Name___________
Date____________

3.2 Parabolas in Standard Form

In Standard Form, parabolas look like $y = ax^2 + bx + c$ $a,b,c \in \Re$, $a \neq 0$

e.g. $y = 2x^2 + 5x - 7$

$y = -1.1x^2 - 18$

not $y = 3x + 2$ (line)

$y = 4x^3 + 9x - 4$ (cubic)

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

Link the Ideas – p. 165 $y = ax^2 + bx + c$ $a,b,c \in \Re$, $a \neq 0$

- *a* determines the shape of the parabola & whether it opens up (+) or down (−)
- *b* influences the l & r position of the graph ☆
- *c* represents the y-intercept

x coord of vertex is $-\frac{b}{2a}$

We can expand out the vertex form using algebra:

e.g. $y = -2(x-5)^2 + 1$ is the same as

$= -2(x^2 - 10x + 25) + 1$

$= -2x^2 + 20x - 50 + 1$

$y = -2x^2 + 20x - 49$

On calculator: graph $Y_1 = -2x^2 + 20x - 49$

Zoom to an appropriate window showing vertex and x & y intercepts

- calculate maximum: 2^{nd} Trace 4 → L, R, guess
- calculate y-intercept: Trace, sub in 0
- calculate x-intercept: 2^{nd} Trace 2 → L, R, guess

Example 1: graph the parabola $f(x) = 2x^2 - 3x - 5$ on a calculator to give:

a) vertex (0.75, −6.125)

b) axis of Symmetry $x = 0.75$

c) direction of opening up

d) y-intercept −5

e) x-intercepts −1, 2.5

Example 2: expand $y = (2x + 5)(x - 1)$ out to standard form to give:

$2x^2 + 3x - 5 \rightarrow \frac{-b}{2a} = \frac{-3}{4}$

a) direction of opening
up

b) coordinates of vertex
(−0.75, −6.125)

c) axis of symmetry
$x = -0.75$

Assignment: p.174 # 2-6(ab), 7, 12