

Exercise 9

For the following exercises, rewrite the quadratic functions in standard form and give the vertex.

$$f(x) = x^2 + 5x - 2$$

Solution

In order to write this quadratic function in vertex form, it's necessary to complete the square, which makes use of the following algebraic identity.

$$(x + B)^2 = x^2 + 2xB + B^2$$

Notice that $2B = 5$, which means $B = \frac{5}{2}$ and $B^2 = \frac{25}{4}$. Add and subtract $\frac{25}{4}$ on the right side and use the identity so that x appears in only one place.

$$\begin{aligned} f(x) &= x^2 + 5x - 2 \\ &= \left(x^2 + 5x + \frac{25}{4}\right) - 2 - \frac{25}{4} \\ &= \left(x + \frac{5}{2}\right)^2 - \frac{33}{4} \end{aligned}$$

Therefore, the vertex of the parabola is $\left(-\frac{5}{2}, -\frac{33}{4}\right)$.

