

Answer on Question #56641 – Math – Algebra

Question

Consider the quadratic function $f(x) = -4x^2 - 8x - 3$.

- a. Describe the transformations we would apply to the basic function $g(x) = x^2$ to obtain f .
- b. What is the vertex and axis of symmetry?

Solution

- a. Let's complete the square for $f(x)$:

$$f(x) = -4x^2 - 8x - 3 = -4x^2 - 8x - 4 + 1 = -4(x^2 + 2x + 1) + 1 = -4(x + 1)^2 + 1.$$

Now we see that the transformations we should apply to the basic function $g(x) = x^2$ to obtain f are the following:

- 1) " -4 " stretches the graph making it appear skinnier. The negative sign changes the parabola's direction so that it will open downward;
- 2) " $+1$ " causes the graph to shift to the left one unit;
- 3) " $+1$ " causes the graph to shift up one unit.

- b. The vertex for the quadratic equation $f(x) = a(x - h)^2 + k$ is the point (h, k) . In this case the vertex is $(-1; 1)$. The axis of symmetry is $x = -1$.