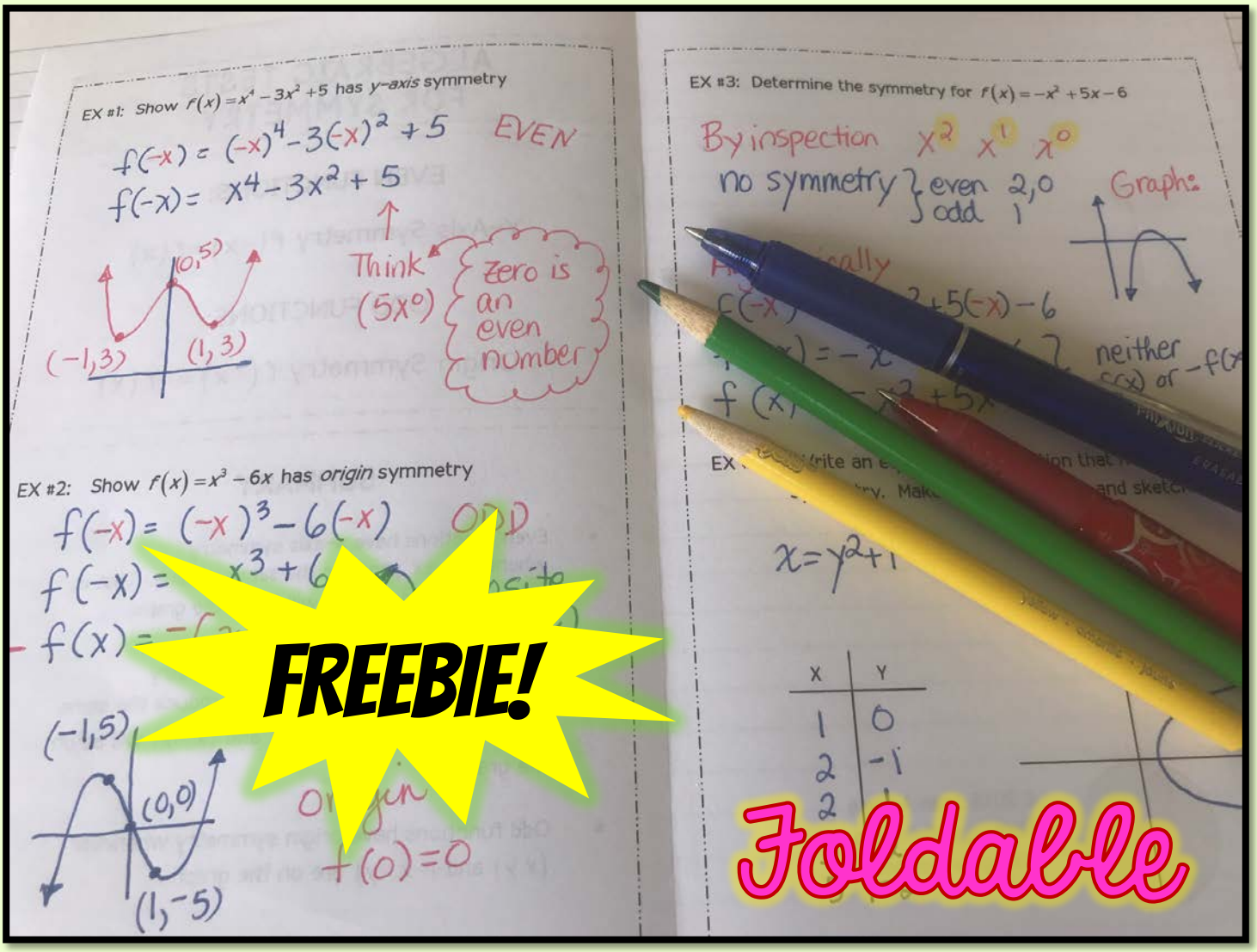
FUNCTIONS & GRAPHS

Algebraic Tests for Symmetry



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ALGEBRAIC TESTS FOR SYMMETRY

This is a FREE lesson in the unit on ***Functions and Graphs*** for students enrolled in PreCalculus. The lesson includes a fully-editable SMART Notebook® lesson and an four-page Folded Book-style Foldable© inspired by the work of Dinah Zike, and is used by permission – see more of her ideas at www.Dinah.com.

You might be interested in my Activities and Assessments Bundle for **Functions and Graphs**.

The SMART Board lesson can be used in many ways. Teachers can display the presentation using the following:

1. SMART Board®
2. Airliner Wireless Slate®
3. SMART Notebook for IPAD App
4. Through the SMART Notebook Express®
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5. Promethean Boards©
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ALGEBRAIC TESTS FOR SYMMETRY

EVEN FUNCTIONS:

Y-Axis Symmetry $f(-x)=f(x)$

ODD FUNCTIONS:

Origin Symmetry $f(-x)=-f(x)$

SUMMARY

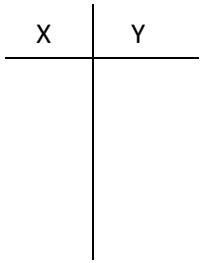
- Even functions have *y*-axis symmetry whenever $\pm x$ produce the same *y*-value. That is, both (x,y) and $(-x,y)$ will be on the graph.
- Even relationships have *x*-axis symmetry (not a function) whenever $\pm y$ produce the same *x*-value. That is, both (x,y) and $(x,-y)$ will be on the graph.
- Odd functions have origin symmetry whenever (x,y) and $(-x,-y)$ are on the graph.

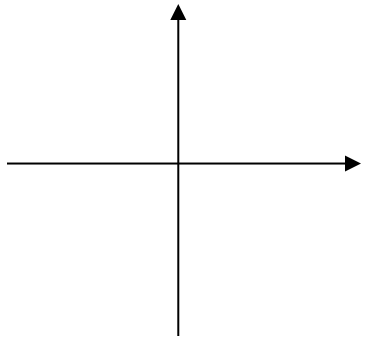
EX #1: Show $f(x) = x^4 - 3x^2 + 5$ has *y-axis* symmetry

EX #2: Show $f(x) = x^3 - 6x$ has *origin* symmetry

EX #3: Determine the symmetry for $f(x) = -x^2 + 5x - 6$

EX #4: Write an equation for a relation that has *x*-axis symmetry. Make a table of values and sketch.





Algebraic Tests for Symmetry

Lesson objectives

Students use the algebraic tests for symmetry and make connections to the graph, a table of values, and the formula.

1.1

Lesson objectives | Teachers' notes | Lesson notes

ALGEBRAIC TESTS FOR SYMMETRY

EVEN FUNCTIONS:

Y-Axis Symmetry $f(-x) = f(x)$

ODD FUNCTIONS:

Origin Symmetry $f(-x) = -f(x)$

SUMMARY

- Even functions have y-axis symmetry whenever $\pm x$ produce the same y-value. That is, both (x, y) and $(-x, y)$ will be on the graph.

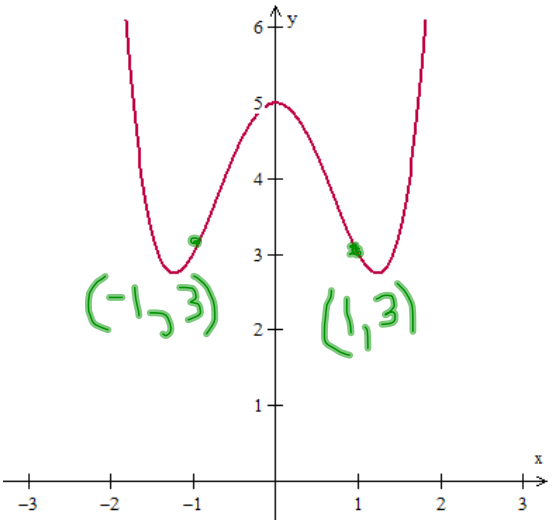
- Even relationships have x-axis symmetry (not a function) whenever $\pm y$ produce the same x-value. That is, both (x, y) and $(x, -y)$ will be on the graph.

- Odd functions have origin symmetry whenever (x, y) and $(-x, -y)$ are on the graph.

EX#1:Show $f(x) = x^4 - 3x^2 + 5$ has *y-axis*symmetry.

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

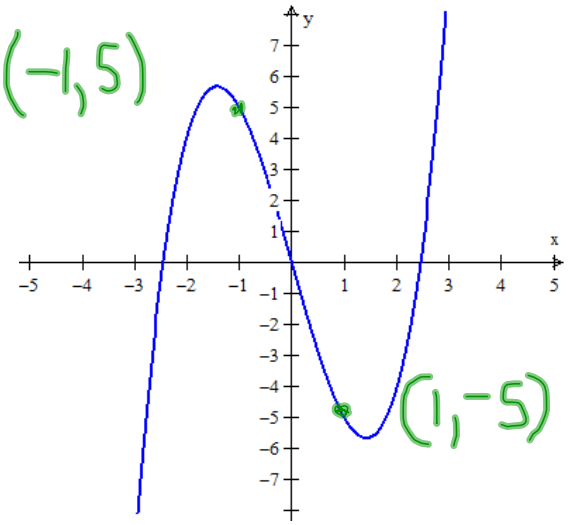
$f(-x) = x^4 - 3x^2 + 5$



EX#2:Show $f(x) = x^3 - 6x$ has *origin*symmetry.

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

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



EX#3:Determinethesymmetryfor $f(x) = -x^2 + 5x - 6$

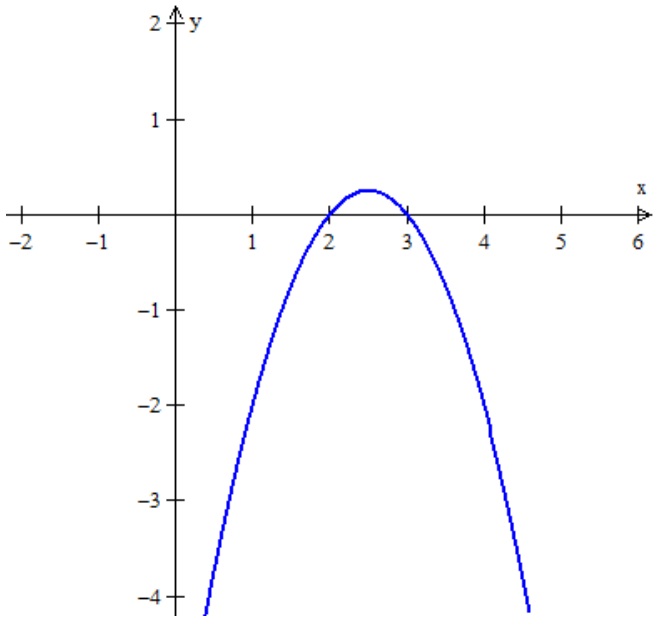
inspection x^2 x^1 x^0 no symmetry

$f(-x) = -(-x)^2 + 5(-x) - 6$

$f(-x) = -x^2 - 5x - 6$

$f(x) = -x^2 + 5x - 6$

neither symmetry

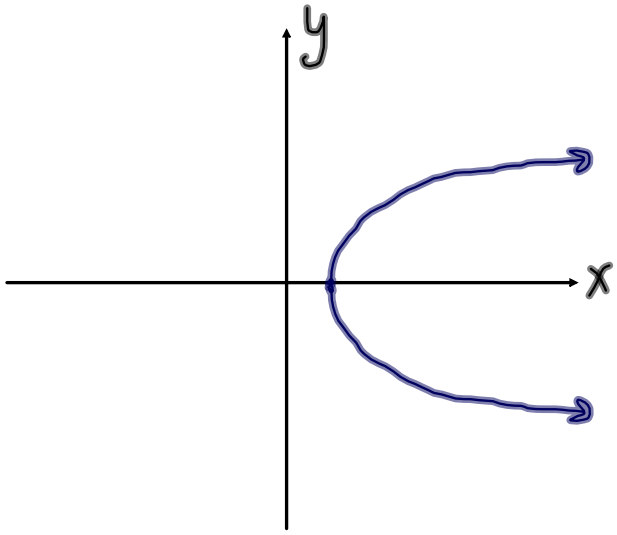


EX#4:Writeanequationforarelationthathas *x*-axis symmetry.Makeatableofvaluesandsketch.

$x = y^2 + 1$

various answers

x	y
1	0
2	1
2	-1
5	2
5	-2



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