

FACTOR:

① $16x^2 - 8x + 1$

② $x^2 + 2x - 24$

③ $10x^2 + 13x - 3$

ANS!

① $16x^2 - 8x + 1$

↓ ✓ 2ab ✓ ✓

$$\boxed{(4x - 1)^2 \text{ or } (4x - 1)(4x - 1)} \quad \text{FOIL } \checkmark$$

② $x^2 + 2x - 24$

Sum $\Rightarrow 2$ Prod $\Rightarrow -24$

-4 + 6

$$\therefore \boxed{(x - 4)(x + 6)} \quad \text{FOIL } \checkmark$$

③ $10x^2 + 13x - 3$

S $\Rightarrow 13$ P $\Rightarrow -30$

-2 + 15

$(10x^2 - 2x) + (15x - 3)$

$2x(5x - 1) + 3(5x - 1)$

$$\boxed{(5x - 1)(2x + 3)} \quad \text{FOIL } \checkmark$$

FTOA Fundamental Theorem of Algebra

Simple Version $\Rightarrow$ Every polynomial of degree N has N roots (solutions).

⑥ Linear Polynomials $\Rightarrow x^1 \Rightarrow 1$ SOLUTIONS

Quadratic Poly's $\Rightarrow x^2 \Rightarrow 2$ SOLUTIONS

$\vdots$
 $\checkmark$
ETC.

$\vdots$
 $\checkmark$
ETC.

THIS WILL BE IMPORTANT TO REMEMBER AS
WE LEARN THE STEPS TO SOLVE "RADICAL"
EQUATIONS $\Rightarrow$ EQUATIONS INVOLVING THE VARIABLE
UNDER A RADICAL.

Here ARE THE STEPS:

- ① GET THE RADICAL term(s) "by itself"
(ON ONE side (or both))
- ② "Undo" the RADICAL $(\sqrt{\quad})^2$, $(\sqrt[3]{\quad})^3$, ETC.
(FOLLOW THE GRE)
- ③ Do checks $\Rightarrow$ MANDATORY! (DUE TO FTOA)

Ex 1
Pg 263

Solve $\sqrt{x+1} + 2 = 4$
 $\quad \quad \quad -2 \quad \quad -2$

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

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

$$x+1 = 4$$

$$\boxed{x = 3}$$

CK $\sqrt{(\quad)+1} + 2 \stackrel{?}{=} 4$

$$\sqrt{(3)+1} + 2 \stackrel{?}{=} 4 \checkmark$$

Why must checks be done? When you "undo" a radical equation, you may change its degree creating false or extraneous solutions. None of your correct solutions may check ($\Rightarrow$ no solution case) or only some may check (discard the false ones), or they may all check.

$$\textcircled{\text{Ex}} \quad \sqrt{x+2} + 4 = x$$

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

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

$$\begin{array}{rcl} x+2 & = & x^2 - 8x + 16 \\ -x-2 & & -x-2 \end{array}$$

$$x^2 - 9x + 14 = 0$$

$$S \Rightarrow -9$$

$$P = 14$$

$$\begin{array}{c} \wedge \\ -2-7 \end{array}$$

$$(x-2)(x-7) = 0$$

$$\begin{array}{c} \uparrow \\ (x-2) = 0 \end{array} \quad \begin{array}{c} \uparrow \\ \text{or} \\ (x-7) = 0 \end{array}$$

$$\therefore x = 2 \text{ or } x = 7$$

ARE SOLUTIONS TO

$$x^2 - 9x + 14 = 0$$

$$\begin{array}{l} \text{CK} \\ x=2 \end{array} \quad \sqrt{(2)+2} + 4 \stackrel{?}{=} (2) \quad \left\{ \begin{array}{l} \text{CK} \\ x=7 \end{array} \right. \quad \sqrt{(7+2)} + 4 \stackrel{?}{=} (7)$$

$$\begin{array}{l} 2 + 4 \neq 2 \\ \text{EXTRANEVOUS} \end{array} \quad \left\{ \begin{array}{l} \text{FALSE} \\ \text{SOLUTION} \end{array} \right. \quad \left\{ \begin{array}{l} 3 + 4 = 7 \checkmark \\ \boxed{x = \{7\}} \end{array} \right.$$

SOLVING QUADRATIC
EQUATIONS BY FACTORING

WHATEVER VALUE OF x
MAKES $(x-2)(x-7) = 0$
TRUE MAKES $x^2 - 9x + 14 = 0$
TRUE SINCE THEY ARE EQUAL

ZPP $\Rightarrow$ Zero Product Property
 $ab = 0 \quad a = 0 \text{ or } b = 0$

$$\textcircled{\text{EX}} \quad X = \sqrt{X+20}$$

$$X^2 = X + 20$$

$$X^2 - X - 20 = 0$$

$$\text{Sum} \Rightarrow -1$$

$$\text{prod} \Rightarrow -20$$

$$\begin{array}{c} \diagup \quad \diagdown \\ 4 \quad -5 \end{array}$$

$$(X+4)(X-5) = 0$$

$$X = -4, 5$$

$$ax^2 + bx + c = 0$$

STANDARD FORM FOR
A QUADRATIC EQUATION

FOIL TO BE SURE
FACTORS ARE CORRECT

ZPP $\Rightarrow$ "Ziggy"

Check for false solutions

$$\begin{array}{l} \underline{\underline{\text{CK}}} \\ X = -4 \end{array} \quad \begin{array}{l} (-4) \stackrel{?}{=} \sqrt{(-4)+20} \\ -4 \neq \sqrt{16} \\ \text{FALSE} \end{array} \quad \left\{ \begin{array}{l} \underline{\underline{\text{CK}}} \\ X = 5 \end{array} \right. \quad \begin{array}{l} (5) \stackrel{?}{=} \sqrt{5+20} \\ 5 = 5 \checkmark \end{array}$$

$$X = \{5\}$$

If you can't get the radical terms completely isolated (by themselves), make sure all like terms are combined so the equation is as simple as possible before undoing the radical.

EX 2
pg 263

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

$$x-15 = (3-\sqrt{x})^2 = (3-\sqrt{x})(3-\sqrt{x})$$

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

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

$$-x + 15 + 15 \quad -x$$

$$0 = 24 - 6\sqrt{x}$$

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

$$\sqrt{x} = 4 \quad \therefore x = 16$$

$$\underline{\text{CK}} \quad \sqrt{(\quad)-15} \stackrel{?}{=} 3 - \sqrt{(\quad)}$$

$$\sqrt{(16)-15} \stackrel{?}{=} 3 - \sqrt{(16)}$$

$$1 \neq -1$$

NO SOLUTION

Ex 3
Pg 264

$$3(5N-1)^{\frac{1}{3}} - 2 = 0$$

Cube root, will
undo by $(?)^3$

$$(5N-1)^{\frac{1}{3}} = \frac{2}{3}$$

$$\left[(5N-1)^{\frac{1}{3}}\right]^3 = \left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3}$$

Group To
Power Rule

$$5N-1 = \frac{8}{27}$$

$$5N = \frac{8}{27} + \frac{27}{27} = \frac{35}{27}$$

$$N = \frac{35}{27} \cdot \frac{1}{5} \quad \therefore N = \frac{7}{27}$$

CK $3\left(5\left(\frac{7}{27}\right)-1\right)^{\frac{1}{3}} - 2 \stackrel{?}{=} 0$

$$3\left(\frac{35}{27} - \frac{27}{27}\right)^{\frac{1}{3}} - 2 \stackrel{?}{=} 0$$

$$3\left(\frac{8}{27}\right)^{\frac{1}{3}} - 2 \stackrel{?}{=} 0$$

$$3\left(\frac{2}{3}\right) - 2 \stackrel{?}{=} 0$$

$$\frac{6}{3} - 2 = 0 \quad \checkmark$$

$$\boxed{N = \frac{7}{27}}$$

Homework: { Ch 5-8, RADICAL EQUATIONS
AND INEQUALITIES }

Pg. 266 #13, 17, 19, 21

PLUS: ① $X = \sqrt{6-X}$

② $\sqrt{5x-6} = X$

③ $\sqrt{28-3x} = X$

Solve QUADRATIC
EQUATIONS By
Factoring + ZPP.
Check for FALSE
SOLUTIONS