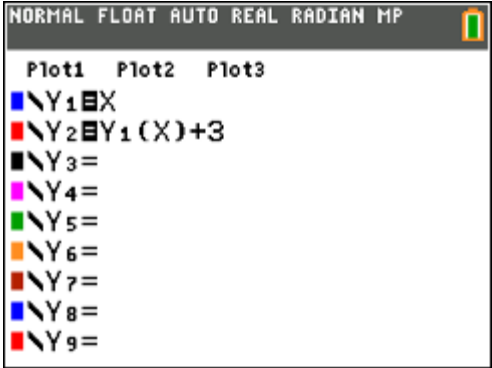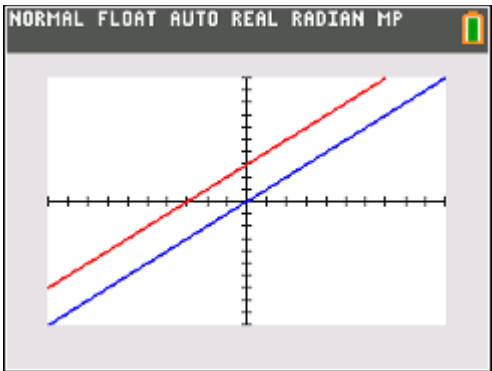**Exploring transformations with the TI-84 Plus CE graphing calculator**
Dr. Richard Parr (rparr@rice.edu)
Rice University School Mathematics Project (http://rusmp.rice.edu)

Compare the graphs and tables of $Y_1= X$ and $Y_2=Y_1(X) +3$. What is the function that is being graphed in Y_2?

How are the graphs the same?

How are the graphs different?

Compare the tables.
What do you notice?

Change the value of 3. Try positive and negative numbers.
What do you notice in the tables and graphs?

Change Y_1 to $Y_1=X^2$. (Leave Y_2 the same).
What is the function that is being graphed now in Y_2?

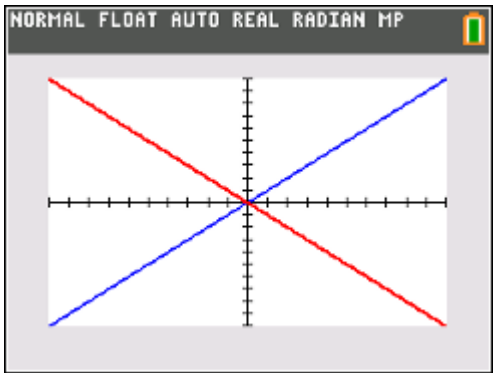Compare graphs and tables. What do you notice?

Change Y_1 to any other function that you wish.
Any surprises?

Compare the graphs and tables of $Y_1 = X$ and $Y_2 = -Y_1(X)$. What is the function that is being graphed in Y_2?

How are the graphs the same?

How are the graphs different?

Compare the tables.
What do you notice?

Change Y_1 to $Y_1 = X^2$. (Leave Y_2 the same).
What is the function that is being graphed now in Y_2?

Compare graphs and tables. What do you notice?

Change Y_1 to any other function that you wish.
Any surprises?

NORMAL FLOAT AUTO REAL RADIAN MP

Plot1 Plot2 Plot3

■\Y₁☐X²
■\Y₂☐2Y₁(X)■
■\Y₃=
■\Y₄=
■\Y₅=
■\Y₆=
■\Y₇=
■\Y₈=

Compare the graphs and tables of $Y_1= X$ and $Y_2=2Y_1(X)$. What is the function that is being graphed in Y_2?

How are the graphs the same?

How are the graphs different?

NORMAL FLOAT AUTO REAL RADIAN MP

Compare the tables.
What do you notice?

Change the value of 2. Try positive and negative numbers.
What do you notice in the tables and graphs?

NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR △Tbl

X	Y₁	Y₂		
0	0	2		
1	1	5		
2	2	8		
3	3	11		
4	4	14		
5	5	17		
6	6	20		
7	7	23		
8	8	26		
9	9	29		
10	10	32		

X=0

Change Y_1 to $Y_1=X^2$. (Leave Y_2 the same).
What is the function that is being graphed now in Y_2?

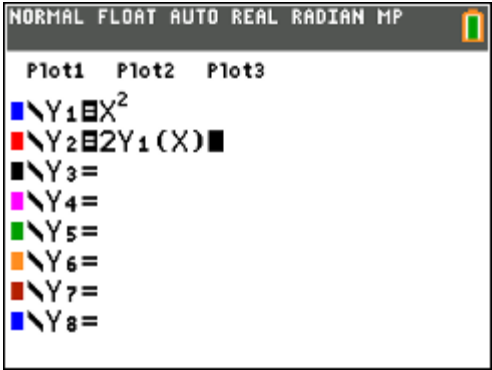Compare graphs and tables. What do you notice?

Change Y_1 to any other function that you wish.
Any surprises?

NORMAL FLOAT AUTO REAL RADIAN MP

Plot1 Plot2 Plot3
Y_1=X
Y_2=Y_1(X-2)
Y_3=
Y_4=
Y_5=
Y_6=
Y_7=
Y_8=
Y_9=

Compare the graphs and tables of Y_1= X and Y_2=Y_1(X-2). What is the function that is being graphed in Y_2?

How are the graphs the same?

How are the graphs different?

NORMAL FLOAT AUTO REAL RADIAN MP

Compare the tables.
What do you notice?

Change the value of -2. Try positive and negative numbers.
What do you notice in the tables and graphs?
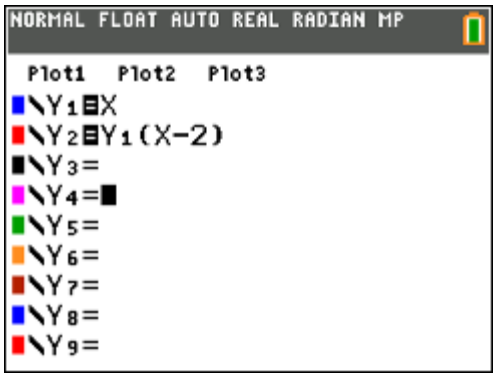
NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR △Tbl

X	Y_1	Y_2		
0	0	-2		
1	1	-1		
2	2	0		
3	3	1		
4	4	2		
5	5	3		
6	6	4		
7	7	5		
8	8	6		
9	9	7		
10	10	8		

X=0

Change Y_1 to Y_1=X^2. (Leave Y_2 the same).
What is the function that is being graphed now in Y_2?
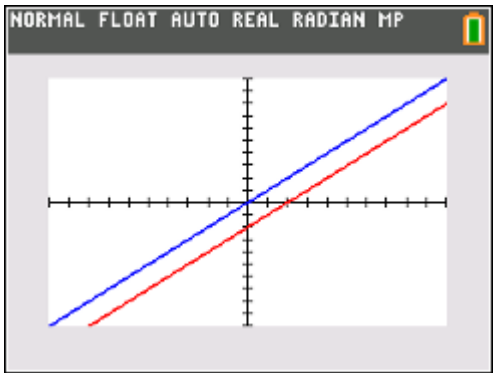
Compare graphs and tables. What do you notice?

Change Y_1 to any other function that you wish.
Any surprises?

NORMAL FLOAT AUTO REAL RADIAN MP

Plot1 Plot2 Plot3
∎❭Y₁🔲X
∎❭Y₂🔲3Y₁(X+2)−4
∎❭Y₃=
∎❭Y₄=
∎❭Y₅=
∎❭Y₆=
∎❭Y₇=
∎❭Y₈=
∎❭Y₉=
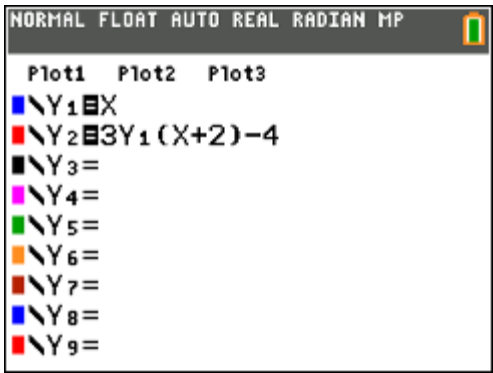
Compare the graphs and tables of $Y_1 = X$ and $Y_2 = Y_1(X+2) -4$. What is the function that is being graphed in Y2?

How are the graphs the same?

How are the graphs different?

NORMAL FLOAT AUTO REAL RADIAN MP

Compare the tables.
What do you notice?

Change Y_1 to $Y_1 = X^2$. (Leave Y_2 the same).
What is the function that is being graphed now in Y_2?
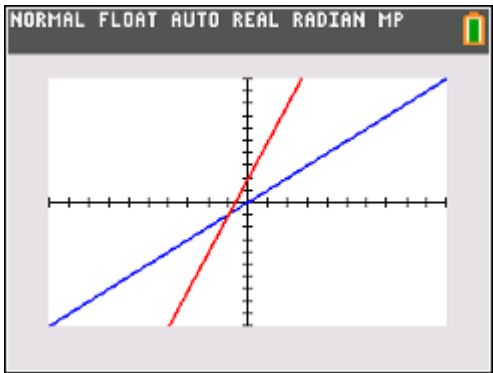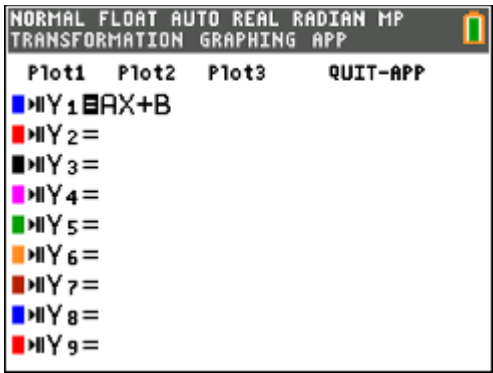
Compare graphs and tables. What do you notice?

NORMAL FLOAT AUTO REAL RADIAN MP
PRESS + FOR △Tbl

X	Y₁	Y₂		
0	0	2		
1	1	5		
2	2	8		
3	3	11		
4	4	14		
5	5	17		
6	6	20		
7	7	23		
8	8	26		
9	9	29		
10	10	32		

X=0

Change Y_1 to any other function that you wish.
Any surprises?

NORMAL FLOAT AUTO REAL RADIAN MP
TRANSFORMATION GRAPHING APP

Plot1   Plot2   Plot3   QUIT-APP
■▶❙❙Y₁⊟AX+B
■▶❙❙Y₂=
■▶❙❙Y₃=
■▶❙❙Y₄=
■▶❙❙Y₅=
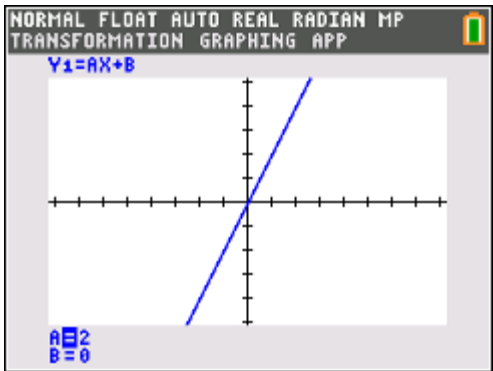■▶❙❙Y₆=
■▶❙❙Y₇=
■▶❙❙Y₈=
■▶❙❙Y₉=

Investigate the TRANSFORMATION app on the TI-84

Change the settings and explore transformations on the parent function.

What are the effects of A and B?
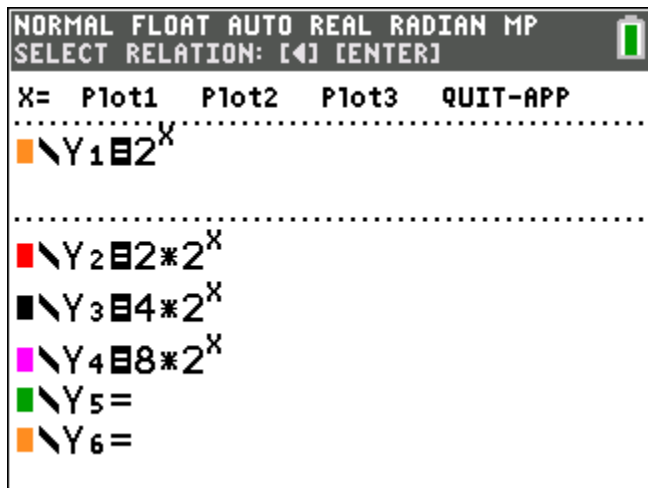
NORMAL FLOAT AUTO REAL RADIAN MP
TRANSFORMATION GRAPHING APP

WINDOW SETTINGS
  ◾▶❙❙   ▶   ▶▶
A⊟2
B=0
Step=1

NORMAL FLOAT AUTO REAL RADIAN MP
TRANSFORMATION GRAPHING APP
 Y₁=AX+B

A⊟2
B=0

Further Explorations:

Explore the following graphs:

What do you notice about the graphs?

What transformations do you see from the graphs?

Does these transformations match the equations you enetered   ? Why or Why not?

Now, explore these graphs:


```
NORMAL FLOAT AUTO REAL RADIAN MP
SELECT RELATION: [◄] [ENTER]

X=  Plot1   Plot2   Plot3   QUIT-APP
■\Y₁⊟log(X)
■\Y₂⊟log(10X)
■\Y₃⊟log(100X)
■\Y₄⊟log(1000X)
■\Y₅=
■\Y₆=
■\Y₇=
■\Y₈=
■\Y₉=
```

What do you notice about the graphs?

What transformations do you see from the graphs?

Does these transformations match the equations you entered? Why or Why not?