



# ALGEBRA II ACTIVITY 11: EVALUATING LOGARITHMS ON THE TI-84 PLUS

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## ACTIVITY OVERVIEW:

In this activity we will

- Use the  $\boxed{Y=}$  register, table and graph to examine the relationship between  $y=10^x$  and  $y=\log(10^x)$
- Evaluate logs in the table and on the home screen
- Evaluate logs with base other than 10

What exactly is the log or logarithm function? To learn about it, enter the equations  $y=10^x$  and  $y=\log(10^x)$  into the  $\boxed{Y=}$  register.

```

Plot1 Plot2 Plot3
Y1=10^X
Y2=log(10^X)
Y3=
Y4=
Y5=
Y6=
Y7=
  
```

Press  $\boxed{2nd}\boxed{GRAPH}$  to view the table. What do you notice about the numbers in the three columns? What is the value of  $10^3$ ? What is the value of  $\log(10^3)$ ?

X	Y1	Y2
0	1	0
1	10	1
2	100	2
3	1000	3
4	10000	4
5	100000	5
6	1E6	6

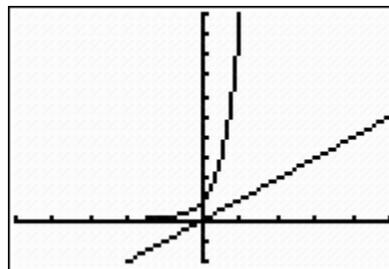
X=0

Set the window in order to view the graph. Press  $\boxed{WINDOW}$ . Set the window as shown.

```

WINDOW
Xmin=-5
Xmax=5
Xscl=1
Ymin=-2
Ymax=10
Yscl=1
Xres=1
  
```

Press  $\boxed{GRAPH}$ . Why does the graph of  $y=\log(10^x)$  appear to be the same as the graph of  $y=x$ ?



Press  $\text{2nd}$  $\text{WINDOW}$ . Set the table to examine what happens for negative values of  $x$  (negative exponents) and for fractional values of  $x$ .

```
TABLE SETUP
TblStart=-2
ΔTbl=.25
IndPnt: Auto Ask
Depend: Auto Ask
```

Do the relationships noticed earlier remain the same?

X	Y1	Y2
-2	.01	-2
-1.75	.01778	-1.75
-1.5	.03162	-1.5
-1.25	.05623	-1.25
-1	.1	-1
-.75	.17783	-.75
-.5	.31623	-.5

X=-2

Press  $\text{2nd}$  $\text{MODE}$  to return to the home screen. Use  $\text{LOG}$  to evaluate  $\log(100)$ . Because  $10^2=100$ , the calculation returns a value of 2.

Try finding the exponent for other values of  $10^x$  such as  $\log(64)$  as shown.

```
log(100)      2
log(64)
1.806179974
```

What happens if the base of your exponential function is not 10? How does that affect the log? Press  $\text{Y=}$  and clear the previous equations. Enter  $y=4^x$  as shown.

```
Plot1 Plot2 Plot3
Y1=4^X
Y2=
Y3=
Y4=
Y5=
Y6=
Y7=
```

Press  $\text{2nd}$  $\text{GRAPH}$  to view the table. What is the value of  $4^3$ ? What is the value of  $4^4$ ?

X	Y1	
0	1	
1	4	
2	16	
3	64	
4	256	
5	1024	
6	4096	

X=0

Press  $\text{2nd}$  $\text{MODE}$  to return to the home screen. Use  $\text{LOG}$  to evaluate  $\log_4 64$ . Use the **change-of-base property** for logarithms, which says  $\log_b a = \log a / \log b$ . How do these results match the results in the table above?

```
log(64)/log(4)  3
log(128)/log(4) 3.5
```