Graphing Quadratics

We used \((x-a)^2 = x^2 - 2ax + a^2\) to graph the previous quadratic. For \(y = 4x^2 - 12x + 7\) we can’t immediately use this method because \(4 \neq 1\). So we add one step to our procedure. Note the importance of the parentheses in this process.

\[
\begin{align*}
y & = 4x^2 - 12x + 7 \\
& = 4(x^2-3x) + 7 \\
& = 4 \left(x^2 - 3x + \frac{9}{4} - \frac{9}{4}\right) + 7 \\
& = 4 \left(x - \frac{3}{2}\right)^2 - \frac{9}{4} + 7 \\
& = 4 \left(x - \frac{3}{2}\right)^2 - 2.
\end{align*}
\]

- Factor out the coefficient of the \(x^2\) term.
- Take the coefficient of the \(x\) term, cut it in half, then square this.
- Add and subtract this amount inside the parentheses.
- Factor the perfect square we have constructed.
- Distribute.
• Finish solving.