Algebra 2 6.7

Solve equations containing radicals

inverse operations

extraneous

radical equation

real solutions

(when is something not real?)

$\sqrt{\quad}$ $\sqrt[3]{\quad}$ $\sqrt[4]{\quad}$

$(\quad)^{\frac{1}{2}}$ $(\quad)^{\frac{1}{3}}$ $(\quad)^{\frac{1}{4}}$

$\sqrt{-25} = 5i$

$2x + 3 = 11$

$-3 \quad -3$

$\frac{2x}{2} = \frac{8}{2}$

$(\sqrt{x})^2 = (5)^2$

What number(s) will make the equation TRUE?

$x = 25$ $\sqrt{25} = 5$

$x = 25$

Real

Example 1 Solve Radical Equations

Solve each equation.

a. $\sqrt{x+2}+4=7$

$-4 \quad -4$

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

$x+2=9$

$-2 \quad -2$

$x=7$

$\sqrt{7+2}+4 \stackrel{?}{=} 7$

$\sqrt{9}$

$3+4=7$ ☺

Solve each equation.

1. $\sqrt{x-4}+6=10$

$-6 \quad -6$

$(\sqrt{x-4})^2 = (4)^2$

$x-4 = 16$

$+4 \quad +4$

$x = 20$

$\sqrt{20-4}+6=10$

$\sqrt{16}$

$4+6=10$ ✓

12. $\sqrt{2t-7} = \sqrt{t+2}$

$(\sqrt{2t-7})^2 = (\sqrt{t+2})^2$

$2t - 7 = t + 2$

$-t + 7 \quad -t + 7$

$t = 9$

$\sqrt{18-7} = \sqrt{9+2}$

$\sqrt{11} = \sqrt{11}$

$(x-3)^2$

$$
\begin{array}{r}
x-3 \\
x-3 \\
\hline
-3x+9 \\
x^2-3x \\
\hline
x^2-6x+9
\end{array}
$$

Uh oh...

27. $\left(\sqrt{x-15}\right)^2 = (3-\sqrt{x})^2$

$3-\sqrt{x}$
$3-\sqrt{x}$

$x - 15 = 9 + x - 6\sqrt{x}$
$-x \quad -9 \quad -x$

$\frac{-24}{-6} = \frac{-6\sqrt{x}}{-6}$

$(4)^2 = (\sqrt{x})^2$

$x = 16$ NS $\emptyset$

$\sqrt{16-15} = 3-\sqrt{16}$

$\sqrt{1} \quad 3-4$

$1 \neq -1$

26. $\left(\sqrt{x-3}\right)^2 = \left(\sqrt{x+4}-1\right)^2$

$x-3 = x+5-2\sqrt{x+4}$

$-x-5 \quad -x-5$

$-8 = -2\sqrt{x+4}$

$\frac{-8}{-2} = \frac{-2\sqrt{x+4}}{-2}$

$4^2 = \sqrt{x+4}^2$

$16 = x+4$

$-4 \quad -4$

$x = 12$ ☺

$\sqrt{x+4}-1$

$\frac{\sqrt{x+4}-1}{-\sqrt{x+4}+1}$

$x+4 - \sqrt{x+4}$

$\sqrt{9} = \sqrt{16} - 1$

$3 = 4 - 1$

$2\sqrt[3]{6\cdot\frac{11}{6}-3}-4=0$

$\sqrt{-4}=2$

Example 2 Solve a Cube Root Equation

$2\sqrt[3]{8}-4=0$

$2\cdot 2-4=\frac{1}{3}0$

isolate
cube
check

Solve $2(6x-3)^{\frac{1}{3}}-4=0.$

$6x-3=8$
$+3\quad+3$

$2\sqrt[3]{6x-3}-4=0$
$+4\quad+4$

$\frac{6x}{6}=\frac{11}{6}$

$\frac{2}{2}\sqrt[3]{6x-3}=\frac{4}{2}$

$x=\frac{11}{6}$

$\left(\sqrt[3]{6x-3}\right)^3=(2)^3$

GuidedPractice

Solve each equation.

2A. $(3n + 2)^{\frac{1}{3}} + 1 = 0$

2B. $3(5y-1)^{\frac{1}{3}} - 2 = 0$

$\frac{3}{3}\sqrt[3]{5y-1} = \frac{2}{3}$

$\sqrt[3]{5y-1} = \frac{2}{3}$

$5y-1 = \frac{8}{27} + 1$

$y = \frac{7}{27}$

Write in radical form?

Standardized Test Example 3 Solve a Radical Equation

What is the solution of $3\left(\sqrt[4]{2n+6}\right) - 6 = 0$?

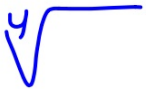
$\div 3 \quad +6 \quad +6 \quad \div 3$

isolate $\sqrt{}$

$\sqrt[4]{2n+6} = 2$

GuidedPractice

3. What is the solution of $4(3x + 6)^{\frac{1}{4}} - 12 = 0$?



6.7 23-47 odd

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