

## Exponential Reflections

ID: 12277

Time required  
10–15 minutes

## Activity Overview

*In this activity, students will reflect a point from the exponential function over the line  $y = x$  and find the locus of the reflection, which is the natural log function.*

## Topic: Exponential Functions

- *Line Reflections*
- *Inverse Functions*
- *Natural Log Function*

## Teacher Preparation and Notes

- *Students need to reflect the point over a line using the reflection tool. You can shorten the activity by reflecting the point before giving the activity to the students.*
- *Using the Geometry trace is another way to examine the graph of the inverse function*
- *Students should be familiar with logarithms in order to complete the activity.*
- ***To download the student and solution TI-Nspire documents (.tns files) and student worksheet, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter “12277” in the quick search box.***

## Associated Materials

- *Alg2Week23\_ExpLog\_Worksheet\_TINspire.doc*
- *Alg2Week23\_ExpLog.tns*
- *Alg2Week23\_ExpLog\_Soln.tns*

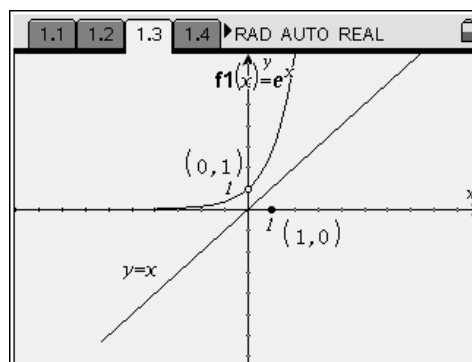
## Suggested Related Activities

*To download any activity listed, go to [education.ti.com/exchange](http://education.ti.com/exchange) and enter the number in the quick search box.*

- *Exponentialis ~ Logarithmus (TI-Nspire technology) — 9207*
- *Evaluating Logarithms (TI-Nspire technology) — 9533*
- *Exponential Growth (TI-Nspire technology) — 8254*

### Problem 1 – Reflecting the Exponential Function

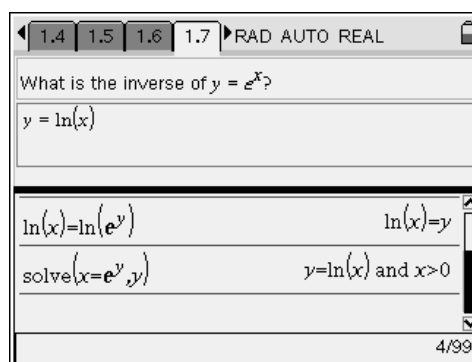
Students begin by reflecting the given point over the line  $y = x$ . To do this, select **MENU > Transformation > Reflection**, then select the point followed by the line  $y = x$ . Then, use **MENU > Actions > Coordinates and Equations** to get the coordinates of the reflected point. Students should record the new point in the table. Have students change the value of the point at  $(0, 1)$  by changing the  $x$ -value. Double-click on the  $x$ -value and type in the new values from the table.



After completing the table, student should find the locus of the reflected points. They should select **MENU > Construction > Locus**, then select the original point and the reflected point.

Have students solve for inverse function algebraically. Students should try to solve the inverse function by hand. If students have access to CAS technology, then they can check their answers using the following process:

- On page 1.7, type in a new equation where  $x$  and  $y$  are switched in the equation given in the first line and press  $\text{Enter}$ .
- Solve for  $y$  by using the inverse function of  $e^x$ . Use the equation from the previous line and take the natural log ( $\ln$ ) of both sides of the equation. The result is the graph of the locus on page 1.3.
- To check this result, use the **Solve** command. Type **Solve(**, then enter the equation, then enter **,y)** and press  $\text{Enter}$ . The result should match the previous result.



Have students graph their resulting function on page 1.3 to show that it matches the locus graph.

### Extension – Reflecting Any Exponential Function

In this activity, students repeat the process of the original activity with different exponential functions using a slider.

