Symmetry

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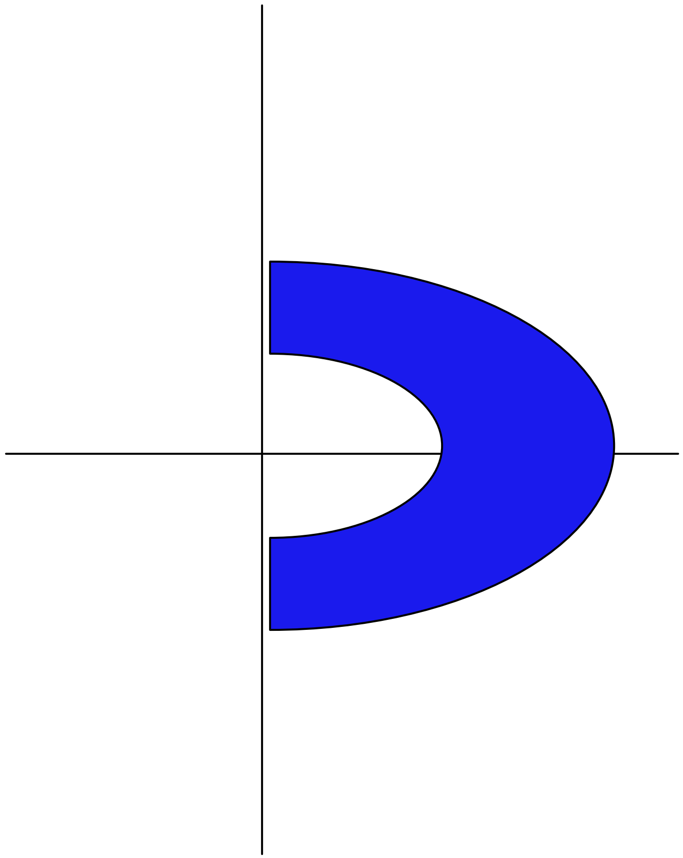
Mathematics Enrichment through Technology

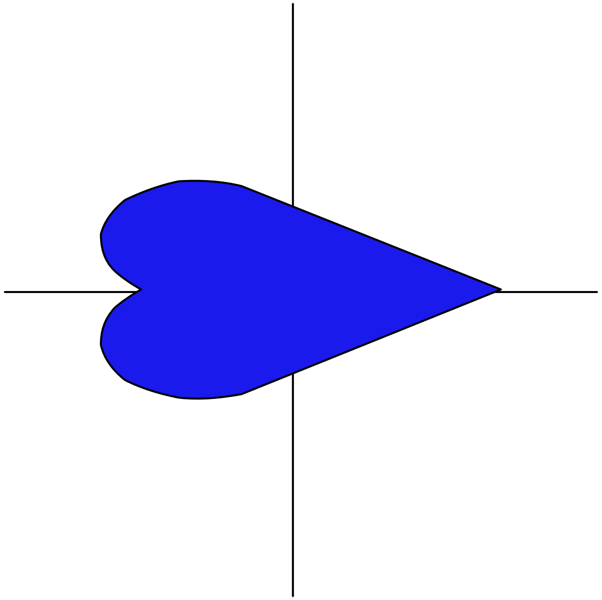
Symmetric with Respect to the x-Axis

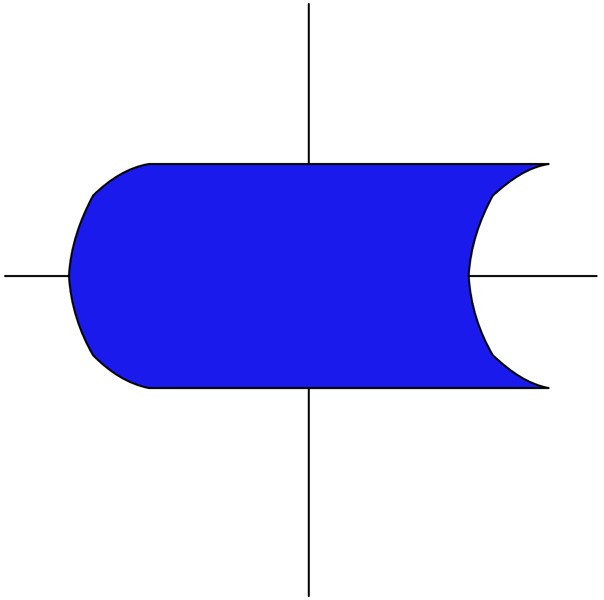
A graph that is symmetric to the x-axis, can be seen as slicing a figure horizontally. In other words, for every point (x,y) on the graph, the point (x,-y) is also on the graph.

The figure illustrates symmetric with respect to the x-axis. The part of the graph above the x-axis is a reflection (mirror image) of the part below the x-axis.



The following figures illustrate symmetric with respect to the x-axis





Testing for Symmetry with respect to the x-axis

Substitute -y for every y in the equation. If the equation is EXACTLY as the original equation, the graph is symmetric with respect to the x-axis.

Testing for Symmetry with respect to the x-axis

The following equation is given: $y^2 = 3x^2 - 4x + 7$

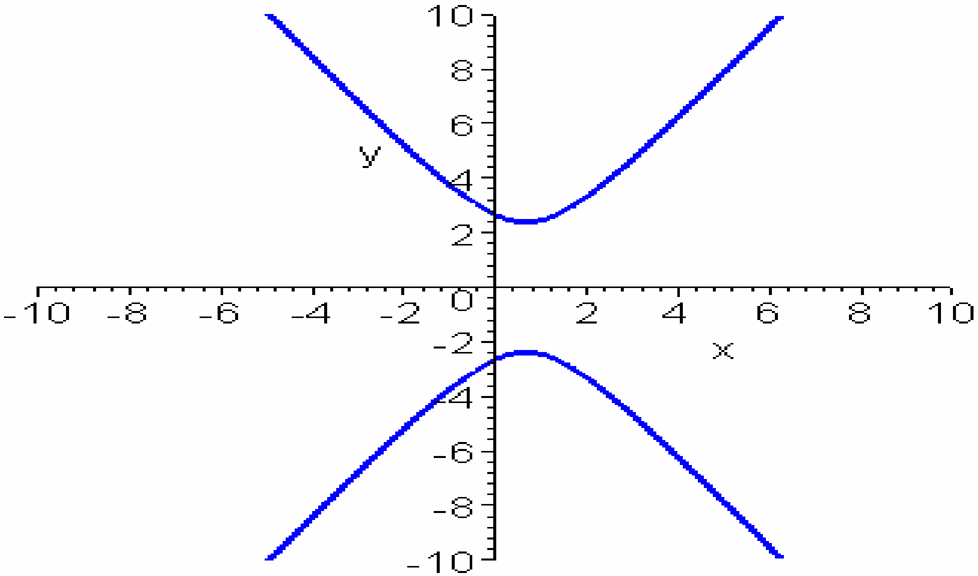
Substitute -y for every y. $(-y)^2 = 3x^2 - 4x + 7$

$$y^2 = 3x^2 - 4x + 7$$

Since the equation is EXACTLY the same as the original equation, then the graph is symmetric with respect to the x-axis.

The function could also be graphed to show that it is symmetric with respect to the x-axis.

$$y^2 = 3x^2 - 4x + 7$$



Is the following equation symmetric with respect to the x-axis?

$$x^2 + 2x - y^2 - 12 = 0$$

$$x^2 + 2x - y^2 - 12 = 0$$

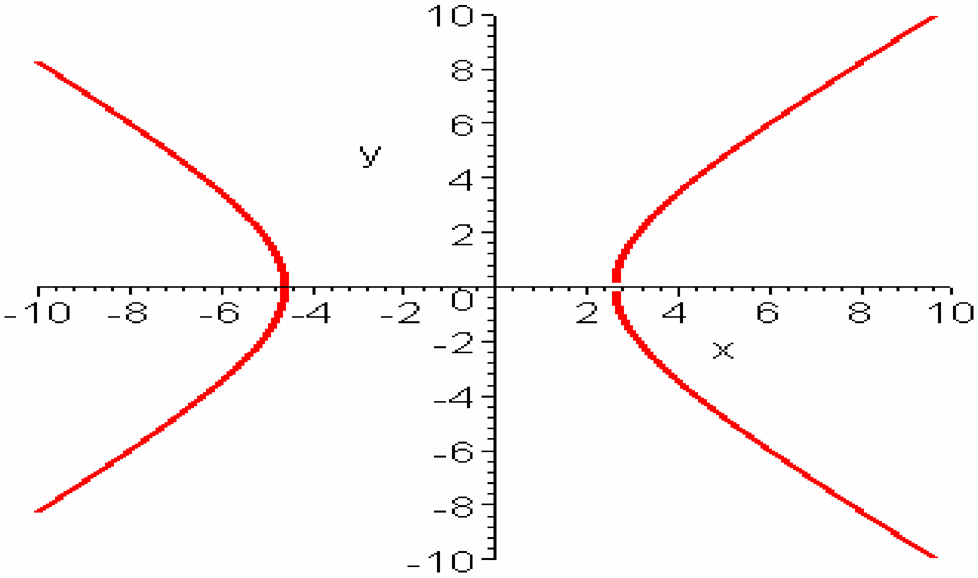
$$x^2 + 2x - (-y)^2 - 12 = 0$$

$$x^2 + 2x - y^2 - 12 = 0$$

After substituting a -y for every y, the equation is EXACTLY the same as the original. Therefore, the equation is symmetric with respect to the x-axis.

The function could also be graphed to show that it is symmetric with respect to the x-axis.

$$x^2+2x-y^2-12=0$$



Is the following equation symmetric with respect to the x-axis?

$$x^2 - 5x - y^2 + 3y + 17 = 0$$

$$x^2 - 5x - y^2 + 3y + 17 = 0$$

$$x^2 - 5x - (-y)^2 + 3(-y) + 17 = 0$$

$$x^2 - 5x - y^2 - 3y + 17 = 0$$

After substituting a -y for every y, the equation is NOT EXACTLY the same as the original. Therefore, the equation is NOT symmetric with respect to the x-axis.

Is the following equation symmetric with respect to the x-axis?

$$y = \frac{x^2 - 4}{2x}$$

$$y = \frac{x^2 - 4}{2x}$$

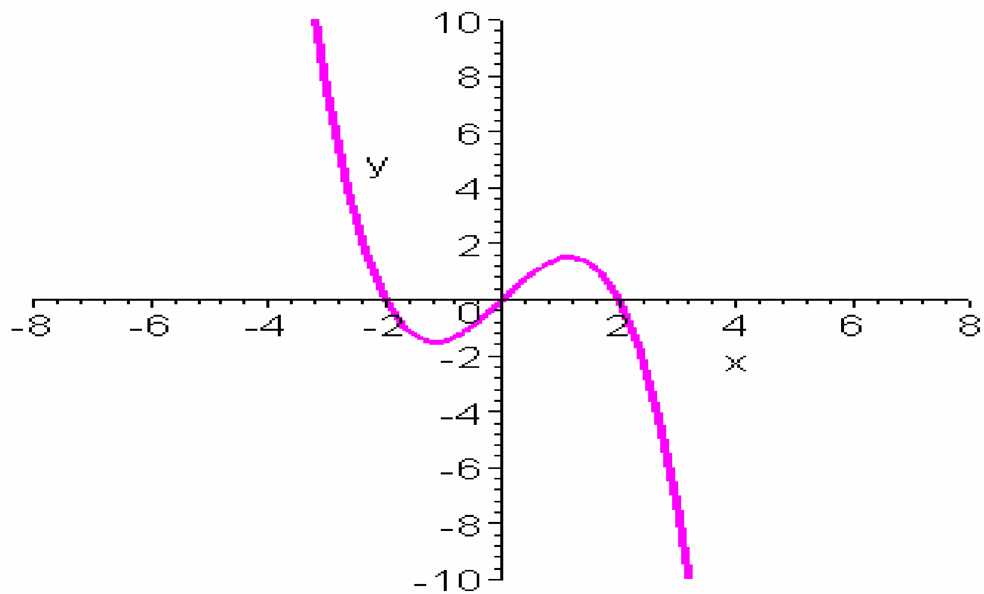
$$(-y) = \frac{x^2 - 4}{2x}$$

$$-y = \frac{x^2 - 4}{2x}$$

After substituting a -y for every y, the equation is NOT EXACTLY the same as the original. Therefore, the equation is NOT symmetric with respect to the x-axis.

The function could also be graphed to show that it is NOT symmetric with respect to the x-axis.

$$y = \frac{x^2 - 4}{2x}$$



Is the following equation symmetric with respect to the x-axis?

$$y^2 = \frac{2x^2 - 3x + 5}{x - 7}$$

$$y^2 = \frac{2x^2 - 3x + 5}{x - 7}$$

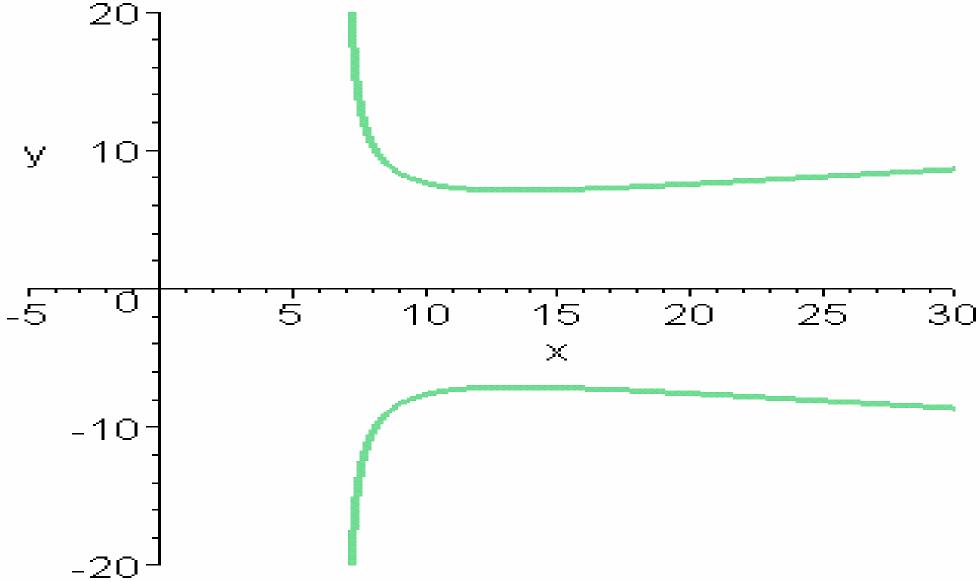
$$(-y)^2 = \frac{2x^2 - 3x + 5}{x - 7}$$

$$y^2 = \frac{2x^2 - 3x + 5}{x - 7}$$

After substituting a -y for every y, the equation is EXACTLY the same as the original. Therefore, the equation is symmetric with respect to the x-axis.

The function could also be graphed to show that it is symmetric with respect to the x-axis.

$$y^2 = \frac{2x^2 - 3x + 5}{x - 7}$$



Congratulations!!

You just completed symmetric with respect to the x-axis