

Parabola Investigation - Transformations Practice

For this investigation I have not provided a worksheet because I want you to gain some practice in efficiently keeping and effectively organizing your notes in order to recognize patterns and describe them. As you use the graphing calculator to investigate each question be sure to keep track of all the equations you try along with their resulting graphs. What doesn't work in one case may be the key to another question that will come later.

- a) Graph the parabola $y = x^2$. Make an accurate sketch of the graph. Be sure to label any important points on your graph. In addition to x - and y -intercepts be sure to label the lowest point which is called the vertex.
- b) Find a way to change the equation to make the same parabola *open downward*. The new parabola should be congruent (the same shape and size) to $y = x^2$, with the same vertex, except it should open downward so its vertex will be its highest point. Record the equations you tried, along with their results. Write down the results even when they are wrong, they may come in handy below.
- c) Find a way to change the equation to make the $y = x^2$ parabola *stretch vertically*(it will appear steeper). The new parabola should have the same vertex and orientation (i.e., open up) as $y = x^2$. Record the equations you tried, along with their results and your observations.
- d) Find a way to change the equation to make the $y = x^2$ parabola *compress vertically*(it will appear as if the points in $y = x^2$ move toward the x -axis). Record the equations you try, their results, and your observations.
- e) Find a way to change the equation to make the $y = x^2$ parabola *move 5 units down*. That is, your new parabola should look exactly like $y = x^2$, but the vertex should be at $(0, -5)$ Record the equations you try, along with their results. Include a comment about moving the graph up as well as down. Record the equations you try, along with their results. Include a comment about moving the graph up as well as down.
- f) Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the right*. That is, your new parabola should look exactly like $y = x^2$, except that the vertex should be at the point $(3, 0)$. Record the equations you try, along with their results. Tell how to move the parabola to the left as well as how to move it to the right.
- g) Find a way to change the equation to make the $y = x^2$ parabola *move 3 units to the left and stretch vertically*, as in part (c). Your new parabola might look like $y = 4x^2$, except that the vertex should be at the point $(-3, 0)$. Record the equations you try, along with their results. Comment about how to move the parabola to the left as well as how to move it to the right.
- h) Finally, find a way to change the equation to make the $y = x^2$ parabola *vertically compressed, open down, move 6 units up, and move two units to the left*. Where is the vertex of your new parabola? Record the equations you try, their results, and your comments on how each part of the equation affects its graph.