

Rational Exponents

$$\sqrt[3]{x^1} = x^{\frac{1}{3}} \quad \text{*exponent of the radicand is the numerator}$$

$$\sqrt[5]{x^2} = x^{\frac{2}{5}} \quad \text{*index of the radical is the denominator}$$

$$\sqrt[n]{x^m} = x^{\frac{m}{n}}$$

$$x^{\frac{5}{8}} = \sqrt[8]{x^5}$$

$$x^{\frac{6}{4}} = x^{\frac{3}{2}} = \sqrt{x^3} = x\sqrt{x}$$

$x \cdot x \cdot x$

Jan 17-2:25 PM

Solving Radical Equations

A radical equation is any equation that contains a variable within a radical.

Ex. $\sqrt{x} = 3$
 $(\sqrt{x})^2 = 3^2$
 $x = 9$

Ex. $\sqrt{x+3} = \sqrt{2x-1}$
 $(x+3)^{\frac{1}{2}} = \sqrt{2x-1}$

*Be sure to check for extraneous solutions because you can't take the square root (or any even root) of a negative number.

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One Radical Equations

① $\sqrt{x+2} = 3$
 $(\sqrt{x+2})^2 = (3)^2$
 $x+2 = 9$
 $x = 7$

② $3 - \sqrt{x-1} = 5$
 $-\sqrt{x-1} = 2$
 $\sqrt{x-1} = -2$
 $(\sqrt{x-1})^2 = (-2)^2$
 $x-1 = 4$
 $x = 5$
 $3 - \sqrt{5-1} = 5$
 $3 - \sqrt{4} = 5$
 $3 - 2 = 5$
 $1 = 5$ (False)
 $x = -7$ (circled)
 $3 - \sqrt{(-7)-1} = 5$
 $3 - \sqrt{-8} = 5$
 $3 - 2i = 5$
 $3 + 2 = 5$ ✓

③ $\sqrt{2x+5} + 2 = -2$
 $\sqrt{2x+5} = -4$
 $(\sqrt{2x+5})^2 = (-4)^2$
 $2x+5 = 16$
 $2x = 11$
 $x = \frac{11}{2}$

Check: $\sqrt{2(\frac{11}{2})+5} + 2 = \sqrt{11+5} + 2 = \sqrt{16} + 2 = 4 + 2 = 6 \neq -2$
 extraneous or no solution

④ Check your answer.

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Two Radical Equations

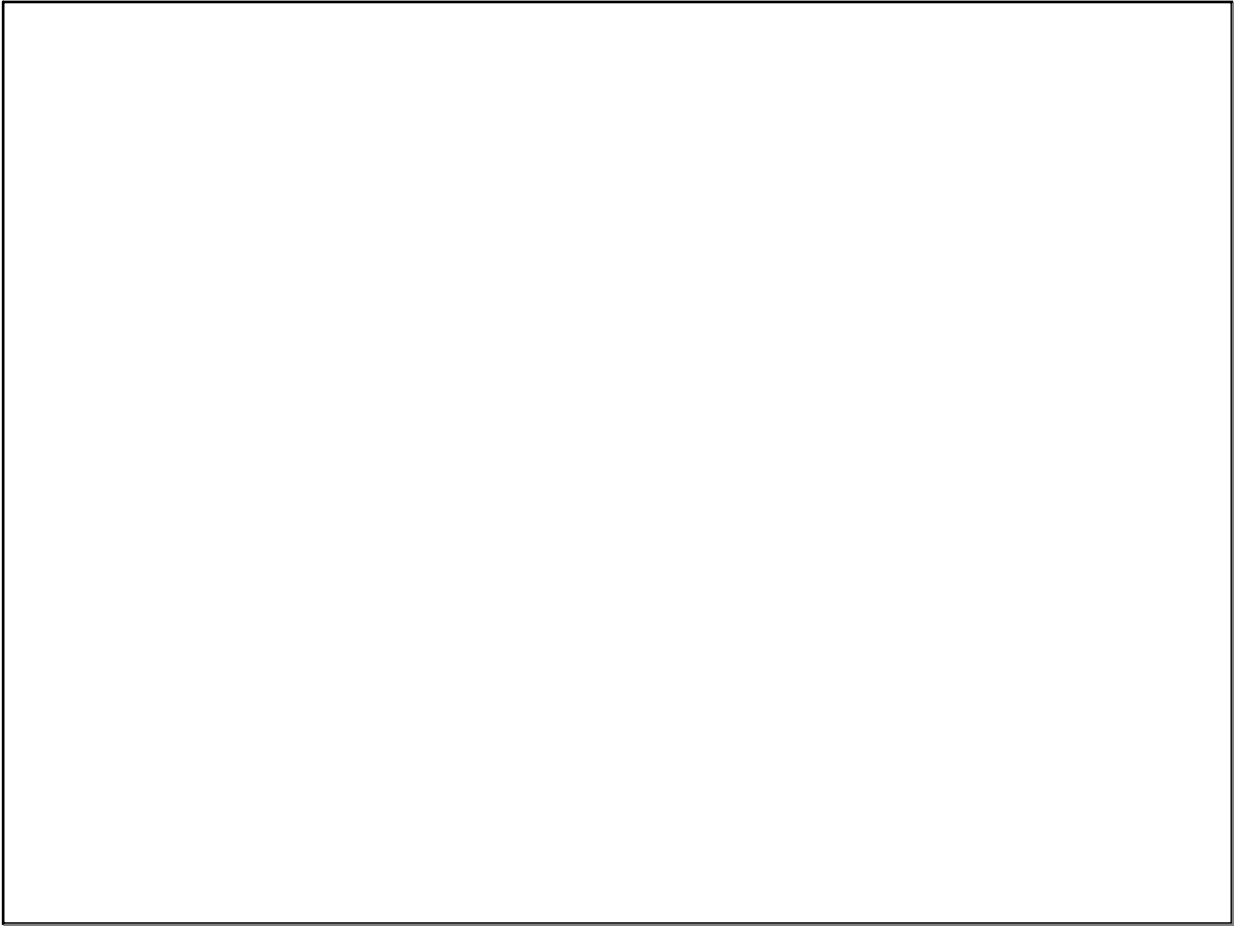
① $\sqrt{x+1} = \sqrt{2x-1}$
 $x+1 = 2x-1$
 $2 = x$
 $\sqrt{2+1} = \sqrt{2(2)-1}$
 $\sqrt{3} = \sqrt{3}$ ✓

② Use exponents to remove the radicals.
 ③ Solve for the variable.
 ④ Check your answer.

② $\sqrt{x+4} = 3\sqrt{x}$
 $(\sqrt{x+4})^2 = (3\sqrt{x})^2$
 $x+4 = 9x$
 $4 = 8x$
 $x = \frac{1}{2}$
 $\sqrt{\frac{1}{2}+4} = 3\sqrt{\frac{1}{2}}$
 $\sqrt{\frac{9}{2}} = 3\sqrt{\frac{1}{2}}$
 $3\sqrt{\frac{1}{2}} = 3\sqrt{\frac{1}{2}}$

③ $\sqrt[3]{x+6} = 2\sqrt[3]{x+2}$
 $(\sqrt[3]{x+6})^3 = (2\sqrt[3]{x+2})^3$
 $x+6 = 8(x+2)$
 $x+6 = 8x+16$
 $-7x = 10$
 $x = -\frac{10}{7}$
 $\sqrt[3]{-\frac{10}{7}+6} = 2\sqrt[3]{-\frac{10}{7}+2}$
 $\sqrt[3]{\frac{32}{7}} = 2\sqrt[3]{\frac{4}{7}}$
 $2\sqrt[3]{\frac{4}{7}} = 2\sqrt[3]{\frac{4}{7}}$

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