

MBF 3CI

The roles of a , h & k in $y = a(x - h)^2 + k$, $a \neq 0$

Date: Dec. 4/17

Based on class discussion, complete the following graphic organizer to summarize the roles of a , h and k .

<p>Role of a:</p> <p>Direction of Opening (Reflection):</p> <ul style="list-style-type: none"> When a is positive, the parabola opens upwards When a is negative, the parabola opens downwards <p>Shape (Vertical Stretch or Compression):</p> <ul style="list-style-type: none"> If $a > 1$ or $a < -1$, then the graph of $y = a(x - h)^2 + k$ is vertically stretched, which means it has a thinner opening than $y = 1(x - h)^2 + k$. If a is between -1 and 1, then the graph of $y = a(x - h)^2 + k$ is vertically compressed, which means it has a wider opening than $y = 1(x - h)^2 + k$. 	<p>Role of h:</p> <p>Properties (Horizontal Translation):</p> <ul style="list-style-type: none"> If $h > 0$, then the graph of $y = a(x - h)^2 + k$ is translated horizontally h units to the right. If $h < 0$, then the graph of $y = a(x - h)^2 + k$ is translated horizontally h units to the left. <p>Relation to the Vertex:</p> <ul style="list-style-type: none"> The value of h is the x - coordinate of the vertex. <p>\therefore for $y = a(x - h)^2 + k$, the vertex is: (h, k).</p>
<p>RST</p> <p>Role of k:</p> <p>Properties (Vertical Translation):</p> <ul style="list-style-type: none"> If $k > 0$, then the graph of $y = a(x - h)^2 + k$ is translated vertically k units up. If $k < 0$, then the graph of $y = a(x - h)^2 + k$ is translated vertically k units down. <p>Relation to the Vertex:</p> <ul style="list-style-type: none"> The value of k is the y - coordinate of the vertex. 	<p>State:</p> <ul style="list-style-type: none"> Coordinates of the vertex: ($3, 5$) Direction of opening: downwards [$a = -2$] Transformations (NOTE: there are 4): <p>reflection in the x-axis [a is negative]</p> <p>vertical stretch by a factor of 2.</p> <p>horizontal translation 3 units to the right.</p> <p>(v.t.) vertical translation 5 units up.</p>