Solving equations with rational exponents Take the following steps when solving an equation where the variable is being raised to a rational exponent.

1. Isolate the term or quantity that is being raised to the rational exponent on one side of the equation.
2. Raise both sides of the equation to the reciprocal power.
3. Finish solving for the variable.

Solve.

$2(x+11)^{\frac{2}{5}} + 310 = 328$

$-310 \quad -310$

$\frac{2(x+11)^{2/5}}{2} = \frac{18}{2}$

$\left[(x+11)^{2/5}\right]^{5/2} = (9)^{5/2} \rightarrow (\sqrt{9})^5 = (\pm 3)^5 = \pm 243$

$x+11 = \pm 243$

$-11 \quad -11$

$243-11$

$-243-11$

$x = -254, 232$

Solve.

$(x-5)^{\frac{3}{4}} + 34 = 7$

$-34 \quad -34$

$\left[(x-5)^{3/4}\right]^{4/3} = (-27)^{4/3} \rightarrow (\sqrt[3]{-27})^4 = (-3)^4 = 81$

$x-5 = 81$

$+5 \quad +5$

$x = 81$

Solve.

$(x+7)^{\frac{2}{3}} + 2 = 18$

$-2 \quad -2$

$\left((x+7)^{2/3}\right)^{3/2} = (16)^{3/2} \rightarrow (\sqrt{16})^3 = (\pm 4)^3 = \pm 64$

$x+7 = \pm 64$

$-7 \quad -7$

$+64-7$

$-64-7$

$x = 57, -71$

Solving radical equations Take the following steps when solving an equation where the variable is in the radicand.

1. Isolate the radical on one side of the equation.
2. Raise both sides of the equation to the power equal to the index of the radical.
3. Finish solving for the variable.

Solve.

$\sqrt[3]{5x-9}+40=13$

$-40 \quad -40$

$\left(\sqrt[3]{5x-9}\right)^3=(-27)^3$

$5x-9=-19683$

$\frac{5x}{5}=\frac{-19674}{5}$

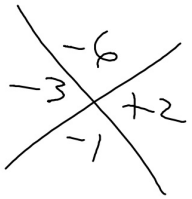
$x=-3934.8$

Solve.

$\left(\sqrt{x^2+5}\right)^2=\left(\sqrt{x+11}\right)^2$

$x^2+5=x+11$

$x^2-x-6=0$



$(x-3)(x+2)=0$

$x=3,-2$

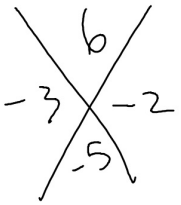
What is different about this one? There is an x outside of the radical.

$\sqrt{3x-5}+1=x$

$\left(\sqrt{3x-5}\right)^2=(x-1)^2$

$3x-5=x^2-2x+1$

$0=x^2-5x+6$



$0=(x-3)(x-2)$

$x=2,3$

Solve.

$$(3x+13)^{\frac{1}{2}} - 5 = x$$

$+5$

$$\left(\sqrt{3x+13}\right)^2 = (x+5)^2$$

$$3x+13 = x^2+10x+25$$

$-3x-13 \qquad -3x-13$

$$x^2+7x+12=0$$

$$(x+4)(x+3)$$

$$x=-4,-3$$

Solves: $\sqrt{24-4x}+3=x$

$$\left(\sqrt{24-4x}\right)^2 = (x-3)^2$$

$$24-4x = x^2-6x+9$$

$$0 = x^2-2x-15$$

$$0=(x-5)(x+3)$$

-15, $+3$, -5, -2

The last step in any solving process is to:

CHECK YOUR ANSWERS!

$x=5, -3$

-3 is an extraneous solution because it doesn't make the original equation true. Therefore, x=5 is the only solution.