

Graphing Calculator Lab

Solving Exponential Equations and Inequalities

You can use a TI-73 Explorer graphing calculator to solve exponential equations by graphing or by using the table feature. To do this, you will write the equations as systems of equations.

ACTIVITY 1

Solve $2^{3x-9} = \left(\frac{1}{2}\right)^{x-3}$.

Step 1 Graph each side of the equation.

Graph each side of the equation as a separate function. Enter $2^{(3x-9)}$ as Y1. Enter $\left(\frac{1}{2}\right)^{(x-3)}$ as Y2. Be sure to include the added parentheses around each exponent. Then graph the two equations.

KEYSTROKES: See Graphing Calculator Lab Lines of Regression.

Step 2 Use the TABLE feature.

You can also use the TABLE feature to locate the point at which the curves cross.

KEYSTROKES: $\boxed{2nd}$ [TABLE]

The table displays x-values and corresponding y-values for each graph. Examine the table to find the x-value for which the y-values for the graphs are equal. At $x = 3$, both functions have a y-value of 1. Thus, the solution of the equation is 3.

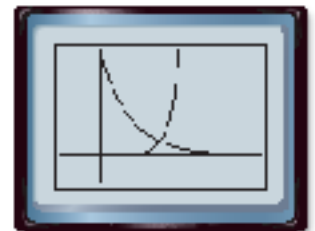
CHECK Substitute 3 for x in the original equation.

$$2^{3x-9} = \left(\frac{1}{2}\right)^{x-3} \quad \text{Original equation}$$

$$2^{3(3)-9} = \left(\frac{1}{2}\right)^{3-3} \quad \text{Substitute 3 for } x.$$

$$2^0 = \left(\frac{1}{2}\right)^0 \quad \text{Simplify.}$$

$$1 = 1 \quad \text{The solution checks.}$$



$[-2, 8]$ scl: 1 by $[-1, 8]$ scl: 1

| X | Y1 | Y2 |
|---|-----|-----|
| 0 | 1/8 | 8 |
| 1 | 1/4 | 4 |
| 2 | 1/2 | 2 |
| 3 | 1 | 1 |
| 4 | 2 | 1/2 |
| 5 | 4 | 1/4 |
| 6 | 8 | 1/8 |

X=3

