

### 3.2 Investigating Quadratic Functions in Standard Form

**Vertex form:**

$$y = a(x - p)^2 + q$$

**Standard form:**

$$y = ax^2 + bx + c$$

$a$  determines the shape and direction of the graph

$b$  influences the position of the graph

$c$  determines the y-intercept of the graph (when  $x = 0$ )

**Memorize these:**

To determine the vertex in standard form:

$$*** p = -\frac{b}{2a}$$

$q = c - ap^2$  (Can be determined by substituting the  $p$ -value into  $x$  of standard form to find the  $y$  value of the vertex)

**Example 1:**

For each function, identify the following:

-coordinates of vertex

-max/min value

-equation of axis of symmetry

-x and y intercepts

-domain/range

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

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

c.)  $f(x) = -x^2 + 2x + 8$

d.)  $f(x) = 2x^2 - 12x + 25$

**Example 2: Modeling a real life problem**

A farmer has 100 m of fencing available to build an enclosure for his cows. The enclosure only requires 3 sides of fencing, as the 4<sup>th</sup> side is against the barn. Determine the dimensions of the enclosure that maximizes the area of the enclosure.