Tests for Symmetry

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

X-axis
If (x,y) is any point on the graph and (x,-y) is also on the graph, then the graph is symmetric to the x-axis

Y-axis
If (x,y) is any point on the graph and (-x,y) is also on the graph, then it is symmetric to the y-axis.
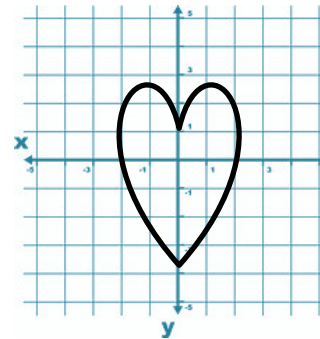
Origin
If (x,y) is any point on the graph and (-x,-y) is also on the graph, then it is symmetric to the origin

Example using the equation:

$y = x^2 + 4$

a. x-axis test $(x,-y)$:
$(-y) = x^2 + 4, \rightarrow$
$y = -x^2 - 4$
 Not the same as original so **no**!

b. y-axis test $(-x,y)$:
$y = (-x)^2 + 4, \rightarrow$
$y = x^2 + 4$
Same as the original so **yes**!

c. Origin $(-x,-y)$:
$(-y) = (-x)^2 + 4, \rightarrow$
$(-y) = x^2 + 4$, or $y = -x^2 - 4$
Not the same as the original so **no**!

Symmetry Examples Using the Graph & Test Point

Test points:
x-axis (x,-y):
(2,1) → (2,-1)
Not on graph!
y-axis (-x,y):
(2,1) → (-2,1)
(1,4)→ (-1,4)
 So **yes**!
Origin (-x,-y):
(2,1) → (-2,-1)
Not on graph!
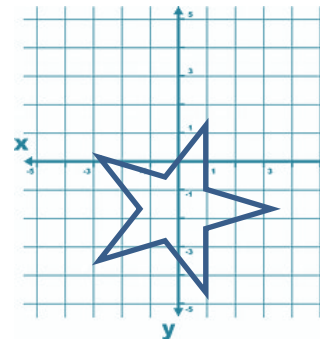
Test points:
x-axis (x,-y):
(1,3) → (1,-3)
Yes!
y-axis (-x,y):
(1,3) → (-1,3)
Not on graph!
Origin (-x,-y):
(1,3) → (-1,-3)
Not on graph!
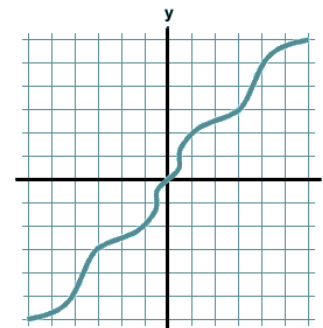
Test points:
x-axis (x,-y):
(3,3) → (3,-3)
Not on graph!
y-axis (-x,y):
(3,3) → (-3,3)
Not on graph!
Origin (-x,-y):
(3,3) → (-3,-3)
Yes!