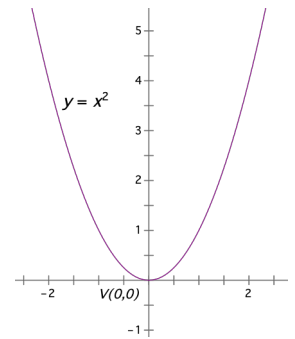# Graphing Parabolas – Vertex Form

$$y = a(x - h)^2 + k, \text{ vertex } (h, k)$$
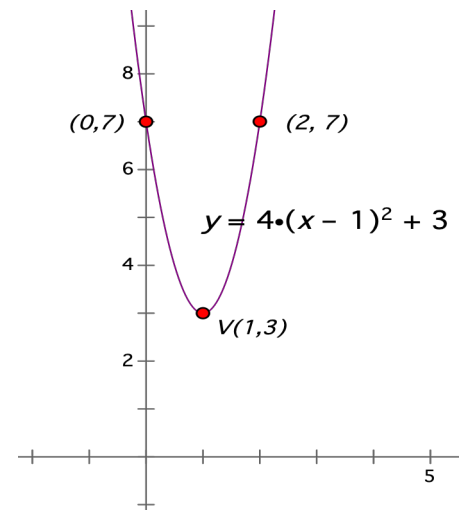
Use the parent function, $y = x^2$,

1. From the parent function, move the vertex over h and up k units.
2. Pick a convenient point, zero if possible
3. Find another point by using symmetry.

Example Graph $y = 4(x - 1)^2 + 3$

1. New vertex $(1, 3)$ – from parent fct with V$(0, 0)$
2. Let $x = 0$, then $y = 7$, $(0, 7)$
3. Use symmetry, 3rd point is $(2, 7)$

From the vertex, we went over 1 to the left and up 4, so by using symmetry, we go over 1 to the right and up 4

Graph the following and identify the vertex.

A	B

1. $y = (x - 3)^2$ $y = (x - 5)^2$

2. $y = (x + 3)^2$ $y = (x + 5)^2$

3. $y = x^2 + 4$ $y = x^2 + 1$

4. $y = x^2 - 2$ $y = x^2 - 1$

5. $y = (x - 3)^2 + 5$ $y = (x - 2)^2 + 5$

5. $y = (x + 3)^2 + 5$ $\qquad\qquad y = (x + 2)^2 + 5$

6. $y = (x + 5)^2 - 2$ $\qquad\qquad y = (x - 2)^2 - 1$

7. $y = -(x + 5)^2 - 2$ $\qquad\qquad y = -(x - 2)^2 - 1$

8. $y = 3(x + 1)^2 - 2$ $\qquad\qquad y = 3(x - 1)^2 + 2$

9. $y = -2(x + 2)^2 + 3$ $\qquad\qquad y = \frac{1}{2}(x + 2)^2 - 1$

10. $y = x^2 + 4$ $\qquad\qquad y = (x - 4)^2$