

Lesson 53 Objective- SWBAT solve radical and rational exponent equations.

Kickoff
Complete questions 22-24 on yesterdays worksheet

$22x = \sqrt[3]{243x^3y^3}$
 $\sqrt[3]{27x^3 \cdot 9y^3}$
 $\sqrt[3]{27x^3} \cdot \sqrt[3]{9y^3}$
 $3x \cdot \sqrt[3]{9y^3}$
 $3x \cdot 3\sqrt[3]{y^3}$
 $9x\sqrt[3]{y^3}$

$23x = \sqrt[3]{256x^3}$
 $\sqrt[3]{64x^3 \cdot 4}$
 $\sqrt[3]{64x^3} \cdot \sqrt[3]{4}$
 $4x \cdot \sqrt[3]{4}$
 $4x\sqrt[3]{4}$

$24x = \sqrt[3]{162x^3}$
 $\sqrt[3]{27x^3 \cdot 6}$
 $\sqrt[3]{27x^3} \cdot \sqrt[3]{6}$
 $3x \cdot \sqrt[3]{6}$
 $3x\sqrt[3]{6}$

⑪ $3\sqrt{5mn}$
 ⑫ $-30v \sqrt[4]{4uv^2}$
 ⑬ $36b^2a$
 ⑭ $-2\sqrt[4]{9mn}$
 ⑮ $24x^2y\sqrt{5x}$
 ⑯ $6\sqrt[3]{80x^3y^2}$
 $\sqrt[3]{16x^3y^2 \cdot 5x}$
 $\sqrt[3]{16x^3y^2} \cdot \sqrt[3]{5x}$
 $2\sqrt[3]{4x^3y^2} \cdot \sqrt[3]{5x}$
 $2\sqrt[3]{4x^3y^2} \sqrt[3]{5x}$

Solving Radical Equations and Rational Exponent Equations

Solving Radical Equations

- 1) Isolate the radical
- 2) Square root → square
cube root → cube.
- 3) DO to Both SIDES and Solve
- 4) Check

Examples.

1) $x = 3 + \sqrt{2x-3}$
 $-3 = -3$
 $(x-3)^2 = (\sqrt{2x-3})^2$
 $x^2 - 6x + 9 = 2x - 3$
 $-2x + 13 = -2x + 13$
 $x^2 - 8x + 12 = 0$
 $(x-2)(x-6) = 0$
 $x = 2$
 $x = 6$
 Check
 $x=2$
 $2 = 3 + \sqrt{2(2)-3}$
 $2 = 3 + \sqrt{1}$
 $2 = 3 + 1$
 $2 = 4$ (Incorrect)

2) $\sqrt[3]{2x-6} = 6$
 $2x-6 = 216$
 $2x = 222$
 $x = 111$
 Check
 $\sqrt[3]{2(111)-6} = 6$
 $6 = 6$

Equations with Rational Exponents

- 1) Isolate the variable and exponent
- 2) Find the reciprocal of the exp.
- 3) Multiply both sides by the reciprocal exp.
- 4) Solve
- 5) Check

*** If the root of the reciprocal is even put ±! Ex: $x^{\frac{2}{3}} \rightarrow \sqrt[3]{\frac{3}{2}}$

Examples:

3) $(x+27)^{\frac{2}{3}} = 4$ (Power root)
 $x+27 = \pm 8$
 $x+27 = 8$ $x+27 = -8$
 $x = -19$ $x = -35$
 Check
 $x = -19$ $(-19+27)^{\frac{2}{3}} = 4$
 $8^{\frac{2}{3}} = 4$
 $4 = 4$

4) $x^{\frac{2}{3}} = (10-2x)^{\frac{1}{3}} + 7$
 $(x-1)^{\frac{2}{3}} = (10-2x)^{\frac{1}{3}}$
 $x^2 - 2x + 1 = 10 - 2x$
 $x^2 - 9 = 0$
 $(x+3)(x-3) = 0$
 $x = 3$
 Check
 $x = 3$ $x = 3$

Solve each of the following. Be sure to check for extraneous roots!!

1) $p = \sqrt{3p}$ 2) $n = \sqrt{14-n} + 8$

① $p = 0$ $p = 3$
 ② $n = 10$
 ③ $b = 3$, $b = 1$ ④ $r = 6$

$$3) \sqrt{2b-2} - b = -1$$

$$4) r - 1 = \sqrt{r+19}$$

$$5) \sqrt{4-2x} = \sqrt{3x-1}$$

$$6) \sqrt{3x-140} = \sqrt{\frac{x}{7}}$$

$$7) 343 = r^{\frac{3}{2}}$$

$$8) (3r + 13)^{\frac{1}{2}} = 7$$

$$9) (7k - 15)^{\frac{4}{3}} = 625$$

$$10) -507 = 5 - 2x^{\frac{4}{3}}$$

$$11) (16)^{\frac{4}{3}} = 256$$

$$12) -6 - (35 - n)^{\frac{4}{3}} = -22$$