## Solving Equations with Rational Exponents

Remember that radical expressions can be represented with rational/fractional exponents (and vice versa).

Examples: $\sqrt{x}=x$
$\sqrt[3]{x^{2}}=$
$8^{1 / 3}=$

Now we will work on solving equations containing fractional exponents within them.

1) Isolate the power
2) Raise both sides to the reciprocal power to cancel.
3) Solve
4) Check your answer

Reviewing reciprocals is necessary before we start. If one side of the equation is raised to a certain fractional power, raising both sides to the reciprocal power will 'unlock' that side.

Examples: $\quad \frac{1}{2}$ reciprocal $\rightarrow \quad \frac{2}{3}$ reciprocal $\rightarrow \quad \frac{4}{3}$ reciprocal $\rightarrow$

| Example 1: <br> $(3 x-1)^{\frac{1}{2}}=(2 x+5)^{\frac{1}{2}}$ | Example 2: <br> $3(5 x-1)^{\frac{1}{2}}-2=0$ | Example 3: <br> $(3 x+2)^{\frac{1}{3}}+1=0$ |
| :--- | :--- | :--- |
| Example D: <br> $(3 x+1)^{\frac{1}{3}}=-5$ | Example E: <br> $3(2 x+6)^{\frac{1}{4}}-6=0$ |  |
|  |  |  |

Almost got it! But here are some problems where the fractional power does not have a numerator of 1 .
Use the $\qquad$ still. $\sqrt[3]{8^{5}}=$ $\sqrt[2]{9^{3}}=$

| Example F: | Example G: | Example H: | Example I: |
| :--- | :--- | :--- | :--- |
| $4 x^{\frac{3}{2}}-8=0$ | $(x-1)^{\frac{2}{3}}=64$ | $4(3 x+5)^{\frac{2}{3}}=100$ | $3(x+2)^{\frac{3}{4}}+6=30$ |
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