# Parabola and Inverse Geogebra Steps for Students

1. Students are presented with the vertex form of the parabola
$$y = a(x - h)^2 + k$$

2. They should then open GeoGebra and create sliders for values a, h, and k. Both h and k can be set as integers, and a be a decimal to one place. In all cases, the range of values should be set to something reasonable, -5 to 5 for example.

3. Within GeoGebra, the students will define a parabola using those values and setting it in the format above. **Note - advanced students can create a text field that shows the values in the vertex form.**

4. If successful, it should appear something like this:
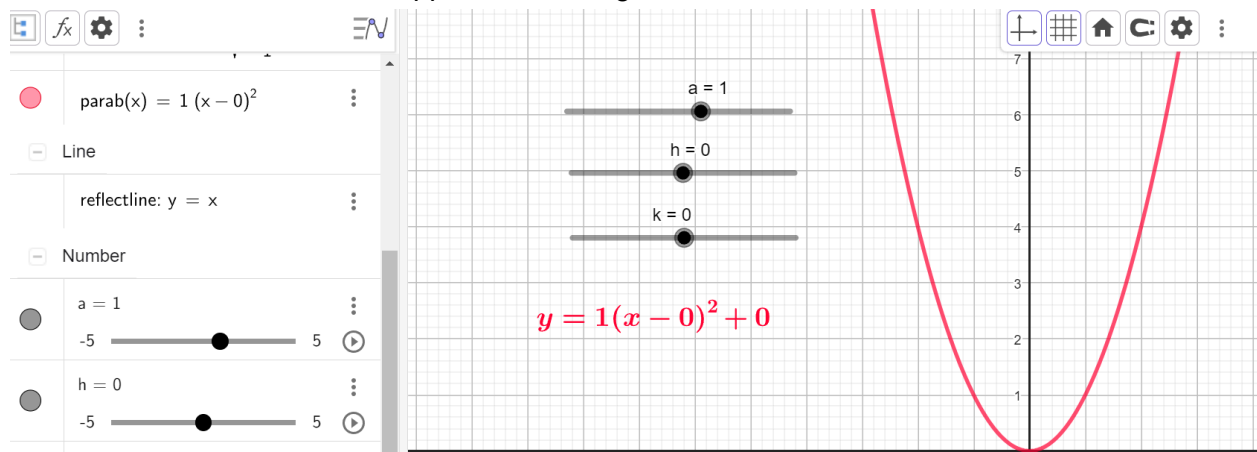
5. Have students create the line y = x in Geogebra. They can denote it in a different color or with hashmarks.

6. Students should next derive the inverse function for the parabola. Have them on paper swap out the x and y and solve for y. When students think they have the solution, they should create it in GeoGebra. They should make it a different color to contrast it from the original function.

7. Ask students how they know if they have the inverse created correctly (the hint is in the line that they added). Have them observe if the inverse is working as expected. They can adjust values on the sliders to help confirm or deny their suspicions. If students have the inverse incorrect, they should continue to work on it.

8. If successful, their application should look similar to this:
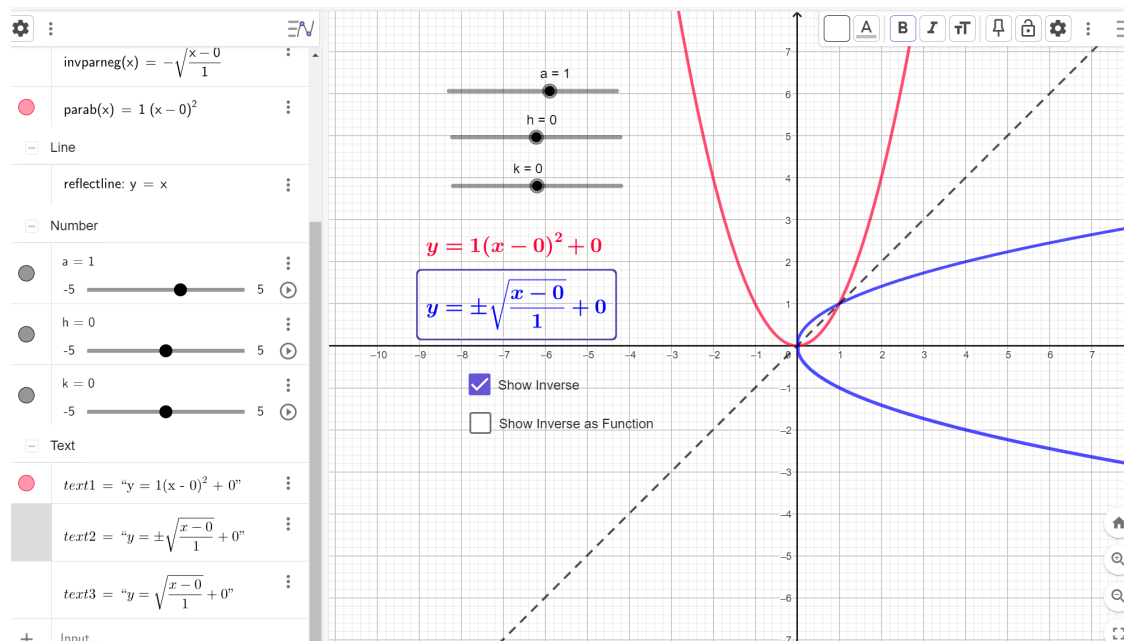
8. As students successfully demonstrate the inverse, ask them if it is also a function. Students should be able to identify that the inverse is NOT a function due to it failing the vertical line test. Ask students what they can do to ensure it is a function.

9. As time permits, and this can be used as differentiation, see if students can code GeoGebra to only show the non-negative values for y on the inverse function.