Unit 3 Day 3

Rational Exponents

Warm Up
Complete Notes p. 7

$\left(x^{\frac{2}{3}}\right)^{-3}$	$\dfrac{1}{x^2}$	$\left(x^{-\frac{4}{7}}\right)^{7}$	$\dfrac{1}{x^4}$
$\left(3x^{\frac{2}{3}}\right)^{-1}$	$\dfrac{1}{3x^{\frac{2}{3}}}$	$5\left(x^{\frac{2}{3}}\right)^{-1}$	$\dfrac{5}{x^{\frac{2}{3}}}$
$(-27x^{-9})^{\frac{1}{3}}$	$\dfrac{-3}{x^3}$	$(-32x^{15})^{\frac{1}{5}}$	$-2x^3$
$\left(\dfrac{x^3}{y^{-1}}\right)^{-\frac{1}{4}}$	$\dfrac{1}{x^{\frac{3}{4}}y^{\frac{1}{4}}}$	$\left(\dfrac{x^2}{y^{-10}}\right)^{\frac{1}{2}}$	xy^5
$\left(x^{\frac{1}{2}}y^{-\frac{2}{3}}\right)^{-6}$	$\dfrac{y^4}{x^3}$	$\left(x^{\frac{2}{3}}y^{-\frac{1}{6}}\right)^{12}$	$\dfrac{x^8}{y^2}$
$\left(\dfrac{x^{\frac{1}{4}}}{y^{-\frac{3}{4}}}\right)^{12}$	$x^3\,y^9$	$\left(\dfrac{x^{-\frac{2}{3}}}{y^{-\frac{1}{3}}}\right)^{15}$	$\dfrac{y^5}{x^{10}}$

Homework Answers

7) $\sqrt[5]{224r^7}$ $2r\sqrt[5]{7r^2}$

8) $\sqrt[3]{24m^3}$ $2m\sqrt[3]{3}$

9) $\sqrt{392x^2}$ $14x\sqrt{2}$

10) $\sqrt{512x^2}$ $16x\sqrt{2}$

11) $\sqrt[4]{405x^3y^2}$ $3\sqrt[4]{5x^3y^2}$

12) $\sqrt[3]{-16a^3b^8}$ $-2ab^2\sqrt[3]{2b^2}$

13) $\sqrt[4]{128x^7y^7}$ $2xy\sqrt[4]{8x^3y^3}$

14) $\sqrt[3]{16xy}$ $2\sqrt[3]{2xy}$

15) $\sqrt[6]{448x^7y^7}$ $2xy\sqrt[6]{7xy}$

16) $\sqrt[3]{56x^5y}$ $2x\sqrt[3]{7x^2y}$

Homework Answers

$9\sqrt{3} + 2\sqrt{3}$ $(9+2)\sqrt{3}$ $\boxed{11\sqrt{3}}$	$5\sqrt{2} + 2\sqrt{3}$ $\boxed{5\sqrt{2} + 2\sqrt{3}}$ not "like" terms	$3\sqrt{7} - 7\sqrt[3]{7}$ $\boxed{3\sqrt{7} - 7\sqrt[3]{7}}$ not "like" terms
$3\sqrt{32} + 2\sqrt{50}$ $3\sqrt{16}\sqrt{2} + 2\sqrt{25}\sqrt{2}$ $3\cdot 4\sqrt{2} + 2\cdot 5$ $12\sqrt{2} + 10\sqrt{2}$ $\boxed{22\sqrt{2}}$	$\sqrt{200} - \sqrt{72}$ $\sqrt{100}\sqrt{2} - \sqrt{36}\sqrt{2}$ $10\sqrt{2} - 6\sqrt{2}$ $\boxed{4\sqrt{2}}$	$14\sqrt[3]{xy} - 3\sqrt[3]{xy}$ $\boxed{11\sqrt[3]{xy}}$
$4\sqrt[3]{81} - 3\sqrt[3]{72} - 3\sqrt[3]{24}$ $4\sqrt[3]{27}\sqrt[3]{3} - 3\sqrt[3]{8}\sqrt[3]{9} - 3\sqrt[3]{8}\sqrt[3]{3}$ $4\cdot 3\sqrt[3]{3} - 3\cdot 2\sqrt[3]{9} - 3\cdot 2\sqrt[3]{3}$ $12\sqrt[3]{3} - 6\sqrt[3]{9} - 6\sqrt[3]{3}$ $\boxed{6\sqrt[3]{3} - 6\sqrt[3]{9}}$	$3\sqrt{12} + 7\sqrt{75} - \sqrt{54}$ $3\sqrt{4}\sqrt{3} + 7\sqrt{25}\sqrt{3} - 1\sqrt{9}\sqrt{6}$ $3\cdot 2\sqrt{3} + 7\cdot 5\sqrt{3} - 3\sqrt{6}$ $6\sqrt{3} + 35\sqrt{3} - 3\sqrt{6}$ $\boxed{41\sqrt{3} - 3\sqrt{6}}$	Simplify $\quad 2\sqrt{9x} - 7\sqrt{9x}$ $2\sqrt{9}\sqrt{x} - 7\sqrt{9}\sqrt{x}$ $2\cdot 3\sqrt{x} - 7\cdot 3\sqrt{x}$ $6\sqrt{x} - 21\sqrt{x}$ A. $-15\sqrt{x}$ B. $-15x$ C. $-5x$ D. $-5\sqrt{x}$

Homework Answers

$5\sqrt{32} - 7\sqrt{8}$

$5\sqrt{16}\sqrt{2} - 7\sqrt{4}\sqrt{2}$

$5 \cdot 4\sqrt{2} - 7 \cdot 2\sqrt{2}$

$20\sqrt{2} - 14\sqrt{2}$

$\boxed{6\sqrt{2}}$

$-7\sqrt{11} + 3\sqrt{11}$

$\boxed{-4\sqrt{11}}$

Multiply $\sqrt[3]{25} \cdot \sqrt[3]{5}$. Simplify.

$\sqrt[3]{125}$

$\sqrt[3]{5 \cdot 5 \cdot 5}$

A. 25
B. $5\sqrt[3]{5}$
C. $5\sqrt[3]{25}$
D. 5

---

2) A garden has width $\sqrt{13}$ and length $7\sqrt{13}$. What is the perimeter of the garden in simplest radical form?

$7\sqrt{13}$

$\sqrt{13}$ $\sqrt{13}$

$7\sqrt{13}$
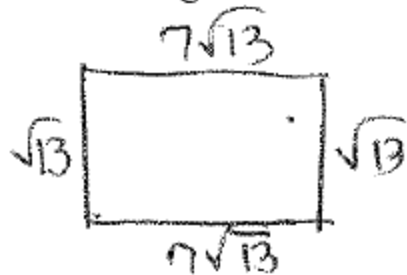
$7\sqrt{13} + 7\sqrt{13} + \sqrt{13} + \sqrt{13}$

$\boxed{16\sqrt{13}}$

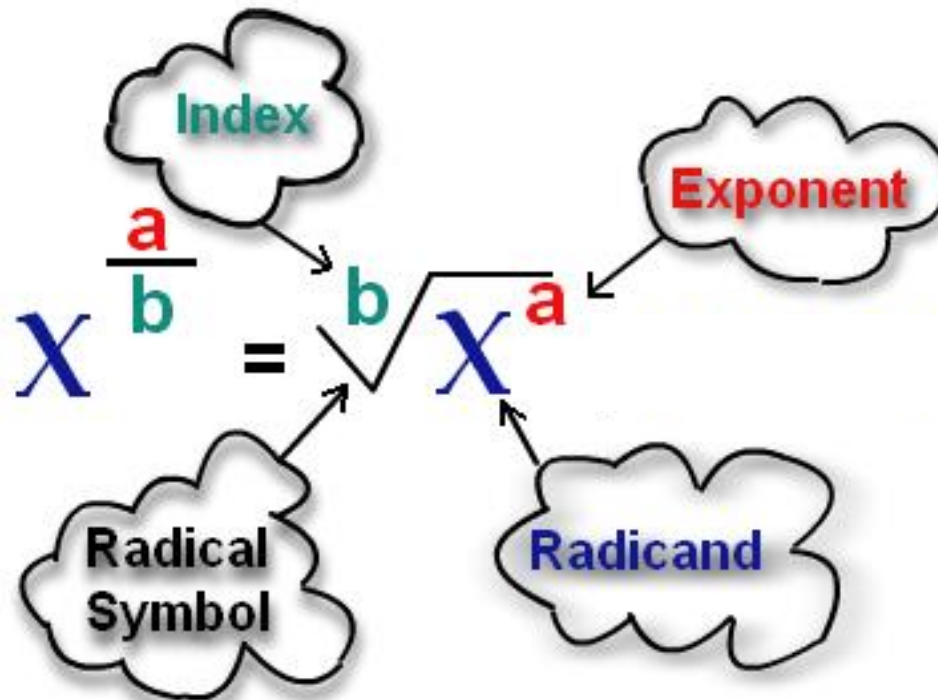# Tonight's Homework:
Packet p. 5 and 6 evens
Finish Notes p. 8 and top of p. 9

The Lesson: **Rational Exponents & Radicals….**

An expression containing a rational exponent can be written in an equivalent radical form.

$$X^{\frac{a}{b}} = \sqrt[b]{X^a}$$

Index

Exponent

Radical Symbol

Radicand

You try: Rewrite each of the following expressions in radical form.   We'll try the first column together!

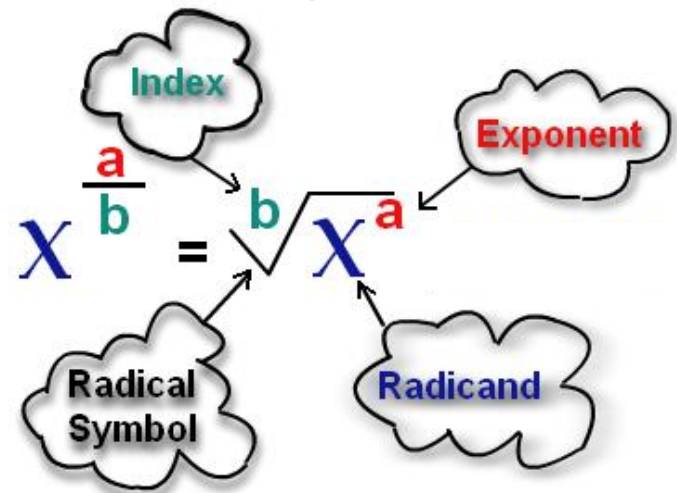| $x^{\frac{3}{2}}$	$(-27)^{\frac{2}{3}}$	$(16x)^{\frac{5}{4}}$	$y^{-9/8}$
$2a^{\frac{1}{4}}$	$4^{\frac{-7}{2}}$	$(3^{\frac{2}{5}})^5$	$x^{1.2}$

$$X^{\frac{a}{b}} = \sqrt[b]{X^a}$$

Index, Exponent, Radical Symbol, Radicand

Now, reverse the rule you developed to change radical expressions into rational expressions.

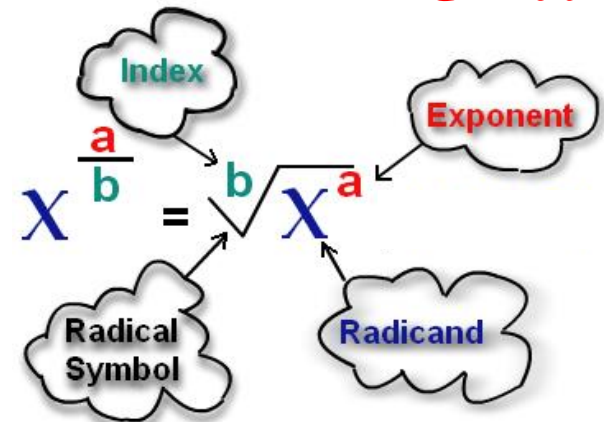We'll try the first column together!

$\sqrt[5]{2}$

$2^{\frac{1}{5}}$

$(\sqrt[3]{6})^5$

$6^{\frac{5}{3}}$

$(\sqrt{5})^7$

$5^{\frac{7}{2}}$

$\sqrt{7}$

$7^{\frac{1}{2}}$

$\sqrt[4]{9^3}$

$9^{\frac{3}{4}}$

$(\sqrt[7]{3x})^2$

$3^{\frac{2}{7}} x^{\frac{2}{7}}$

Index

Exponent

$$x^{\frac{a}{b}} = \sqrt[b]{x^a}$$

Radical Symbol

Radicand

Earlier today, you learned that when written in radical form, it's only possible to write two multiplied radicals as one if the index is the same.

However, if you convert the radical expressions into expressions with rational exponents, you CAN multiply or divide them!

Let's give it a try ☺
Write your final answer as a simplified radical.

We'll try the first column together!
   Write your answer as a **simplified radical** (if applicable)!

1. $\dfrac{12\sqrt[3]{y}}{4\sqrt{y}}$ $\dfrac{3}{\sqrt[6]{y}}$

4. $\sqrt[4]{x^{12}} \cdot \sqrt{y^{-2}}$ $\dfrac{x^3}{y}$

7. $\sqrt[7]{x^2} \cdot \sqrt[14]{x^3}$ $\sqrt{x}$

12

2. $\left(\dfrac{\sqrt[3]{a^2}}{\sqrt{b}}\right)^{-6}$ $\dfrac{b^3}{a^4}$

3. $\left(2\sqrt[4]{a}\right)^3 \cdot \sqrt{a^3}$

$8a^2\sqrt[4]{a}$

5. $\dfrac{\sqrt{64x^3}}{\sqrt[3]{512x^9}}$ $\dfrac{1}{x\sqrt{x}}$

6. $\sqrt[4]{625x^8}$

$5x^2$

8. $\dfrac{1}{\sqrt[3]{-27x^9}}$ $\dfrac{1}{-3x^3}$

9. $\left(\sqrt{x} \cdot \sqrt[3]{y^2}\right)^{-6}$

$\dfrac{1}{x^3 y^4}$

Mixed Review: Simplify each expression.

1. $\sqrt{75y} - 2\sqrt{27y} + \sqrt{45y}$

$-1\sqrt{3y} + 3\sqrt{5y}$

3. $2\sqrt{18a^2 b} \cdot 6\sqrt{3b^2}$

$36ab\sqrt{6b}$

2. $\sqrt{108yz^2} + 3\sqrt{98yz^2} + 2\sqrt{55yz^2}$

$6z\sqrt{3y} + 21z\sqrt{2y} + 2z\sqrt{55y}$

4. $\dfrac{3x^{-14}y^{11}}{18x^2}$

$\dfrac{y^{11}}{6x^{16}}$

Tonight's Homework:
Packet p. 5 and 6 evens
Finish Notes p. 8 and top of p. 9