Example

Solve the following equation for \( x \):

\[
(x + 5)^{3/2} = 8.
\]

**Solution:** This equation involves the rational exponent \( \frac{3}{2} \), and relevant to the solution of the equation is the fact that

\[
\left((x + 5)^{3/2}\right)^{2/3} = x + 5.
\]

So, in order to solve for \( x \), raise both sides of the original equation to the \( 2/3 \) power,

\[
\left((x + 5)^{3/2}\right)^{2/3} = 8^{2/3},
\]

or

\[
x + 5 = \left(8^{1/3}\right)^2
= 2^2
= 4.
\]

Solving for \( x \),

\[
x + 5 = 4 \implies x = -1.
\]

Check to make sure \( x = -1 \) is actually a solution of the original equation,

\[
(x + 5)^{3/2} = 8,
\]

by substituting this value into the equation. Substitution gives

\[
(-1 + 5)^{3/2} = 4^{3/2} = \left(4^{1/2}\right)^3 = 2^3 = 8,
\]

which confirms that \( x = -1 \) is a solution of the original equation.

**The solution is:** \{ -1 \}. 