NC
1. $32^{\frac{2}{5}}$ $\left(\sqrt[5]{32}\right)^2 = 4$

$i = i$
$i^2 = -1$
$i^3 = -i$
$i^4 = 1$

NC
2. $\dfrac{9}{(3-2i)} \dfrac{(3+2i)}{(3+2i)} = \dfrac{27+18i}{9+6i-6i-4i^2}$

$\dfrac{27 + 18i}{13}$

C
3. $\left(\sqrt[5]{1000}\right)^4$ 251.19

NC
4. i^{14} $\boxed{-1}$ $i^{12} = 1$ $i^{12}i^2$

Objective:

Today we will...
- Solve Radical Equations
- Solve Equations with Integer Exponents
- Solve Equations with Rational Exponents

Agenda:
- Solving Radical Equations Notes/Examples
- Independent Practice
- Quiz Review

Solving Radical Equations

1) Get Radical by itself

2) Raise both sides to the power of the index

3) Solve

Ex. 1 $-6 = -10 + \sqrt{3r - 5}$

$+10 \qquad +10$

$4^2 = \sqrt{3r - 5}^{\cancel{2}}$

$16 = 3r - 5$

$+5 \qquad\qquad +5$

$21 = 3r$

$r = 7$

Ex 2.

$$\frac{24}{6} = \frac{6\sqrt[3]{-2-3a}}{6}$$

$$4 = \sqrt[3]{-2-3a}^{\,3}$$

$$64 = -2 - 3a$$

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

$$\frac{66}{-3} = \frac{-3a}{-3}$$

$$\boxed{-22 = a}$$

Ex.3- You Try

$$2\sqrt[5]{9x} + 4 = 10$$

$$\underline{2\sqrt[5]{9x}} \overset{-4}{} = \underline{6} \overset{-4}{}$$

$$\left(\sqrt[5]{9x}\right)^5 = (3)^5$$

$$\frac{9x}{9} = \frac{243}{9}$$

$$x = 27$$

$$2x + 4 = 10$$

Ex. 4

$$\sqrt[x]{1 - 6x} = \sqrt[x]{x + 1}$$

$$1 - 6x = x + 1$$
$$-1 + 6x \qquad + 6x - 1$$

$$\frac{0}{7} = \frac{7x}{7}$$

$$\boxed{x = 0}$$

Ex. 5

$$\sqrt{5n-1}^2 = (n-3)^2$$

$$5n-1 = (n-3)(n-3)$$

$$5n-1 = n^2 - 3n - 3n + 9$$

$$5n-1 = n^2 - 6n + 9$$

(Unit 2)

1) Get Variable with exponent (n) by itself

$$2x^3 =$$

2) Take nth root of both sides

3) Simplify radical completely

** Anytime you introduce an even radical, you must precede it with $\pm$

Ex 2) $2x^2 + 13 = 53$

$ \underline{-13 \quad -13}$

$2x^2 = 40$

$\sqrt{x^2} = \sqrt{20}$

$x = \pm\sqrt{20}$

$x = \pm\sqrt{4}\sqrt{5}$

$x = \pm 2\sqrt{5}$

Ex. 3 $-2x^3 + 19 = -35$

$$\frac{-2x^3}{+2} = \frac{-54}{-2}$$

$$\sqrt[3]{x^3} = \sqrt[3]{27}$$

$$\boxed{x = 3}$$

Ex. 4 $\sqrt{(x + 4)^2} = \sqrt{50}$

$$X + 4 = \pm\sqrt{50}$$
$$ -4 \quad\quad -4$$

$X = -4 + 5\sqrt{2}$

$X = -4 - 5\sqrt{2}$

$$X = -4 \pm \sqrt{50}$$

$$\boxed{X = -4 \pm 5\sqrt{2}}$$

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

$$3x - 15 = \pm\sqrt{27}$$

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

$$\begin{array}{r} +15 \\ \dfrac{3x}{3} = \dfrac{15 \pm 3\sqrt{3}}{3} \end{array}$$

$$\boxed{x = 5 \pm \sqrt{3}}$$

Solving equations with Rational Exponents

Fraction

1) Get variable with rational exponent by itself

2) Raise both sides to the reciprocal of the rational exponent

3) Solve

$$\left(x^5\right)^3 = x^{15}$$

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

Ex.1

$$\left(27\right)^{\frac{2}{3}}=\left(n^{\frac{3}{2}}\right)^{\frac{2}{3}}$$

$$27^{2/3} = n$$

$$\left(\sqrt[3]{27}\right)^{2} = n$$

$$9 = n$$

Ex. 2

$$x^{\frac{2}{3}} - 9 = 16$$

$$+9 \quad +9$$

$$\left(x^{\frac{2}{3}}\right)^{\frac{3}{2}} = (25)^{\frac{3}{2}}$$

$$X = 25^{\frac{3}{2}}$$

$$X = \left(\sqrt{25}\right)^3$$

$$\boxed{X = 125}$$

Ex. 3 - You try $\left((x+1)^{4/3}\right)^{\frac{3}{4}}=(16)^{\frac{3}{4}}$

$$X+1 = 16^{\frac{3}{4}}$$

$$X+1 = \left(\sqrt[4]{16}\right)^3$$

$$X+1 = (2)^3 \quad \boxed{X=7}$$

$$X+1 = 8$$

Ex. 4

$$5(x-8)^{\frac{3}{4}} = 40$$

$$\frac{5(x-8)^{\frac{3}{4}}}{5} = \frac{40}{5}$$

$$\left((x-8)^{\frac{3}{4}}\right)^{4/3} = (8)^{4/3}$$

$$x-8 = \left(\sqrt[3]{8}\right)^4$$

$$x-8 = 16 \qquad \boxed{x = 24}$$
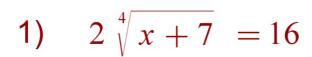
Wrap Up

Vocab:

What does <u>rational</u> mean?

What does <u>nth root</u> mean?

<u>What are the steps for solving:</u>

- Radical Equations?
- Equations with integer exponents?
- Equations with rational exponents?

Lesson Check

1) $2\sqrt[4]{x+7} = 16$

$(3, 6)$

2) $9x^2 = 360$

3) $343 = (x-24)^{\frac{3}{2}}$