Tests for Symmetry

There are three types of symmetry: symmetric with respect to the y-axis, symmetric with respect to the x-axis, and symmetric with respect to the origin.

1. If (x, y) is a point on the graph and (-x, y) is also a point on the graph, the portion of the graph to the left of the y-axis is a *mirror image* of the portion to the right of the y-axis.

2. If (x, y) is a point on the graph and (x, -y) is also a point on the graph, the portion of the graph above the x-axis is a *mirror image* of the portion below the x-axis.

3. If (x, y) is a point on the graph and (-x, -y) is also a point on the graph, the graph is *unchanged* by a rotation of 180° about the origin.

Find the axis of symmetry for the following problems:

$y = x^2 - 6$ $\qquad$ $y^2 = x^3 - 8x$ $\qquad$ $xy = 4$

(-x, y) Symmetric about the y-axis	**(x, -y) Symmetric about the x-axis**	**(-x, -y) Symmetric about the origin**
$y = x^2 - 6$ $y = (-x)^2 - 6$ $y = x^2 - 6$	$y = x^2 - 6$ $-y = x^2 - 6$ $-y = x^2 - 6$	$y = x^2 - 6$ $-y = (-x)^2 - 6$ $-y = x^2 - 6$
$y^2 = x^3 - 8x$ $y^2 = (-x)^3 - 8(-x)$ $y^2 = -x^3 + 8x$	$y^2 = x^3 - 8x$ $(-y)^2 = x^3 - 8x$ $y^2 = x^3 - 8x$	$y^2 = x^3 - 8x$ $(-y)^2 = (-x)^3 - 8(-x)$ $y^2 = -x^3 + 8x$
$xy = 4$ $(-x)y = 4$ $-xy = 4$	$xy = 4$ $x \ -y \ = 4$ $-xy = 4$	$xy = 4$ $(-x)(-y) = 4$ $xy = 4$

After substituting in the negatives and solving, the final equation should equal the beginning equation. This provides you with the axis of symmetry.