Remember the $y = x^2$ pattern and the $y = -x^2$ pattern

x	y
0	0
+1	1
–1	1
+2	4
–2	4
+3	9
–3	9

x	y
0	0
+1	–1
–1	–1
+2	–4
–2	–4
+3	–9
–3	–9

DIRECTIONS: The following quadratic functions are already in vertex form. Find the vertex; axis of symmetry (will be in the form $x =$ ); state whether it opens UP or DOWN; and state whether it is wider, narrower, or the same shape as $y = x^2$ (Hint: all the functions on this sheet are the same shape as $y = x^2$). Graph these functions on graph paper.

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

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

3. $y - 2 = -(x + 4)^2$

4. $y + 3 = -(x + 6)^2$

DIRECTIONS: Put the following quadratic functions in vertex form. Find the vertex; axis of symmetry (will be in the form $x =$ ); state whether it opens UP or DOWN; and state whether it is wider, narrower, or the same shape as $y = x^2$ (Hint: all the functions on this sheet are the same shape as $y = x^2$). Graph these functions on graph paper.

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

6. $y = x^2 + 8x + 13$

7. $y = -x^2 - 12x - 32$

8. $y = -x^2 + 10x - 27$