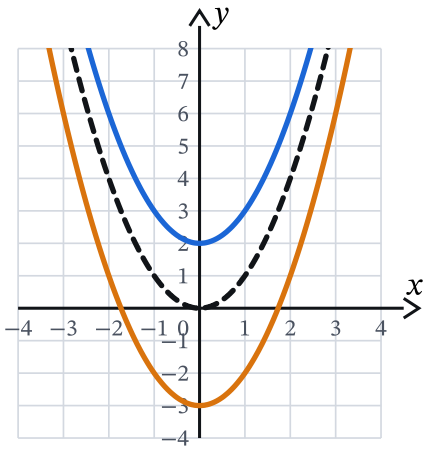
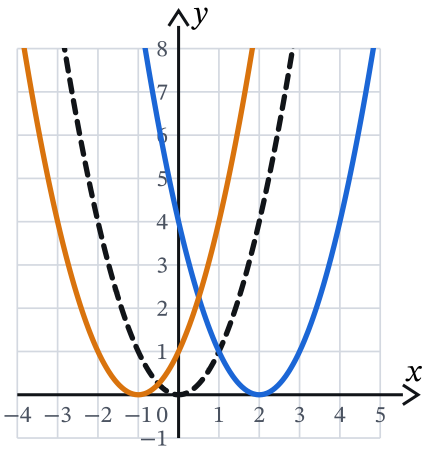
Names (pair) _____ Date _____

Shifting the Parabola



--- x^2 — $x^2 + 2$ — $x^2 - 3$

$x^2 + c$: a shift **up** for $c > 0$, **down** for $c < 0$



--- x^2 — $(x - 2)^2$ — $(x + 1)^2$

$(x - p)^2$: a shift **right** for $p > 0$, **left** for $p < 0$

Remember

The graph of $(x - 3)^2$ is shifted **right** by 3 because we only get the value 0 at $x = 3$. The vertex of $x^2 + c$ is $V(0, c)$, and the vertex of $(x - p)^2$ is $V(p, 0)$.

1 ON YOUR OWN **Predict, then check.** Write where the parabola $y = x^2$ moves and what the vertex is. Check in the app.

Function	Shift	Vertex
$x^2 + 4$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$
$x^2 - 1$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$
$(x - 2)^2$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$
$(x + 3)^2$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$
$x^2 - 5$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$
$(x + 1)^2$	**up** / **down** **left** / **right** by ☐	$V($☐,☐$)$

Names (pair) _____ Date _____

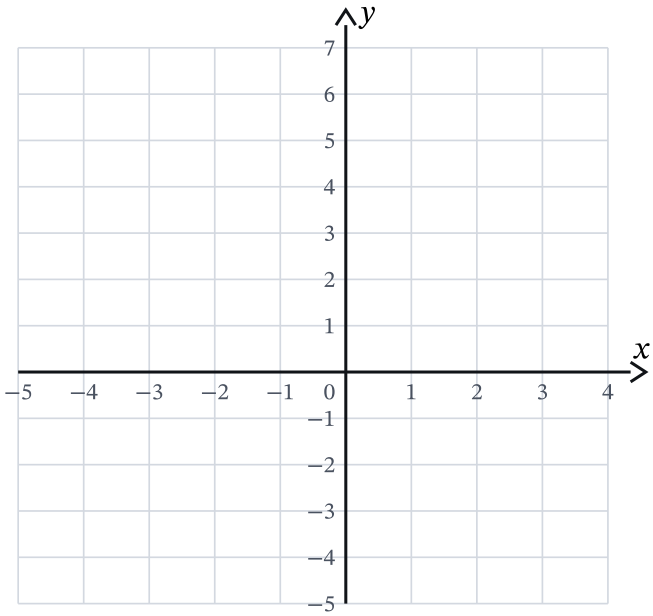
2 IN PAIRS **Why to the right?** One student works out x^2, the other $(x-3)^2$. Compare the rows.

x	-1	0	1	2	3	4	5	6
x^2	☐	☐	☐	☐	☐	☐	☐	☐
$(x-3)^2$	☐	☐	☐	☐	☐	☐	☐	☐

Where is the value 0 in each row? By how much is the second row shifted?

_____

3 ON YOUR OWN Draw the graphs of $f(x) = x^2 - 4$ and $g(x) = (x+2)^2$.



The Parabola app · otooly.com/parabola-explorer

Mode **Predict and check**: choose the tasks $x^2 + q$ and $(x-p)^2$.

★ ON YOUR OWN **Exit card.** The vertex of $(x-5)^2$ is $V($☐, ☐$)$, and of $x^2 + 5$ it is V ($\square$, $\square$).