DATE: $\qquad$ 5/28
Radical Equations

$$
(\underset{\text { undo }}{(\sqrt[2]{ }})^{2}(\sqrt[3]{ })^{3} \cdots \text { so on }
$$

Target 10C. Solve equations containing radicals

Solving Radical Equations
Solve. Check for extraneous solutions.

1. $\sqrt{x+1}+2=4$

$$
\begin{array}{cc}
\sqrt{x}+1+2=4 \\
-2-2 \\
(\sqrt[2]{x+1})^{2}=2^{2} & \text { squaring } \\
x+1=4 & \text { Ind } \\
\frac{-1}{}-1 & \text { both } \\
x=3 &
\end{array}
$$

bot by squaring both sides

$$
\begin{aligned}
& x+1=4 \\
&-1 \\
& \hline x=3
\end{aligned} \quad \text { bot } \quad \begin{aligned}
& x+1 \\
& \sqrt{x+1}+2=4 \\
& \sqrt{3+1}+2=4 \\
& 2+2=4
\end{aligned}
$$

$$
\text { 2. }(\sqrt[2]{x-15})^{2}=(3-\sqrt{x})^{2}
$$

$$
\begin{aligned}
& x-15=(3-\sqrt{x})(3-\sqrt{x}) \\
& x-15=9-2 \sqrt{x}-3 \sqrt{x}+
\end{aligned}
$$

$$
x-15=9-3 \sqrt{x}-3 \sqrt{x}+x
$$

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

$$
\begin{aligned}
& -15=9-6 \sqrt{x} \\
& -9
\end{aligned}
$$

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

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

$$
16=x
$$

CHECK: $\begin{aligned} \sqrt{16-15} & \neq 3-\sqrt{16} \\ \sqrt{1} & \neq 3-4 \\ 1 & \neq-1\end{aligned}$

5-8 Radical Equations - Microsoft Word
3. $\left(\sqrt[2]{x^{2}-2 x}\right)^{2}=(\sqrt[2]{-6 x+21})^{2}$

$$
\begin{gathered}
\begin{array}{c}
x^{2}-2 x=-6 k+21 \\
+6 x+6 k
\end{array} \\
\hline x^{2}+4 x=21 \\
-21-21 \\
\hline x^{3}+4 x-21=0 \\
(x-3)(x+7)=0
\end{gathered}
$$

FACTOR

$$
\begin{aligned}
& \text { Both } \\
& \text { sol. }
\end{aligned} \begin{aligned}
& x-3=0 \text { or } x+7=0 \\
& +3+3
\end{aligned}
$$

$$
\text { Sol. } \rightarrow \frac{+3+3}{x=3} \text { or } \quad \frac{-7-7}{x=-7}
$$

CHECK: $\begin{aligned} \sqrt{3^{2}-2 \cdot 3} & =\sqrt{-6 \cdot 3+21} \\ \sqrt{3} & =\sqrt{3}\end{aligned}$
$\left(\begin{array}{c}\begin{array}{|c|c|}\hline x & -3 \\ +7 \\ x^{2} & -3 \\ \hline+7 & -21 \\ \hline\end{array} \\ \hline\end{array}\right.$
$-\hat{1.21}$
$-3.7$
CHECK: $\sqrt{(-1)^{2}-2 .-7}=\sqrt{-6 \cdot-7+21}$

$$
-3+7=4
$$

$$
\sqrt{63}=\sqrt{63}
$$

$$
\text { 4. } \begin{aligned}
5 \sqrt[3]{x}+28 & =8 \\
-28 & -28 \\
\hline \frac{5 \sqrt[3]{x}}{5} & =\frac{-20}{5} \\
(\sqrt[3]{x})^{3} & =(-4)^{3} \\
x & =(-4)^{3}=-64
\end{aligned}
$$

CHECK:

$$
\begin{gathered}
5 \sqrt[3]{-64}+28=8 \\
5 \sqrt[3]{(-4)^{3}}+28=8 \\
5 \cdot(-4)+28=8 \\
-20+28=8 \\
8=8
\end{gathered}
$$

5. $(x-3)^{2}=(\sqrt{4 x})^{2}$

$$
\begin{aligned}
& \underbrace{}_{x-3)(x-3)}=4 x \\
& x^{2}-3 x-3 x+9=4 x \\
& x^{2}-6 x+9=4 x \\
& -4 x \quad-4 x \\
& x^{2}-10 x+9=0 \\
& (x-9)(x-1)=0
\end{aligned}
$$

$$
\begin{aligned}
& 6.01+\sqrt[5]{5 x+7}=5 \\
&-3
\end{aligned} \begin{aligned}
&-8)^{5} \\
& \hline(\sqrt[5]{5 x+7})^{5}=(2)^{5} \\
& 5 x+7 /=32 \\
& \frac{-77}{5}=\frac{-7}{5}
\end{aligned}
$$

$x-9=0$ or $x-1=0$
$x=9$ or $x=1 \rightarrow$ Not a solution
CHECK:

$$
\begin{gathered}
x-3=\sqrt{4 x} \\
9-3=\sqrt{4(9)} \\
6=\sqrt{36} \\
6=6
\end{gathered}
$$

$$
\begin{aligned}
& x-3 \neq \sqrt{4 x} \\
& 1-3 \neq \sqrt{4(1)} \\
&-2 \neq \sqrt{4} \\
&-2 \neq 2
\end{aligned}
$$

CHECK:

$$
\begin{gathered}
3+\sqrt[5]{5(5)+7}=5 \\
3+\sqrt[5]{32}=5 \\
3+\sqrt[5]{2^{5}}=5 \\
3+2=5 \\
5=5
\end{gathered}
$$

$$
\begin{aligned}
& 7(\sqrt[2]{3 x+1})^{2}=(\sqrt[2]{5 x}-1)^{2} \\
& 3 x+1=(\sqrt{5 x}-1)(\sqrt{5 x}-1) \\
& 3 x+1=5 x-\sqrt{5 x}-\sqrt{5 x}+1 \\
& \begin{array}{l}
3 x+1=5 x-2 \sqrt{5 x}+1 \\
5 x+1
\end{array} \\
& \frac{-5 x+1-5 x-\frac{1}{-2}}{\frac{-2 x}{-2}=\frac{-2 \sqrt{5 x}}{-2}} \\
& (x)^{2}=(\sqrt{5 x})^{2} \\
& x^{2}=5 x \Rightarrow \begin{array}{l}
x^{2}-5 x=0 \\
x(x-5)=0
\end{array} \\
& \text { CHECK: } \\
& \sqrt{3 \cdot 0+1} \neq \sqrt{5 \cdot 0}-1 \\
& \sqrt{3 \cdot 5+1}=\sqrt{5.5}-1 \\
& \sqrt{1} \neq \sqrt{0}-1 \\
& \sqrt{16}=\sqrt{25}-1 \\
& 1 \neq 0-1 \\
& 4=5-1 \\
& 1 \neq-1 \\
& \text { v } 4=4 \\
& \text { not sol. } \\
& \text { if you want to } \\
& \text { ( } x=0 \text { or } \begin{array}{r}
x-5=0 \\
+5+5
\end{array} \\
& \begin{array}{l}
x-5=0 \\
+5+5 \\
x=5
\end{array}, \text { Sol. } \\
& \text { see kor to deal } \\
& \text { problems on } \\
& \text { Nsirie } B
\end{aligned}
$$

