

# Domain & Range Using the Trace in GSP

Another way to show students the domain and range of a function is by doing a simple construction and then having them trace the out the domain or range on the  $x$  or  $y$  axis. This has two advantages over the smashing technique. First of all some students have a great difficulty in mentally manipulating an image, like a graph. Some people see it and some do not. So the act of smashing a graph mentally to an axis could pose great distress. Another advantage is that it portrays the relationship to input and output more closely. The unfortunate thing about this method is that of the tools we are using in this class GSP is the only one that will allow us to do it.

Here is the idea in a nutshell.

1. Graph the function of interest and adjust the viewing window to your liking.
2. Place a point on the graph.
3. For tracing the domain, Select the point on the graph and the  $x$ -axis.
4. Select Construct  $\succ$  Perpendicular Line from the menu.
5. Put a point of intersection between the perpendicular line and the  $x$ -axis.
6. Right click on this point of intersection and select the Trace option.
7. Now Select the arrow tool from the toolbar and click and drag the point on the function around. Make sure that you move the point all over the function so that you get as much of the domain as possible.

Note that to do the range we simply do the above process but using the  $y$ -axis instead of the  $x$ -axis.

Try this technique on the following functions.

1.

$$f(x) = \sqrt{2x + 1}$$

2.

$$f(x) = \sqrt{3x^2 - 5x + 1}$$

3.

$$f(x) = \frac{\sqrt{3x^2 - 5x + 1}}{x - 2}$$