

## CHAPTER 9 Calculator Notes for the TI-83 and TI-83/84 Plus

### Note 9A • Animating a Figure

This is a sample program that translates the arrow in the project of Lesson 9.1. You can modify this program to translate a different figure or to involve other transformations.

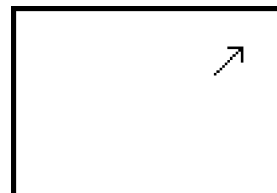
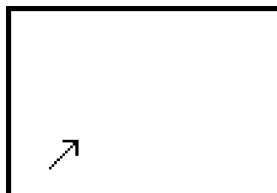
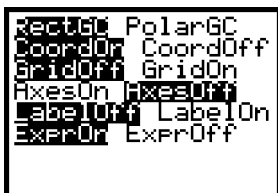
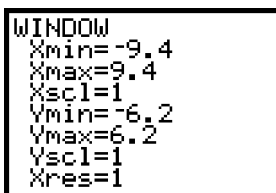
Enter the following program into your calculator. (See **Note 0G** if you need help entering a program.)

```

PROGRAM:ANIMATE
{ - 7 , - 5 , - 6 , - 5 , - 5 } → L1
{ - 5 , - 3 , - 3 , - 3 , - 4 } → L2
Plot1 (HyLine, L1, L2, .)
For(A, 1, 20)
    L1 + 0.6 → L1
    L2 + 0.35 → L2
    DispGraph
End
    
```

Before you run the program, clear or disable any equations on the Y= screen and set the calculator to a friendly window with a factor of 2. (See **Note 8D** if you need help with friendly windows.) Also press **2nd** [FORMAT] and select **AxesOff**. Remember to turn the axes back on when you are finished with the program.

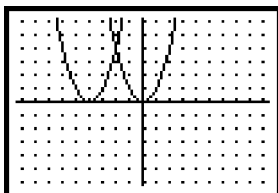
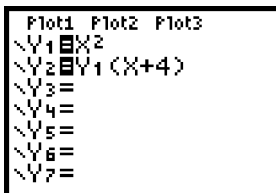
When you run the program, the arrow will appear to move from the lower left to the upper right of the screen in twenty frames.



### Note 9B • Transformations of Functions

Recall that your calculator uses  $Y_1(x)$  as function notation. The function is defined by the expression you enter for  $Y_1$  in the Y= screen. You can use one function, say  $Y_1(x)$ , to define another function, say  $Y_2(x)$ . This allows you to do transformations. (See **Note 8A** to review selecting  $Y_1$  from the Y-VARS menu.)

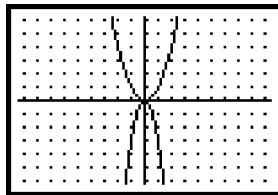
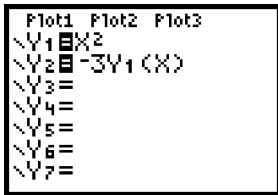
For example, if  $Y_1(x) = x^2$ , then the graph of  $Y_2(x) = Y_1(x + 4)$  is a translation of the graph of  $Y_1(x) = x^2$  to the left 4 units. This is the same as graphing  $Y_2(x) = (x + 4)^2$ .



$[-9.4, 9.4, 1, -6.2, 6.2, 1]$

(continued)

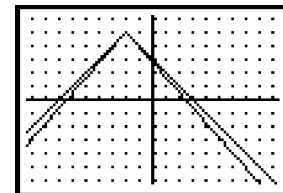
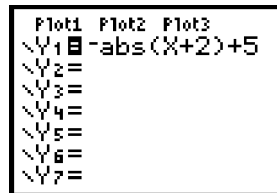
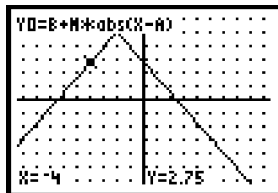
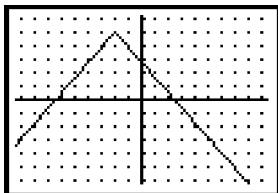
The graph of  $Y_2(x) = -3Y_1(x)$  is a reflection of the graph of  $Y_1(x) = x^2$  across the  $x$ -axis and a vertical stretch by a factor of 3. This is the same as graphing  $Y_2(x) = -3x^2$ .



[-9.4, 9.4, 1, -6.2, 6.2, 1]

Note 9C • ABS Program

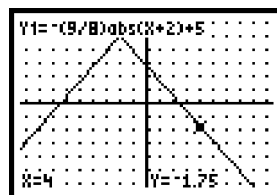
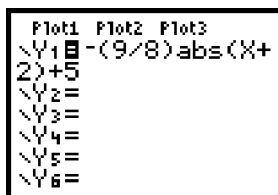
Enter the ABS program into your calculator or link it from another calculator. When you execute the program it will create a random absolute value graph on your screen. Study the graph in order to find its equation. If you want to know the coordinates of points on the function, press **TRACE** and the horizontal arrow keys. When you have a guess for the function, press **Y=**. Enter your guess and press either **GRAPH** or **2nd** **[TABLE]** to compare your guess to the calculator's function,  $Y_0$ . If your guess needs adjustment, go back to **Y=** and make changes. When you have a match, the graphs of the two functions will coincide and their tables will be identical. Pressing **TRACE** and the arrow keys can help confirm or disprove the equivalence of the two graphs. When you have finished with a function, press **2nd** **[QUIT]** and then press **ENTER** to replay or **1** **ENTER** to quit.



[-9.4, 9.4, 1, -6.2, 6.2, 1]

X	Y1	Y0
-5	1.625	1.625
-4	2.75	2.75
-3	3.875	3.875
-2	5	5
-1	6.125	6.125
0	7.25	7.25
1	8.375	8.375

X=-5



X	Y1	Y0
-5	1.625	1.625
-4	2.75	2.75
-3	3.875	3.875
-2	5	5
-1	6.125	6.125
0	7.25	7.25
1	8.375	8.375

X=-5

```
PROGRAM:ABS
ClrHome
Disp " PRESS ENTER"," TO SEE
  GRAPH",""," AFTER YOU ARE","
  DONE","PRESS 2ND [QUIT]"
Pause
FnOff :PlotsOff
GridOn:
-9.4→Hmin:9.4→Hmax
1→Hscl:1→Yscl
-6.2→Ymin:6.2→Ymax
randInt(-9,8)→A
randInt(A+1,9)→C
```

```
ClrHome
Disp " PRESS ENTER"," TO
  REPLAY",""," PRESS"," 1 AND
  ENTER"," TO QUIT"
Lbl 1
randInt(-6,6)→B
randInt(-6,6)→D
If B=D:Goto 1
(D-B)/(C-A)→M
"B+M*abs(H-A)"→Y0
GraphStyle(0,5)
DispGraph
```