Find the equation of a parabola that has vertex of \((-2, -4)\), and passes through \((1,3)\).

\[
y = a (x - h)^2 + k
\]

Begin with the standard form of a quadratic function.

\[
y = a (x - (-2))^2 + (-4)
\]

Substitute the values of \(h\) and \(k\) in for the vertex of the parabola.

\[
y = a (x + 2)^2 - 4
\]

Simplify, now all you need is the value of \(a\) to complete the equation.

\[
3 = a (1)^2 - 4
\]

\[
3 = 9a - 4
\]

\[
7 = 9a
\]

\[
a = \frac{7}{9}
\]

Simplify and solve for \(a\).

\[
y = \frac{7}{9} (x + 2)^2 - 4
\]

Once you have found the value of \(a\), rewrite the completed equation. You have just found the equation of a parabola that has vertex of \((-2, -4)\), and passes through \((1,3)\).

When you encounter these types of problems the most common mistake people make, is they forget to find the value of \(a\).