

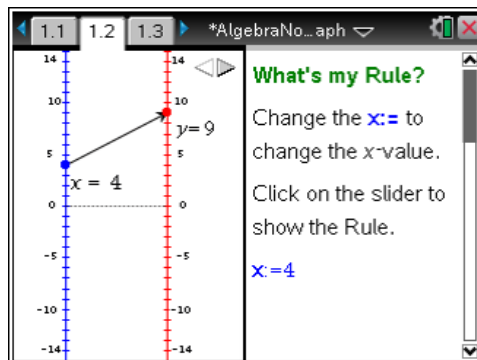
Introduction

A **nomograph** is similar to a function machine in that it relates a number in one set (the *domain*) to a number in a second set (the *range*). The nomograph takes the form of a pair of vertical number lines; the one on the left represents the domain; the one on the right represents the range. The function rule mapping an element in the domain to its corresponding element in the range is shown by an arrow.

Problem 1 – “What’s my Rule?”

The first nomograph (representing an unknown function) is shown on page 1.2. Enter a value of x into $x:=$ of the notes page. The nomograph relates it to a y value by substituting the value x into the function’s rule.

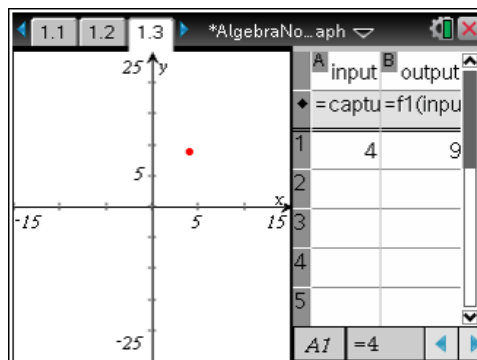
Your task is to find the “mystery rule” for f_1 that pairs each value for x with a value for y . Once you think you have found the rule, record it below. Then continue testing your prediction using the nomograph. To check your work, you can click on the slider to show the rule.



$f_1(x) = \underline{\hspace{2cm}}$

Each time you entered a different value for x , that value and its corresponding y -value were recorded into the spreadsheet on page 1.3 and simultaneously displayed in the scatter plot. Record four such ordered pairs and draw them on the coordinate grid to the right.

The line through these points is the graph of $f_1(x)$, which you can see has a slope of 1. How can you tell this from the nomograph by looking at the arrows for different values of x ?



Problem 2 – More “What’s my Rule?”

The nomograph on page 2.1 follows a different function rule than the nomograph in Problem 1. As before, enter values for x in the notes page and find the rule for this new function f_1 . You may use the resulting ordered pairs in the spreadsheet and scatter plot on page 2.2. Test your rule using the nomograph.

$f_1(x) = \underline{\hspace{2cm}}$

What is the slope of this function? Slope: _____

How do the arrows on the nomograph for this function differ from those in Problem 1?

Problem 3 – The “What’s my Rule?” Challenge

Page 3.1 shows a nomograph for the function $f_1(x) = x$. The challenge is to make up a new rule for $f_1(x)$, and have a partner guess your rule by using the nomograph.

Click into the $f_1:=x$ box in the notes section and enter your own equation of the form $y = ax + b$ (where a and b are integers). Then, exchange handhelds with your partner, who will use the nomograph and the graph on page 3.2 to discover your rule. Then, repeat.

List at least four of the functions you and your partner explored with the nomograph.

$f(x) =$ _____ $f(x) =$ _____ $f(x) =$ _____ $f(x) =$ _____

Problem 4 – Even more “What’s my Rule?”

For the nomograph on page 4.1, you change the input, x , by grabbing and dragging the base of the arrow. As you move the point up and down, it will “jump” by steps of 1, and the arrow point to each corresponding y -value.

Here, the ordered pairs are not recorded in a spreadsheet, so you will need to record some of your ordered pairs below. Use these ordered pairs and work with a partner to find the rule for this function.

_____ _____ _____
 _____ _____ _____ $y =$ _____

Problem 5 – A more difficult “What’s my Rule?”

Record ordered pairs and find the rule for the nomograph on page 5.1.

_____ _____ _____
 _____ _____ _____ $y =$ _____

Extension

Problem 6 – The case of the disappearing arrow

Page 6.1 displays the nomograph for the function $f_1(x) = \sqrt{6 - x}$. Observe what happens as you grab and drag the base of the arrow.

When does the arrow disappear?

Why does it disappear?