Solving Cube Root (and Other Power) Functions

Solve the equation: $2\sqrt[3]{2x-3}-22=0$

$2\sqrt[3]{2x-3}=22$ *Isolate the radical*

$\sqrt[3]{2x-3}=11$ *Isolate the radical*

$\left(\sqrt[3]{2x-3}\right)^3=(11)^3$ *Cube both sides*

$2x-3=1331$ *Simplify*

$2x=1334$ *Solve for x*

$x=667$

Solve the equation: $\sqrt[4]{4x+3} = 2\sqrt[4]{x-1}$

$\left(\sqrt[4]{4x+3}\right)^4 = \left(2\sqrt[4]{x-1}\right)^4$ *Raise each side to the 4th power*

$4x + 3 = 16(x-1)$ *Simplify*

$4x + 3 = 16x - 16$ *Distribute*

$19 = 12x$ *Solve for x*

$x = \frac{19}{12}$

Solve the equation: $\sqrt[5]{(2x+2)^2} = 3$

$\left(\sqrt[5]{(2x+2)^2}\right)^5 = (3)^5$ *Raise each side to the 5th power*

$(2x+2)^2 = 243$ *Simplify*

$\sqrt{(2x+2)^2} = \sqrt{243}$ *Square root*

$2x + 2 = 15.588$ *Simplify*

$2x = 13.588$ *Solve for x*

$x \approx 6.794$

A **rational exponent** is an exponent that is a fraction.

When converting a root expression to a rational exponent, the root goes in the denominator.

$\sqrt[3]{x^5} = x^{5/3}$

$\sqrt[10]{x^7} = x^{7/10}$

$\sqrt[5]{(x-2)^2} = (x-2)^{2/5}$

$\sqrt[6]{(5x)^8} = (5x)^{8/6} = (5x)^{4/3}$

$\sqrt[3]{x^2+5}$ cannot re-write because 5 isn't being squared

Solve the equation: $\sqrt[5]{(2x+2)^2} = 3$

$$(2x+2)^{2/5} = 3$$ *Re-write exponent as a fraction*

$$((2x+2)^{2/5})^{5/2} = (3)^{5/2}$$ *Raise to the reciprocal power*

$$2x + 2 = 15.588$$ *Simplify*

$$2x = 13.588$$ *Solve for x*

$$x \approx 6.794$$