Even & Odd Functions

y-axis symmetry:

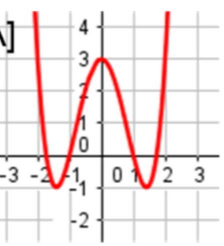
origin (rotational) symmetry:

Example 1 Using the graph

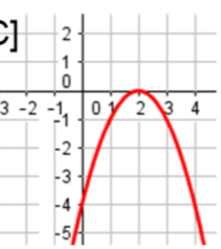
When looking at the graph, first make sure it is a function, then...

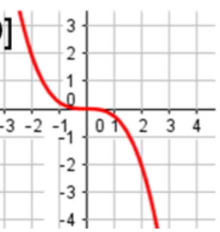
Symmetry about the y-axis = **even function**

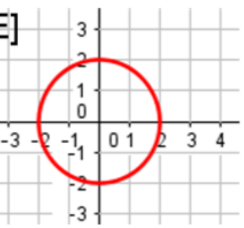
Symmetry about the origin = **odd function**

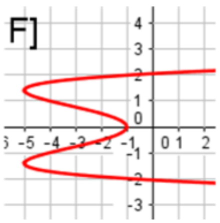
A]


B]


C]


D]


E]


F]


Example 2 Using a table of ordered pairs

When looking at a table...

If (x, y) and (-x, y) are in the table = **even function**

If (x, y) and (-x, -y) are in the table = **odd function**

x	y
-3	-2/3
-2	-1
-1	-2
0	error
1	2
2	1
3	2/3

x	y
-3	10
-2	4
-1	0
0	-2
1	-2
2	0
3	4

x	y
-6	69
-4	29
-2	5
0	-3
2	5
4	29
6	69

Example 3 Verifying algebraically

Even functions: $f(-x) = f(x)$

Odd functions: $f(-x) = -f(x)$

Substitute -x in the function and simplify. If you get back the original function, it is even. If you get back the opposite of the function, it is odd.

A] $f(x) = 4x^2 - 10$

B] $f(x) = -9\sqrt[3]{x}$

C] $f(x) = |x - 5|$

Example 4 Shortcut for polynomials

EVEN polynomials have ALL EVEN exponents.

ODD polynomials have ALL ODD exponents.

$c(x) = x^6 - 2x^2 + 3$

$f(x) = x^6 - 3$

$d(x) = x^3 - 3$

$e(x) = 4x^5 - 2x^3 + 3x$