4.3 Graphing Parabolas in Standard Form ($y = ax^2 + bx + c$)

Method 1: Graphing by Factoring

This method is useful when the quadratic you are trying to graph is factorable.

1. Find the x-intercepts of the parabola $y = x^2 – 2x – 8$ by factoring and setting $y = 0$.
2. Plot the x-intercepts.
3. State the equation of the axis of symmetry. What is the significance of the axis of symmetry for parabolas?
4. Find the y-coordinate of the vertex.
5. Draw a smooth curve through the three points you know to be on the parabola.

1. Use this procedure to graph the following parabolas:

(a) $y = x^2 – 8x + 12$ (b) $y = x^2 – 2x – 3$ (c) $y = x^2 + 10x + 21$
(d) $y = x^2 + 4x$ (e) $y = x^2 – 6x + 5$ (f) $y = x^2 – 6x – 7$

Method 2: Graphing by Partial Factoring

This method is an alternative to completing the square. It is similar to the above method.

Try the following steps for $y = 2x^2 – 8x + 5$

1. Factor the leading coefficient and x from the first two terms.
2. Find the two values of x that make the factored part equal to zero.
3. Plot the coordinates of the two points you found.
4. State the equation of the axis of symmetry.
5. Find the y-coordinate of the vertex.
6. Draw a smooth curve through the three points you know to be on the parabola.

2. Use this procedure to graph the following parabolas:

(a) $y = x^2 – 4x – 1$ (b) $y = x^2 – 8x + 6$ (c) $y = 3x^2 – 12x + 4$
(d) $y = 2x^2 – 4x + 3$ (e) $y = x^2 + 2x – 5$ (f) $y = x^2 + 6x + 7$

3. Determine the coordinates of the vertex for a parabola in the form $y = ax(x – s) + t$

is the answer to 3. $\left(\frac{s}{2}, t - \frac{as^2}{4}\right)$