup>nd</sup>, x<sup>-1</sup>, TVM Solver

1. You are going to invest \$6000 at 4.2% compounded quarterly. How much money will you have at the end of 5 years?

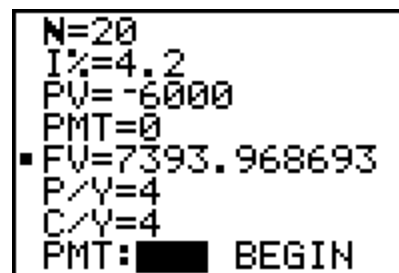
Put your calculator into TVM solver mode and enter the following:



- (a)  $N = 20$  because the total number of compounding periods is  $5 \cdot 4 = 20$   
 (b)  $I\% = 4.2$   
 This is entered as a yearly percentage, without converting to a decimal.  
 (c)  $PV = -6000$   
 6000 is entered as a negative number because it is a cash outflow, that is, money which you are spending. Cash inflows (money you are receiving) are entered as positive numbers and cash outflows are entered as negative numbers.  
 (d)  $PMT = 0$  In this case, the only money invested is the original \$6000. There are no other payments in this problem.  
 (e)  $FV = 0$  Enter 0 for the variable for which you'll be solving.  
 (f)  $P/Y = 4$  and  $C/Y = 4$  This is the number of compounding periods per year.  
 (g)  $PMT: END$  In this problem, there are no payments so either END or BEGIN will work fine. However, in some other types of problems, we will have to use END here, so it's best to leave this line on END.

Now put the cursor on the FV line, and select ALPHA, ENTER. This chooses SOLVE. The screen should look like this. (The cursor has been put at the bottom so that it would not block the answer.) Rounded to two decimal places, the FV is now

\$7393.97, which is the same as  $6000 \left(1 + \frac{.042}{4}\right)^{20}$ .



2. How many years would it take the original \$6000 in problem #1 to double if money is invested at the same rate?  
 This time we are finding N, so enter  $N = 0$ . The FV is 12000. Everything else is the same. Your screen should look like the first screen below. With the cursor on the  $N = 0$  line, press ALPHA, ENTER to get the second screen below.



The answer for N is approximately 66.36. This is given in quarters of a year. To convert it to years, divide by 4 to get approximately 16.6 years.

3. **Finding the effective rate (annual percentage yield or APY)** The effective rate is the simple interest rate that will produce the same future value in one year as a rate which is compounded more than once a year. To find it, use a PV of \$100 and a time period of 1 year, and then subtract the original investment of \$100 to find the amount of interest earned. This will be the effective rate since percent is equivalent to per hundred.

To find the effective rate for 6% compounded monthly, your screen should look like the first screen below. With the cursor on the FV line, press ALPHA ENTER to get the second screen.

```

N=12
I%=6
PV=-100
PMT=0
FV=0
P/Y=12
C/Y=12
PMT: [ ] [ ] BEGIN
  
```

```

N=12
I%=6
PV=-100
PMT=0
FV=106.1677812
P/Y=12
C/Y=12
PMT: [ ] [ ] BEGIN
  
```

The effective rate will be  $106.1677812 - 100$ , or  $6.1677812\%$ .

**Use the TVM Solver to solve each of the following problems:**

4. Find the future value for an investment of \$6300 at 3.8% compounded monthly for 4 years.
5. How much money must you invest now at 4.6% compounded semi-annually in order to have \$10,000 in 5 years?
6. How long will it take \$5000 to grow to \$7000 at 6% compounded quarterly?
7. What is the effective rate of 5% compounded monthly?

Answers:            4. \$7332.45                            6. 22.6 quarters, or 5.65 years  
                          5. \$7966.06                            7. 5.12%