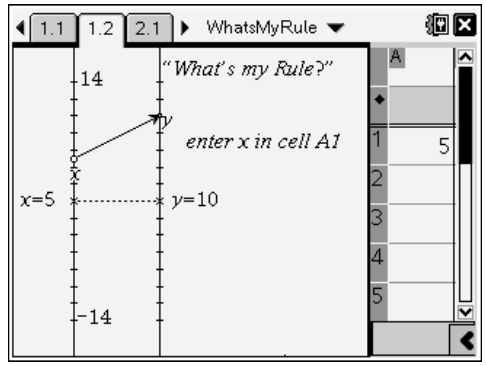
What’s My Rule?

WhatsMyRule.tns

Name ________________________

Class ________________________

Problem 1 – “What’s my Rule?”

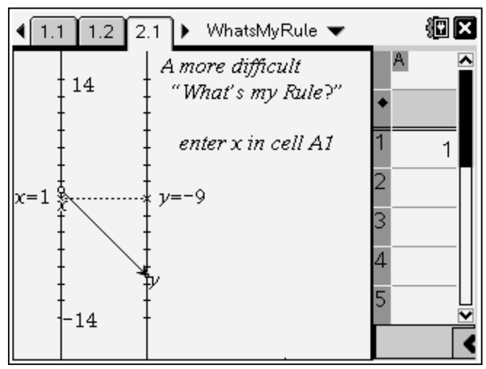


The first nomograph (representing an unknown function) is shown on page 1.2. Enter a value of *x* into cell A1 of the spreadsheet. (Press ctrl + tab to toggle between the applications as needed.) The nomograph relates it to a *y*-value by substituting the value *x* into the function’s rule.

Your task is to find the “mystery rule” for **f1** 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.

f1(*x*) = ___________

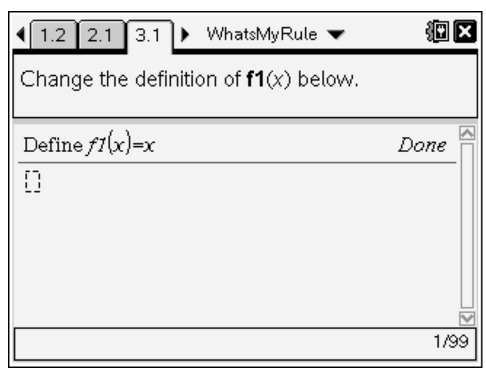
Problem 2 – A more difficult “What’s my Rule?”



Unlike the nomograph in Problem 1, the nomograph on page 2.1 follows a non-linear function rule. As before, enter values for *x* in cell A1 and find the rule for this new function **f1**. Test your rule using the nomograph.

f1(*x*) = ___________

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



Page 3.2 shows a nomograph for the function **f1**(x) = x. The challenge is to make up a new rule (of the form $ax + b$ or $ax^2 + b$) for **f1**(x), and have a partner guess your rule by using the nomograph.

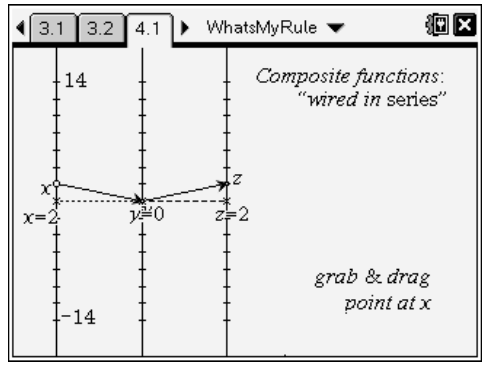
On the *Calculator* application on page 3.1, select **MENU > Actions > Recall Definition** and press enter to choose **f1**. Use the **CLEAR** key to erase the current definition and enter your own. Then, exchange handhelds with your partner, who will use the nomograph to discover your rule. Then, repeat.

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 (Extension) – Composite functions: "wired in series"

The nomograph on page 4.1 consists of three vertical number lines and behaves like *two* function machines wired in series. The point at *x* identifies a domain value on the first number line and is dynamically linked by the function **f1**(x) = 3x – 6 to a range value *y* on the middle number line. That value is then linked by a second function **f2**(x) = –2x + 2 to a value *z* on the far right number line.



Either of the two notations **f2(f1(*x*))** or **f2 ◦ f1** can be used to describe the ***composite function*** that gives the result of applying function **f1** *first*, and then applying function **f2** to that result.

For example, the number 4 is linked to 6 by **f1** (because **f1**(4) = 6), which in turn is linked to –10 by **f2** (because **f2**(6) = –10). Grab and drag the base of the arrow at point *x*—the point "jumps" in discrete steps of 2. Set *x* = 4 and confirm that *y* = 6 and *z* = –10.

Find a rule for the single function **f3** that gives the same result as **f2**(**f1**(x)) for all values of *x*. To test your answer, move to page 4.2 and define **f3** to be your function (as you did in Problem 3). Now compute several values, for each function, such as **f2**(**f1**(4)) and **f3**(4). Are they equal?

f3(x) = ________________

Now use the *Calculator* application to compute and compare the following.

f2(**f1**(3)) = __________ **f1**(**f2**(3)) = __________

Try other values of *x*. Does the order in which you apply the functions matter?

Test your understanding by completing another example:

Again on page 4.2, redefine **f1**(x) = $(x – 1)^2$ and **f2**(x) = 2x + 3. Find a rule for both **f2 ◦ f1** and **f1 ◦ f2**, and test your answers by computing values as you did above. Test your answer by computing several values for each function, using the *Calculator* application.

f2(**f1**(x))= ________________ **f1**(**f2**(x))= ________________

©2011 Texas Instruments Incorporated