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What is axis of symmetry of a parabola

The word symmetry implies balance. Symmetry can be applied to different contexts and situations. For example, a marriage could be said to have symmetry if each spouse has an equal share in decision-making when it comes to money issues. But since such matters are not always clear, we will limit our discussion today to mathematical contexts. Symmetry is found in geometry when one figure can be divided into two halves that are the exact reflections of the other, as shown in Figure 1. These figures have line symmetry. If we were to fold each digit in half to the red lines (symmetry lines), the two halves would be exactly on top of each other. A symmetry axis is the imaginary line through a shape that would make each side a mirror image. Figure 1 Axis of symmetry in a ParabolaIn this lesson, our concern is the symmetry of a parabola in the x-y coordinate plane. Figure 2 shows a parabola that has a symmetry axis that is on the y-axis. Notice that the tip of this parabola is at the orderly pair (0, 0). The symmetry axis of a parable always passes through the top of the parable. In other words, it's a vertical line that runs through the x-coordinates of the vertex. Therefore, the symmetry axis equation for this parabola is $x = 0$. Figure 2 As in the geometric figures in Figure 1, if we bend the parabola on the y-axis, the two halves will be exactly on top of each other. Paraboles always have perfect symmetry. The symmetry axis of a parabola is not always on the y axis. A parabola may have a symmetry axis that is to the left or right of the y-axis, and the parabola may open upwards, as shown in Figure 2, or open down. Paraboles may also be displayed as opening up to the left or right, but these types of paraboles are not considered functions and will not be a part of this lesson. These paraboles each present a symmetry axis that is not on the y-axis. This parabola in Figure 3 has a symmetry axis that crosses the x-axis to -2. Therefore, the equation of this symmetry axis is $x = -2$. The parabola in Figure 4 has a symmetry axis that crosses the x-axis to 3. Therefore, the equation of this symmetry axis is $x = 3$. Figure 3 Figure 4 A parabola is the graph of a square equation. Here is the shape of a square equation: the square equation Each of the parabolas in Figure 3 and Figure 4 can be expressed as a square equation. The square equation for the parabola in Figure 3 is $x^2 + 4x + 6$. The square equation for the parabola in Figure 4 is $-x^2 + 6x - 8$. We can also use these square equations to find the symmetry axes of the paraboles by applying them to the symmetry axis equation. Axis of symmetry equationHere is the equation for the axis of symmetry: Axis of symmetry equation Let's look at the equation for the parabola in Figure 3. The value of a is 1, and the value is 4. The symmetry axis equation is: If you see this message, it means that we have problems loading external resources to our website. If you're behind a web filter, make sure that *.kastatic.org and *.kasandbox.org domains are unlocked. The axis of symmetry (Parabola) The axis of symmetry of a parabola is a line about which the parabola is symmetrical. When the parabola is vertical, the symmetry line is vertical. When a square function is graphical in the coordinate plane, the resulting parabola and corresponding axis of symmetry are vertical. FORMA STANDARD The graph of the parabola represented by the square function $y = a(x - p)^2 + q$ has a symmetry axis represented by the vertical line equation $x = p$. GENERAL FORMULAR Click here to see this formula is derived. FACTORIZED FORM In Chart 2, what is the equation of the symmetry axis? Chart 2 Is line \$\$\$x = \$2 \$ In Chart 3, what is the equation of the symmetry axis? Chart 3 Is line \$\$x = \$1\$\$ This is a graph of the parabola with all its major features labeled: symmetry axis, focus, vertex, and directrix. The graph of a square function is a parabola. The symmetry axis of a parabola is a vertical line that divides the parabola into two congruent halves. The axis of symmetry always passes through the top of the parable. The x-coordinates of the vertex is the equation of the symmetry axis of the parabola. For a square function in standard form, $y = a x^2 + b x + c$, the symmetry axis is a vertical line $x = -\frac{b}{2a}$. Example 1: Find the symmetry axis of the displayed parable. The x-coordinates of the vertex is the equation of the symmetry axis of the parabola. The tip of the parabola is (2 , 1). So the axis of symmetry is line $x = 2$. Example 2: Find the symmetry axis of the y graph $= x^2 - 6x + 5$ using the formula. For a square function in standard form, $y = a x^2 + b x + c$, the symmetry axis is a vertical line $x = -\frac{b}{2a}$. Here, $a = 1$, $b = -6$ and $c = 5$. Substitute. $x = -\frac{-6}{2(1)}$ Simplification. $x = \frac{6}{2} = 3$ Therefore, the symmetry axis is $x = 3$.