

$$f(x) = x^2$$

HORIZONTAL SHIFT

$-h$ moves RIGHT

$+h$ moves LEFT

$$f(x) = (x - h)^2$$

INSIDE
PARENTHESES IS

VERTICAL SHIFT

$+k$ moves up

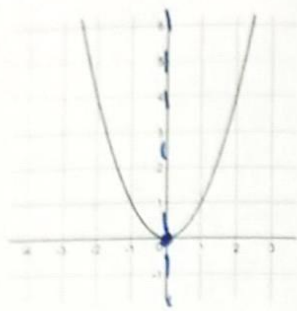
$-k$ moves down

$$f(x) = x^2 + k$$

OUTSIDE (BEHIND)
 x^2

$$f(x) = ax^2$$

IN FRONT
 x^2



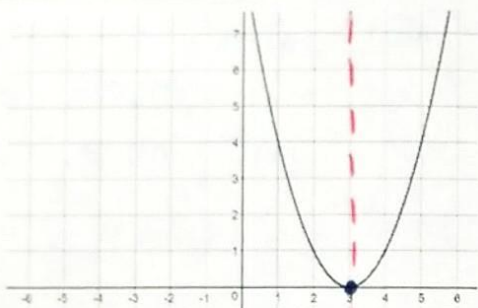
THE PARENT QUADRATIC FUNCTION

$$f(x) = x^2$$

VERTEX (0,0)

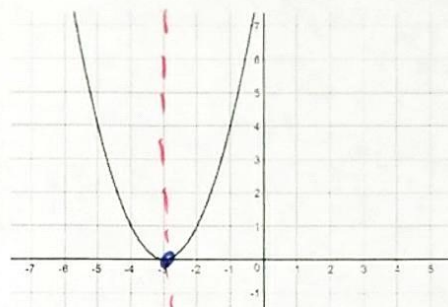
AXIS OF SYMMETRY x=0

↑ THE VERTICAL LINE THAT SPLITS THE PARABOLA IN HALF



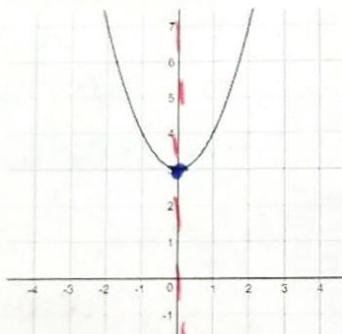
$$f(x) = (x-3)^2$$

VERTEX (3,0)
AXIS OF SYMMETRY x=3



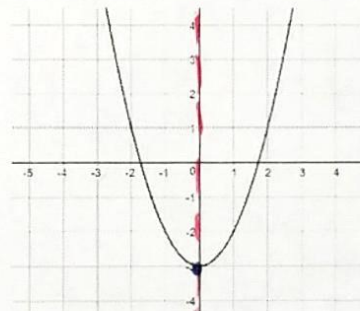
$$f(x) = (x+3)^2$$

VERTEX = (-3,0)
AXIS OF SYMMETRY x=-3



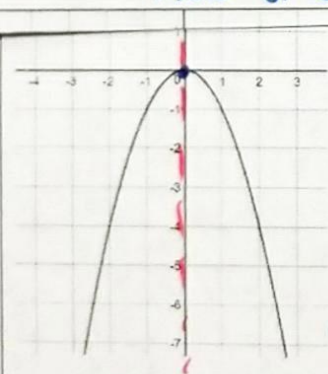
$$f(x) = x^2 + 3$$

VERTEX (0,3)
AXIS OF SYMMETRY x=0



$$f(x) = x^2 - 3$$

VERTEX (0,-3)
AXIS OF SYMMETRY x=0

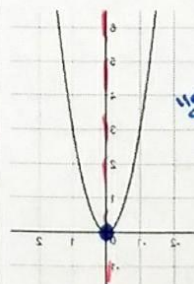


$$f(x) = -x^2$$

REFLECTION OVER X-AXIS

VERTEX (0,0)

AXIS OF SYMMETRY x=0

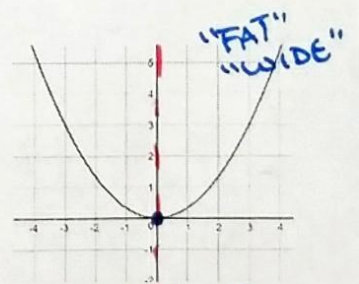


"SKINNY"

$$f(x) = 3x^2$$

SHRINK BY FACTOR OF 3
VERTEX (0,0)

AXIS OF SYMMETRY x=0



"FAT"
"WIDE"

$$f(x) = \frac{1}{3}x^2$$

STRETCH BY FACTOR OF 1/3
VERTEX (0,0)

AXIS OF SYMMETRY x=0