Unit 9 Day 6

Solving Radical Equations

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HW 9-5

1. You can take the cube root of -27 followed by raising that answer to the fourth power making the answer 81.
2. $3x^2$
3. a. $x^{\frac{8}{15}}$ b. $3^{\frac{5}{12}}$
4. a. $\frac{1}{a^{\frac{1}{3}}}$ or $\frac{1}{\sqrt[3]{a}}$ b. $\frac{1}{b^{\frac{7}{16}}}$ or $\frac{1}{\sqrt[16]{b^7}}$ c. $\frac{1}{b^{\frac{7}{16}}}$ or $\frac{1}{\sqrt[16]{b^7}}$
5. -1 index 3 radicand -1
6. 3 index 4 radicand 81
7. $4a^2b^2\sqrt{2b}$
8. $2a^3b^4\sqrt[4]{3b^2}$
9. $3x^3$
10. $a^4\sqrt{7}$
11. $2b^3$

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Name________________________________ Alg 2 HW 9-5

1. Explain how $(-27)^{\frac{4}{3}}$ can be evaluated using properties of rational exponents to result in and integer answer.

See explanation on first slide

2. Given the equal terms $\sqrt[5]{27x^6}$ and $y^{\frac{3}{5}}$, determine and state y, in terms of x. State your answer in simplest form.

$\sqrt[5]{27x^6} = y^{3/5}$

$(27x^6)^{1/5 \cdot 5/3} = y^{3/5 \cdot 5/3}$

$(27x^6)^{1/3} = y$

$y = \sqrt[3]{27x^6} = 3x^2$

3. Write as a single term with a rational exponent.

a. $\sqrt[5]{x} \bullet \sqrt[3]{x}$

$x^{1/5} \cdot x^{1/3}$

$x^{3/15} \cdot x^{5/15}$

$x^{8/15}$

b. $\sqrt[4]{3} \bullet \sqrt[6]{3}$

$3^{1/4} \cdot 3^{1/6}$

$3^{3/12} \cdot 3^{2/12}$

$3^{5/12}$

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4. Using the rules for positive and negative exponents, simplify the following expressions.

a. $\left(\dfrac{a^{\frac{1}{3}}}{a^{\frac{1}{6}}}\right)^{-2}$

$= \left(\dfrac{a^{1/6}}{a^{1/3}}\right)^2 = \dfrac{a^{2/6}}{a^{2/3}} = \dfrac{1}{a^{1/3}}$ or $\dfrac{1}{\sqrt[3]{a}}$

b. $\left(\dfrac{b^2}{b^{\frac{9}{8}}}\right)^{-\frac{1}{2}} = \left(\dfrac{b^{9/8}}{b^2}\right)^{1/2}$

$= \dfrac{b^{9/16}}{b^1} = \dfrac{1}{b^{7/16}}$ or $\dfrac{1}{\sqrt[16]{b^7}}$

c. $\left(b^{\frac{7}{8}}\right)^{-\frac{1}{2}} = b^{\frac{-7}{16}}$

$= \dfrac{1}{b^{7/16}}$ or $\dfrac{1}{\sqrt[16]{b^7}}$

Simplify. Identify the index and the radicand.

5. $\sqrt[3]{-1}$

Answer -1

Index 3

Radicand -1

6. $\sqrt[4]{81}$

Answer 3

Index 4

Radicand 81

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Simplify.

7. $\sqrt{32a^4b^5}$

$= \sqrt{16a^4b^4}\sqrt{2b}$

$= 4a^2b^2\sqrt{2b}$

8. $\sqrt[4]{48a^{12}b^6}$

$= \sqrt[4]{16a^{12}b^4}\sqrt[4]{3b^2}$

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

9. $\sqrt[3]{27x^9} = 3x^3$

Divide and Simplify.

10. $\dfrac{\sqrt{14a^{13}}}{\sqrt{2a^5}} = \sqrt{\dfrac{14a^{13}}{2a^5}} = \sqrt{7a^8}$

$= a^4\sqrt{7}$

11. $\dfrac{\sqrt[4]{32b^{20}}}{\sqrt[4]{2b^8}} = \sqrt[4]{\dfrac{32b^{20}}{2b^8}}$

$= \sqrt[4]{16b^{12}} = 2b^3$

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Solving Radical Equations

Unit 9 Day 6

Warmup:

Express the fraction $\dfrac{2x^{\frac{3}{2}}}{(16x^4)^{\frac{1}{4}}}$ in simplest radical form.

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Solving Radical Equations Unit 9 Day 6

Steps:

1. Isolate the expression containing the radical. (Be sure to have only one radical per side.)
2. Square both sides.
3. Solve the resulting equation. linear quadratic(x^2)
4. Check (extraneous roots!) ① Always use the original equation. ② No ± in a check ③ Never cross the equal sign.
5. Write the solution set { }

Example:

$\sqrt{2x+1} = 3$

$(\sqrt{2x+1})^2 = (3)^2$

$2x+1 = 9$
$-1 \quad -1$
$\frac{2x}{2} = \frac{8}{2}$
$x = 4$ $\{4\}$

Check:
$\sqrt{8+1} = 3$
$\sqrt{9} = 3$
$3 \overset{\checkmark}{=} 3$

Solve and check.

1. $\sqrt{x^2+7} = x+1$

$(\sqrt{x^2+7})^2 = (x+1)^2$
$x^2+7 = (x+1)(x+1)$
$x^2+7 = x^2+x+x+1$
$x^2+7 = x^2+2x+1$ $\boxed{=0}$
$-x^2 \quad -x^2$
$7 = 2x+1$
$-1 \quad -1$
$\frac{6}{2} = \frac{2x}{2}$
$x = 3$
$\{3\}$

Check
$\sqrt{9+7} = 3+1$
$\sqrt{16} = 4$
$4 \overset{\checkmark}{=} 4$

2. $\sqrt{x+7} - 1 = x$
$+1 \quad +1$
$(\sqrt{x+7})^2 = (x+1)^2$
$x+7 = (x+1)(x+1)$
$x+7 = x^2+2x+1$
$-x-7 \quad -x-7$
$x^2+x-6 = 0$ P: -6 S: 1 3, -2
$(x+3)(x-2) = 0$
$x+3=0 \mid x-2=0$
$x=-3 \mid x=2$
reject

Check $x=-3$
$\sqrt{-3+7} - 1 = -3$
$\sqrt{4} - 1 = -3$
$2-1 = -3$
$1 \neq -3$

Check $x=2$
$\sqrt{2+7} - 1 = 2$
$\sqrt{9} - 1 = 2$
$3-1 = 2$
$2 \overset{\checkmark}{=} 2$
$\{2\}$

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3. $\sqrt{3x-4} - \sqrt{2x+3} = 0$
$+\sqrt{2x+3} \quad +\sqrt{2x+3}$
$(\sqrt{3x-4})^2 = (\sqrt{2x+3})^2$
$3x-4 = 2x+3$
$-2x+4 \quad -2x+4$
$x = 7$
$\{7\}$

Check
$\sqrt{21-4} - \sqrt{14+3} = 0$
$\sqrt{17} - \sqrt{17} = 0$
$0 \overset{\checkmark}{=} 0$

4. $\sqrt{3x+13} - 5 = x$
$+5 \quad +5$
$(\sqrt{3x+13})^2 = (x+5)^2$
$3x+13 = (x+5)(x+5)$
$3x+13 = x^2+10x+25$
$-3x-13 \quad -3x-13$
✓ $x^2+7x+12 = 0$ P: 12 S: 7 3, 4
$(x+3)(x+4) = 0$
$x+3=0 \mid x+4=0$
✓ $x=-3 \mid x=-4$

Check
✓ $x=-3$
$\sqrt{-9+13} - 5 = -3$
$\sqrt{4} - 5 = -3$
$2-5 = -3$
$-3 \overset{\checkmark}{=} -3$

✓ $x=-4$
$\sqrt{-12+13} - 5 = -4$
$\sqrt{1} - 5 = -4$
$1-5 = -4$
$-4 \overset{\checkmark}{=} -4$

✓ $\{-4, -3\}$

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

$-x \quad -x$

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

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

$2x+1 = 1-2x+x^2$

$-2x-1 \quad -1-2x$

$x^2-4x=0$ *Think GCF

$x(x-4)=0$

$x=0$ | $x-4=0$, $x=4$

Check

$x=0$

$\sqrt{0+1}+0=1$

$\sqrt{1}+0=1$

$1 \stackrel{\checkmark}{=} 1$

$\{0\}$

reject

$x=4$

$\sqrt{8+1}+4=1$

$\sqrt{9}+4=1$

$3+4=1$

$7\neq 1$

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