HW #10 - due Fri, 10/2
5.7 #35-75odd Solving equations by factoring

HW #11 - due Mon, 10/5
6.1 #39-79 odd Simplifying rational expressions

HW #12 - due Fri, 10/8
6.2 #3-95 odd Operations on rational expressions
6.6 #5-25 odd Literal Equations

7.1 #85-113 odd Rational Exponents and Radical Expressions
39-73 odd, 125-149 odd
7.2 #11-21 odd, 43-51 odd, 57-65 odd, 85-91 odd, 97-103 odd,113-121 odd
8.2 #59-69 odd

Simplify.

$$\frac{ab^3c^5}{a^4bc^7} = \boxed{\frac{b^2}{a^3c^2}}$$

Simplify.

$$(x^{-1}y^2)^{-3}(x^2y^{-4})^{-3} = x^3y^{-6}x^{-6}y^{12} = x^{-3}y^6 = \boxed{\frac{y^6}{x^3}}$$

7.1 Rational Exponents & Radical Expressions

$m, n \in \mathbb{Z}^+$; $a^{1/n} \in \mathbb{R}$

positive integers   real

1. $a^{m/n} = (a^m)^{\frac{1}{n}} = \left(a^{\frac{1}{n}}\right)^m$

$\frac{m}{n} = \frac{m}{1} \cdot \frac{1}{n}$

$a \in \mathbb{R}$; $n \in \mathbb{Z}^+$

2. $a^{\frac{1}{n}} = \sqrt[n]{a}$

"n^{th} root of a" is the number that when raised to the n^{th} power (multiplying it by itself n times) equals a.

understood 2

$x^{1/2} = \sqrt{x}$

$x^{1/3} = \sqrt[3]{x}$

$a^{1/n} \in \mathbb{R}$

$$a^{\frac{m}{n}} = \begin{cases} (a^m)^{\frac{1}{n}} = \sqrt[n]{a^m} \\ \left(a^{\frac{1}{n}}\right)^m = \left(\sqrt[n]{a}\right)^m \end{cases}$$

* numerator of exponent stays an exponent, denominator is a root

special case:

$\cancel{\sqrt[n]{a^n} = a^{\frac{n}{n}} = a^1 = a}$

$$\sqrt[n]{a^n} = \begin{cases} a, & \text{if } n \text{ is odd} \\ |a|, & \text{if } n \text{ is even} \end{cases}$$

$\sqrt[3]{2^3} = \sqrt[3]{8} = 2$

$\sqrt[3]{(-2)^3} = \sqrt[3]{-8} = -2$

$\sqrt[2]{3^2} = \sqrt[2]{9} = 3 = |3|$

$\sqrt[2]{(-3)^2} = \sqrt[2]{9} = 3 = |-3|$

$\sqrt[n]{x^n} = |x|$ for n even

$(-1)^{odd} = -1$

$(-1)^{even} = 1$

$\sqrt{-2}$ is not a real #

(even roots of negative #'s are imaginary)

$\sqrt{x}$ domain is $[0, \infty)$

Rewrite as radical.

94. $(a^2b^4)^{3/5}$

$= a^{6/5}b^{12/5} = (a^6b^{12})^{1/5} = \sqrt[5]{a^6b^{12}}$

simplified . . . $= \sqrt[5]{a^5a^1b^{10}b^2} = \sqrt[5]{\underline{a^5}a^1\underline{(b^2)^5}b^2}$

$= \boxed{ab^2\sqrt[5]{ab^2}}$

rewrite as exponent

104. $\sqrt[4]{a^3} = a^{3/4}$

110. $-\sqrt[4]{4x^5}$

Simplify.

$$\sqrt[3]{81x^5y^6} = \sqrt[3]{\underline{3^3}\cdot 3^1 \cdot \underline{x^3}\cdot x^2 \cdot \underline{(y^2)^3}}$$

$$= \boxed{3xy^2\sqrt[3]{3x^2}}$$

Simplify.

$$\sqrt[5]{96x^{12}y^7z^{15}}$$

$$= \sqrt[5]{3\cdot 2^5 (x^2)^5 x^2 y^5 y^2 (z^3)^5}$$

$$= \boxed{2x^2yz^3\sqrt[5]{3x^2y^2}}$$

$x^{12} = x^{10}x^2$

$= (x^2)^5 x^2$

$y^7 = y^5 \cdot y^2$

$z^{15} = (z^3)^5$

$96 = 3\cdot 32$

$= 3\cdot 2\cdot 16$

$= 3\cdot 2\cdot 2\cdot 8$

$= 3\cdot 2\cdot 2\cdot 2\cdot 2\cdot 2$

$= 3\cdot 2^5$

7.1

38. $\left(b^{\frac{2}{3}} \cdot b^{\frac{1}{6}}\right)^{6} = b^{\frac{2}{\cancel{3}} \cdot \frac{\cancel{6}^{2}}{1}} \cdot b^{\frac{1}{6} \cdot \frac{6}{1}} = b^{4} b^{1}$

$= \boxed{b^{5}}$

66. $\left(\dfrac{49c^{5/3}}{a^{-1/4} b^{5/6}}\right)^{-3/2}$ $\quad 49^{3/2} = \sqrt[2]{49^{3}} = \left(\sqrt{49}\right)^{3}$

$$\begin{array}{r} 280 \\ 63 \\ \hline 343 \end{array}$$

$= \dfrac{49^{-3/2} c^{-5/2}}{a^{3/8} b^{-5/4}} = \dfrac{b^{5/4}}{49^{3/2} a^{3/8} c^{5/2}}$

$= \dfrac{b^{5/4}}{343 a^{3/8} c^{5/2}}$

72. $b^{-2/5}\left(b^{-3/5} - b^{7/5}\right)$

$= b^{-2/5} b^{-3/5} - b^{-2/5} b^{7/5}$

$= b^{-5/5} - b^{5/5} = b^{-1} - b = \boxed{\frac{1}{b} - b}$

$= \frac{1-b^2}{b}$

$$\sqrt[n]{x^n} = \begin{cases} x, & \text{if } n \text{ is odd} \\ |x|, & \text{if } n \text{ is even} \end{cases}$$

$\sqrt[n]{x}$ = the # that we raise to the n^{th} power to get x

e.g. $\sqrt[3]{64} = 4$; $\sqrt{81} = 9$

understood to be $\sqrt[2]{81}$

$\sqrt[3]{8} = 2$

$\sqrt[3]{2^3}$

$\sqrt[4]{x^4} = |x|$

$\sqrt[3]{-8} = -2$

$\sqrt[2]{4} = 2$

$\sqrt[2]{(-2)^2} = |-2| = 2$

114. $\sqrt[2]{x^{16}} = \sqrt[2]{(x^8)^2} = |x^8| = \boxed{x^8}$

118. $\sqrt{x^2y^{10}} = \sqrt{(x)^2(y^5)^2} = \boxed{|xy^5|}$

124. $-\sqrt[3]{x^{15}y^{3}} = -\sqrt[3]{(x^5)^3 y^3}$

$= \boxed{-x^5 y}$

136. $\sqrt[3]{-64x^9y^{12}} = \sqrt[3]{(-4)^3(x^3)^3(y^4)^3}$

$= \boxed{-4x^3y^4}$

146. $\sqrt[4]{81x^4y^{20}} = \sqrt[4]{(3)^4 x^4 (y^5)^4}$

$\sqrt[n]{x^n} = \begin{cases} |x|, & n \text{ even} \\ x, & n \text{ odd} \end{cases}$

$= |3xy^5| = \boxed{3|xy^5|}$

150. $\sqrt[5]{243x^{10}y^{40}} = \sqrt[5]{(3)^5(x^2)^5(y^8)^5}$

$= \boxed{3x^2y^8}$