<u>Symmetry</u>

To test for symmetry find $f(-x)$. Which means substitute $(-x)$ for all x's in the function.

Y-axis symmetry or Even Function

$f(x) = 3x^4 - 7x^2 + 6$

$f(-x) = 3(-x)^4 - 7(-x)^2 + 6$ Notice that these 2 functions are equal.

$f(-x) = 3x^4 - 7x^2 + 6$

When f(-x) turns out to be exactly the same as f(x), then the function has <u>y-axis symmetry.</u>

Origin symmetry or Odd Function

$f(x) = 6x^5 - 8x^3 + x$

$f(-x) = 6(-x)^5 - 8(-x)^3 + (-x)$ Notice that <u>ALL</u> 3 of the signs changed.

$f(-x) = -6x^5 + 8x^3 - x$

When f(-x) turns out to be the exact opposite of f(x) (all signs change), then the function has <u>origin symmetry</u>.

Neither

$f(x) = 6x^5 - 8x^3 + 6$

$f(x) = 6(-x)^5 - 8(-x)^3 + 6$ Notice that only 2 of the 3 signs changed.

$f(x) = -6x^5 + 8x^3 + 6$

When f(-x) changes some of the signs from f(x) but not all of them, then the function has <u>Neither</u> of the symmetries.

Note: There is another type of symmetry called x-axis symmetry. But this type of symmetry does not occur in functions.

X-axis symmetry

$x = y^2$

$x = (-y)^2$ Notice that these 2 relations are equal.

$x = y^2$

When replacing y with (-y) results in the exact same equation that was started with, then the graph has <u>x-axis symmetry</u>.
