

1.6 Rational + Radical Equations

Day 1 ①

Ex 1 $\cancel{3(x-1)}^3 \frac{x-1}{3} - \frac{\cancel{3(x-1)}^3 2x}{x-1} = x^{(3(x-1))}$ LCD = $3(x-1)$

$$(x-1)(3x-1) - 3(2x) = 3x(x-1)$$

$$\cancel{3x^2} - x - 3x + 1 - 6x = \cancel{3x^2} - 3x$$

$$-4x - 6x + 1 = -3x$$

$$-10x + 1 = -3x$$

$$+10x \qquad \qquad \qquad +10x$$

$$\frac{1}{7} = \frac{7x}{7}$$

$$\boxed{\frac{1}{7} = x}$$

Ex 2 Solve

$$x(x-2) \frac{3x+2}{x-2} + \frac{x(x-2)}{x} = \frac{-2(x(x-2))}{x^2-2x} \quad \text{LCD} = x(x-2)$$

$$x(3x+2) + (x-2) = -2$$

$$3x^2 + \underline{2x} + \underline{x} - 2 = -2$$

$$3x^2 + 3x \quad -2 = -2$$

$$\qquad \qquad \qquad +2 \quad +2$$

$$3x^2 + 3x = 0$$

$$3x(x+1) = 0$$

$$\frac{3x}{3} = 0$$

$$x = 0$$

$$x+1 = 0$$

$$\underline{-1 \quad -1}$$

$$\boxed{x = -1}$$

Ex 4

Solve

$$x - \sqrt{15-2x} = 0$$

$$+ \sqrt{15-2x} \quad + \sqrt{15-2x}$$

$$x^2 = \sqrt{15-2x}^2$$

$$x^2 = 15-2x$$

$$\begin{array}{r} -15 + 2x \quad -15 + 2x \\ \hline \end{array}$$

$$x^2 + 2x - 15 = 0$$

$$(x+5)(x-3) = 0$$

$$x+5=0$$

$$\begin{array}{r} -5 \quad -5 \\ \hline \end{array}$$

$$x = -5$$

$$x-3=0$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$x = 3$$

① Isolate $\sqrt{\quad}$ radical on one side

② Raise both sides to a power that will cancel the radical

$$\begin{array}{r} -15 \quad | \quad 2 \\ \hline \end{array}$$

$$5 \quad (-3) \quad | \quad 5-3 = 2$$

Check: $-5 - \sqrt{15-2(-5)} = 0$

$x = -5$

$$-5 - \sqrt{15+10} = 0$$

$$-5 - \sqrt{25} = 0$$

$$-5 - 5 = 0$$

$$-10 \neq 0$$

Reject -5

$x = 3$

$$3 - \sqrt{15-2(3)} = 0$$

$$3 - \sqrt{15-6} = 0$$

$$3 - \sqrt{9} = 0$$

$$3 - 3 = 0$$

$$0 = 0$$

Solution
 $x = 3$

1.6

$$\left(\sqrt[5]{x} \right)^3 = \sqrt[5]{x^3} = x^{\frac{3}{5}}$$

Day 1

(3)

$$\textcircled{a} \left(x^{\frac{3}{5}} \right)^{\frac{5}{3}} = (27)^{\frac{5}{3}}$$

$$x^{\frac{5}{5}} = \left[(27)^{\frac{1}{3}} \right]^5$$

$$x = 3^5$$

$$x = 243$$

$$\sqrt{x} = 9$$

$$\left(x^{\frac{1}{2}} \right)^2 = (9)^2$$

$$x = 81$$

$$\textcircled{b} \left[(x-4)^{\frac{2}{3}} \right]^{\frac{3}{2}} = 16^{\frac{3}{2}}$$

$$x-4 = \left(16^{\frac{1}{2}} \right)^3$$

$$x-4 = (\pm 4)^3$$

$$x-4 = \pm 64$$

+4

+4

$$x = +64 + 4$$

$$x = -64 + 4$$

$$x = 68$$

$$x = -60$$