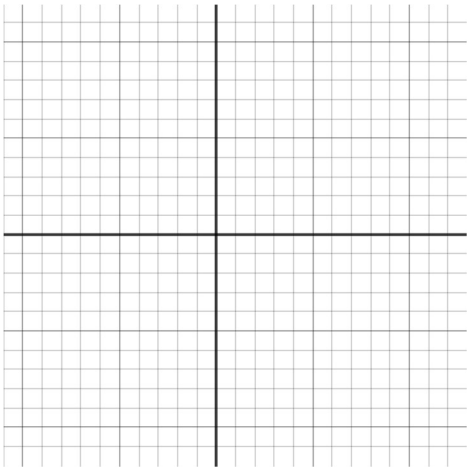
Algebra 2 H Name: _____ Per: ___ Date: _____

Checking for Symmetry

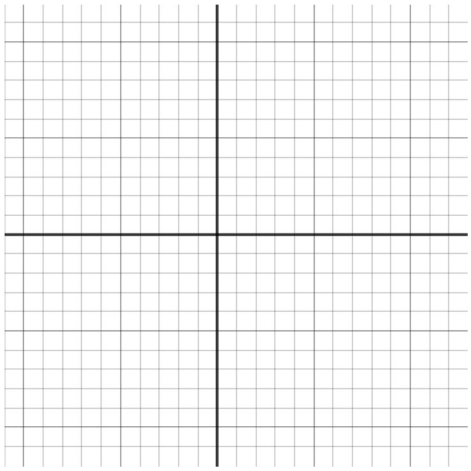
1. Test for an EVEN function: Symmetry about the y-axis.

An equation is symmetric about the $y-axis$ if its graph is a reflection over the $y-axis$.
If this equation is a function, we call it an EVEN function.

Show that $y=x^2$ IS symmetric about the $y-axis$.



Show that $y=x^3$ is NOT symmetric about the $y-axis$.



To test this algebraically, rewrite the equation replacing x with $-x$.
If this new equation is equivalent to the original equation, then the equation has symmetry about the $y-axis$.

a) Check $y=x^2$ for symmetry about the $y-axis$:
Rewrite the equation by replacing x with $-x$.
Is the new equation equivalent to the original equation?

Is $y=x^2$ symmetric over the $y-axis$? _____ Why or why not?

b) Check $y=x^3$ for symmetry about the $y-axis$:
Rewrite the equation by replacing x with $-x$.
Is the new equation equivalent to the original equation?

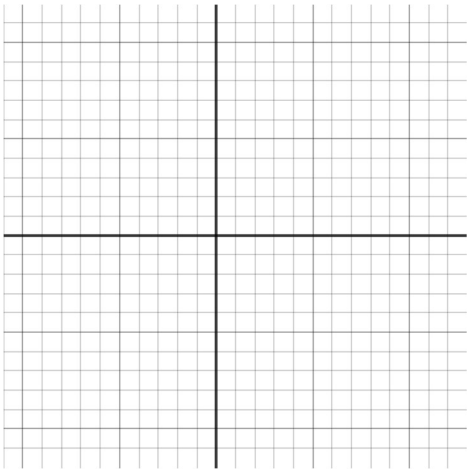
Is $y=x^3$ symmetric about the $y-axis$? _____ Why or why not?

Which of these is an EVEN function? _____ Why?

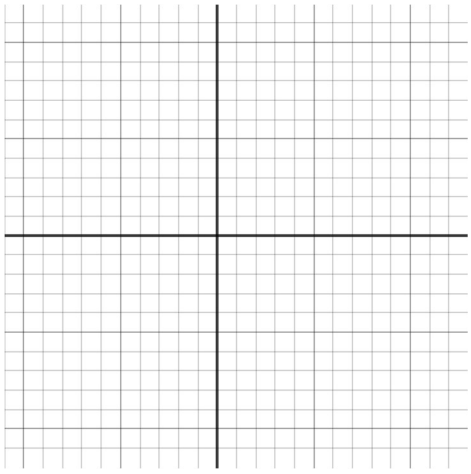
2. Test for an ODD function: Symmetry about the origin.

An equation is symmetric about the origin if its graph is the same when rotated 180° around the origin. If this equation is a function, we call it an ODD function.

Show that $y = x^3$ IS symmetric about the origin.



Show that $y = |x|$ is NOT symmetric about the origin.



To test this algebraically, rewrite the equation replacing x with $-x$ and y with $-y$.
If this new equation is equivalent to the original equation, then the equation has symmetry about the origin.

a) Check $y = x^3$ for symmetry about the origin:
Rewrite the equation by replacing x with $-x$ and y with $-y$.
Is the new equation equivalent to the original equation?

Is $y = x^3$ symmetric about the origin? _____ Why or why not?

b) Check $y = |x|$ for symmetry about the origin:
Rewrite the equation by replacing x with $-x$ and y with $-y$.
Is the new equation equivalent to the original equation?

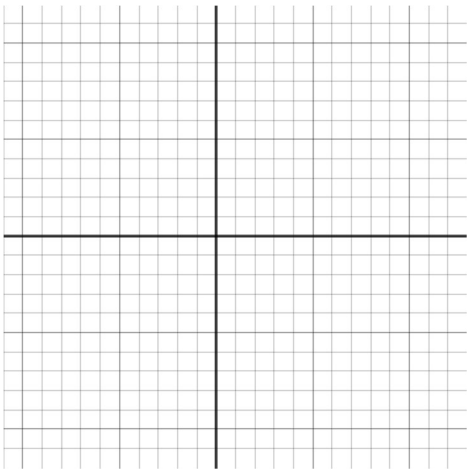
Is $y = |x|$ symmetric about the origin? _____ Why or why not?

Which of these is an ODD function? _____ Why?

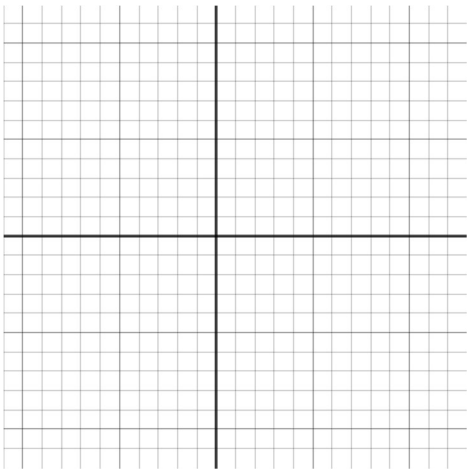
3. Symmetry about the $x - axis$.

An equation is symmetric about the $x - axis$ if its graph is a reflection over the $x - axis$.

Show that $x = y^2$ IS symmetric about the $x - axis$.



Show that $y = x^3$ is NOT symmetric about the $x - axis$.



To test this algebraically, rewrite the equation replacing y with $-y$.
If this new equation is equivalent to the original equation, then the equation has symmetry about the $x - axis$.

a) Check $x = y^2$ for symmetry about the $x - axis$:
Rewrite the equation by replacing y with $-y$.
Is the new equation equivalent to the original equation?

Is $x = y^2$ symmetric about the $x - axis$? _____ Why or why not?

b) Check $y = x^3$ for symmetry about the $x - axis$:
Rewrite the equation by replacing y with $-y$.
Is the new equation equivalent to the original equation?

Is $y = x^3$ symmetric about the $x - axis$? _____Why or why not?

Practice with the following exercise. Do them in your notebook and show a quick sketch of each that demonstrates the symmetry (or lack of symmetry). You can use your graphing calculator or Desmos to see the graphs AFTER you have made a determination using algebra.

EXERCISES

A. Test the following relations for symmetry about the coordinate axes, the origin and the line $y = x$:

1) $y = x^4$

2) $y = x^3$

3) $y^2 = x^3$

4) $y = -x + 5$

5) $y = x^2 - 2$

6) $y = x^{-3}$

8) $x^3 = y^4 + 16$

9) $x = -4$

10) $y = 4$

11) $x^2 + y^2 = 1$

12) $y = 0$

13) $x = 5 - 3y$