

SOLVER
TI-83 QUICK REFERENCE

The SOLVER feature is used to solve equations. There may be one variable or more than one variable in the equation.

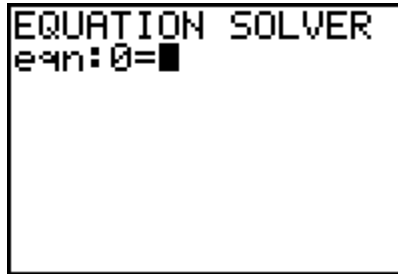
1. Press **MATH** **0** to activate the SOLVER.
2. Enter the equation in "eqn."
 - a. The equation must be in the form of some expression equal to zero. For example, $0 = X^2 + X - 2Y$.
 - b. If an equation exists in eqn which you do not wish to use, press the up arrow, clear the existing expression and enter the one you wish to use.
3. Press **ENTER**.
4. If you have more than one variable in the equation, enter values for all but one of the variables.
5. The calculator will look for solutions between the bounds. Ensure that your solution will occur between the bounds. If you are unsure, you may enter the default values, $-1E99$ and $1E99^{**}$, for the left and right bounds.
6. Move the cursor to the line containing the variable for which you wish to solve.
7. Press ENTRY SOLVE
ALPHA **ENTER**.
8. The solution for the variable will appear with a square to the left. The value "left-rt" gives an indication of the accuracy of the solution and should be 0 or near 0.
9. Repeat from 4., above, if you wish to solve the equation for other combinations of variables.

To enter $-1E99$, press **(-) **1** **2nd** EE J **,** **9** **9** **.**

EXAMPLE
SOLVER - USING THE TI-83

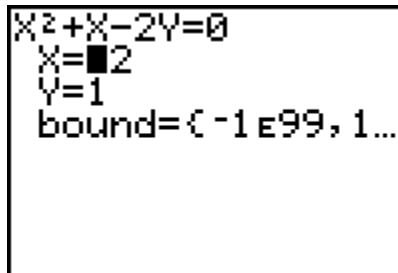
You will be using the compound interest formula to illustrate the use of the SOLVER. No knowledge of this formula is necessary in order to understand its use by the SOLVER. The formula is $F=P(1+R)^N$.

Press MATH 0 to activate the SOLVER. Your screen may or may not look like the one below.



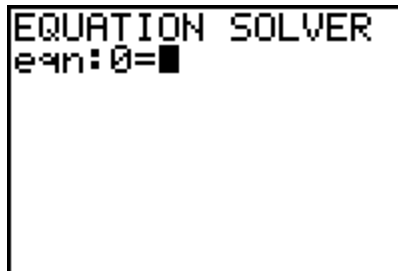
```
EQUATION SOLVER
eqn: 0=
```

If your screen looks like the one above, you will skip the next instruction and go to the next page. If your screen is similar to the one below, i.e. it has some sort of equation displayed with one or more variables, etc., you will need to clear the equation.



```
X^2+X-2Y=0
X=2
Y=1
bound={-1E99,1...
```

Press the up arrow followed by the CLEAR key. Now your screen should appear as below.



```
EQUATION SOLVER
eqn: 0=
```

Our equation, $F=P(1+R)^N$, must be entered into the calculator as some expression equal to zero. Therefore we must change the form of the equation to $0=P(1+R)^N-F$. The calculator has entered the $0=$ for you. Type in the rest of the equation using the ALPHA key for entering the letters.

```
EQUATION SOLVER
eqn: 0=P(1+R)^N-F
```

Press ENTER .

```
P(1+R)^N-F=0
P=96.54570927...
R=0
N=3.3414902794...
F=1100
bound=(-1E99,1...
```

Your screen should be similar to the one above but will most likely have different values for P, R, N, and F.

Enter 1000 for P, .02 for R and 8 for N. If your values in "bound" are different from $\{-1E99, 1E99\}$, change the values there. Position the cursor over the value for F. Other than the value in F, your screen should now appear as the one below.

```
P(1+R)^N-F=0
P=1000
R=.02
N=8
F=1100
bound=(-1E99,1...
```

With the cursor over the value of F, press ALPHA ENTER .

```
P(1+R)^N-F=0
P=1000
R=.02
N=8
▪ F=1171.6593810...
bound=(-1E99,1...
▪ left-rt=0
```

The calculator has determined that F is approximately 1171.66 when P=1000, R=.02, and N=8.

We will now determine the value for P if R=.03, N=12, and F=1500.
Enter these values, position the cursor over the value for P and

ENTRY SOLVE

press ALPHA ENTER .

```
P(1+R)^N-F=0
▪ P=1052.0698202...
R=.03
N=12
F=1500
bound=(-1E99,1...
▪ left-rt=0
```

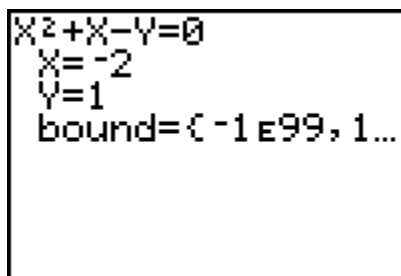
The value of P is approximately 1052.07.

Press the up arrow to the position of the equation.

```
EQUATION SOLVER
eqn: 0=P(1+R)^N-F
```

With the equation displayed in this manner, we may edit the equation or clear the equation and enter another.

Enter the equation $0=X^2+X-Y$ and press **ENTER** .



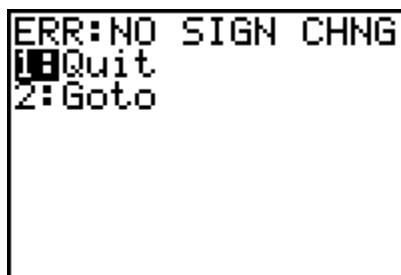
```
X^2+X-Y=0
X=-2
Y=1
bound=(-1E99,1E99)
```

The values for X and Y may be different on your screen. Enter -2

for Y, position the cursor over the value for X, and press

ENTRY SOLVE

ALPHA **ENTER** .

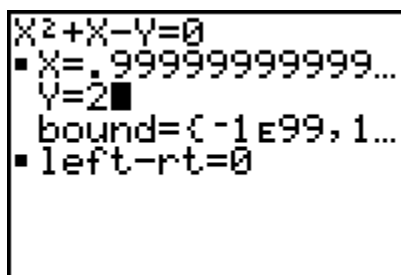


```
ERR:NO SIGN CHNG
1:Quit
2:Goto
```

The calculator is telling you that there is no solution for X if $Y=-2$.

If you assign the value 2 to Y, the equation becomes $X^2+X-2=0$. We know that this equation has two solutions for X. The X-solution found by the SOLVER will depend on the bounds set and/or the current value (guess) in X when you instruct the calculator to SOLVE. We will find the first solution by guessing 6 for X.

Press **2** to return to the SOLVER, enter 2 for Y, enter 6 as a guess for X and solve for X again.



```
X^2+X-Y=0
X=.999999999999
Y=2
bound=(-1E99,1E99)
left-rt=0
```

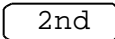
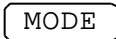
You see that $X=1$ when $Y=2$. (Remember that all calculator answers should be considered approximate.)

To find the other solution, we may change the bounds since the calculator will only look between the bounds or we may enter a guess value in X closer to the "other" solution. Either method requires that we have some knowledge of the number and approximate locations of solutions.

Enter -6 for X and solve for X again. You will find that the other solution is -2.

```
X^2+X-Y=0
▪ X=-2
  Y=2
bound=(-1E99,1E99)
▪ left-rt=0
```

QUIT

Press   to return to the HOME screen.

EXERCISES with ANSWERS

1. Solve the equation $V=LWH$ for W when $V=100$, $L=15$ and $H=12$.

```
LWH-V=0
L=15
W=.5555555555...
H=12
V=100
bound=(-1e99,1...
left-rt=0
```

$$W = 5/9.$$

2. For the equation in 1., find V when $L=15$, $W=8$ and $H=3$.

```
LWH-V=0
L=15
W=8
H=3
V=360
bound=(-1e99,1...
left-rt=0
```

$$V = 360.$$

3. The formula for the volume of a right-circular cylinder is $V= R^2H$ where V is the volume, R is the radius and H is the height. Find the volume when the height is 8.00 cm and the radius is 3.00 cm. Note: The number is accessed as the second function of the exponent key, $^$.

```
πR²H-V=0
R=3
H=8
V=226.19467105...
bound=(-1e99,1...
left-rt=0
```

The volume is approximately 226.19 cm^3 .

4. For the formula in 3., above, find the radius when the volume is 320.00 cm^3 and the height is 20.00 cm.

```
πR²H-V=0
R=2.2567583341...
H=20
V=320
bound=(-1e99,1...
left-rt=0
```

The radius is approximately 2.26 cm.

5. Solve the equation $X^2+X-5=0$.

Hint: This equation has 2 solutions. Guess 10 for X to find one solution and -10 to find the other.

```
X^2+X-5=0
▪ X=1.7912878474...
  bound={-1e99,1...
▪ left-rt=0
```

```
X^2+X-5=0
▪ X=-2.791287847...
  bound={-1e99,1...
▪ left-rt=0
```

The two solutions found are approximately 1.7913 and -2.7913.