Warm Up

1) For all x, $2(-3x)^2$ is equivalent to:

   A. $-36x^2$ $2(9x^2)$

   B. $-18x^2$

   C. $-6x^2$

   D. $18x^2$

   E. $36x^2$

2) For y≠0, $\dfrac{y^8}{y^2}$ is equivalent to:

   A. 1

   B. 4
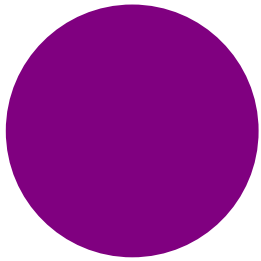
   C. y^3

   D. y^4

   E. y^6
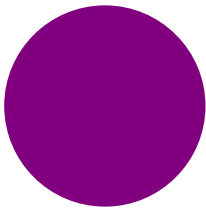
X   Tic Tac Toe   O

Homework Questions

Review

1) Rewrite using rational exponent notation.

$(\sqrt[4]{343})^5$ $343^{\frac{5}{4}}$

2) Rewrite using radical notation.

$42^{5/9}$ $\left(\sqrt[9]{42}\right)^5$

3) Evaluate without a calculator.

a) $(\sqrt[4]{256})^3$ b) $343^{-2/3}$ c) $27^{2/3}$

4^3 $\dfrac{1}{(\sqrt[3]{343})^2}$ $\left(\sqrt[3]{27}\right)^2$

64 $\dfrac{1}{7^2} = \dfrac{1}{49}$ 3^2

                                                            9

even more practice if needed
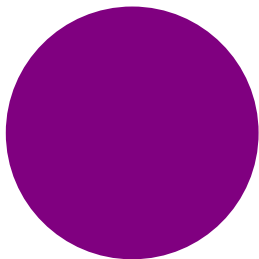
DLT

Bonus: What is the csc 60?

$\text{Sin } 60 = \dfrac{\sqrt{3}}{2}$ $\dfrac{2\sqrt{3}}{3}$

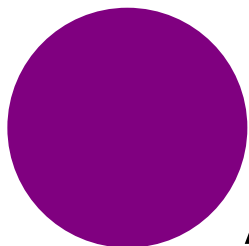$\sqrt[5]{(x+3)^4} = \sqrt[5]{16}$

$x + 3 = \pm 2$

$x + 3 = 2$ $x + 3 = -2$

$x = -1$ $x = -5$

Rewriting Radicals Grid

Chapter 6 Section 2

Apply Properties of Rational Exponents

*You will solve equations using nth roots.

*You will simplify expressions involving integer exponents.

*You will simplify expressions involving rational exponents.

Do you remember how to add & subtract fractions?

$\frac{16}{8} - \frac{15}{8} = \boxed{\frac{1}{8}}$

$2) -\frac{1}{3} + \frac{3 \cdot 3}{11 \cdot 3}$

$1) \; 2 - \frac{15}{8}$

$\frac{-11}{33} + \frac{9}{33} = \boxed{\frac{-2}{33}}$

$3) \; 4 - \frac{1}{5}$

Do you remember how to multiply fractions?

$$\frac{15}{16}$$

1) $\dfrac{2}{4} \cdot \dfrac{15}{8}$

$$\frac{-1}{11}$$

2) $-\dfrac{1}{3} \cdot \dfrac{3}{11}$

3) $4 \cdot \dfrac{1}{7}$

Let a and b be real numbers and let m and n be rational numbers. The following properties have the same names as those listed on page 330, but now apply to rational exponents as illustrated.

<u>6.2</u>

Property	**Example**
1. $a^m \cdot a^n = a^{m+n}$	$5^{1/2} \cdot 5^{3/2} = 5^{(1/2+3/2)} = 5^2 = 25$
2. $(a^m)^n = a^{mn}$	$(3^{5/2})^2 = 3^{(5/2 \cdot 2)} = 3^5 = 243$
3. $(ab)^m = a^m b^m$	$(16 \cdot 9)^{1/2} = 16^{1/2} \cdot 9^{1/2} = 4 \cdot 3 = 12$
4. $a^{-m} = \dfrac{1}{a^m},\ a \neq 0$	$36^{-1/2} = \dfrac{1}{36^{1/2}} = \dfrac{1}{6}$
5. $\dfrac{a^m}{a^n} = a^{m-n},\ a \neq 0$	$\dfrac{4^{5/2}}{4^{1/2}} = 4^{(5/2-1/2)} = 4^2 = 16$
6. $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m},\ b \neq 0$	$\left(\dfrac{27}{64}\right)^{1/3} = \dfrac{27^{1/3}}{64^{1/3}} = \dfrac{3}{4}$

Using the properties of exponents.

1) $7^{1/4} \cdot 7^{1/2}$

2) $(4^5 \cdot 4^{1/3})^2$

$\frac{1}{4} + \frac{1 \cdot 2}{2 \cdot 2}$

$\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$

$\boxed{7^{3/4}}$

$3 \cdot \frac{5}{1} + \frac{1}{3} \cdot$

$\frac{15}{3} + \frac{1}{3}$

$\left(4^{\frac{16}{3}} \right)^2 = 4^{\frac{32}{3}}$

$\frac{16}{3} \cdot \frac{2}{1}$

3) $\dfrac{5^1}{5^{1/3}}$

$\frac{3}{3} - \frac{1}{3}$ $\boxed{5^{2/3}}$

$3 \cdot \frac{1}{1} - \frac{1}{3}$

$\frac{3}{1} - \frac{1}{3}$

$\frac{3}{3} - \frac{1}{3} = \frac{2}{3}$

Using the properties of exponents.

1) $x^{3/4} \cdot x^{1/2}$ $x^{\frac{5}{4}}$

TOYO

2) $\left(\dfrac{2^{1/2}}{5^{1/2}} \right)^3$ $\dfrac{2^{\frac{3}{2}}}{5^{\frac{3}{2}}}$ or $\left(\dfrac{2}{5} \right)^{\frac{3}{2}}$

⭐ <u>What is "simplest form"?</u> ⭐

A radical with index *n* is in simplest form if the radicand has no perfect *n*th power as factors and any denominator has been rationalized.

$$\frac{1}{\sqrt{3}}$$

Simplifying a radical

1. $\sqrt{75}$

$\sqrt{25} \cdot \sqrt{3}$

$\boxed{5\sqrt{3}}$

2. $\sqrt{32}$

$\sqrt{16} \cdot \sqrt{2}$

$\boxed{4\sqrt{2}}$

3. $\sqrt{3} \cdot \sqrt{6}$

$\sqrt{18}$

$\sqrt{9} \cdot \sqrt{2}$

$\boxed{3\sqrt{2}}$

Homer Simpson	Spongebob Squarepants	Winnie the Pooh	Big Bird	Ronald McDonald
Tweety Bird	Simba	Pikachu	Belle	Bert
Wario	Pac-Man	Wolverine	The Minions	Woodstock

Properties of Radicals

Product property of radicals

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

Quotient property of radicals

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \ , \ b = 0$$

Ex: $\sqrt[3]{12} \cdot \sqrt[3]{18}$

$$\sqrt[3]{216}$$

$$6$$

Ex: $\dfrac{\sqrt[4]{80}}{\sqrt[4]{5}}$

$$\sqrt[4]{\frac{80}{5}}$$

$$\sqrt[4]{16}$$

$$2$$

Properties of Radicals

Product property of radicals

$$\sqrt[n]{a \cdot b} = \sqrt[n]{a} \cdot \sqrt[n]{b}$$

Quotient property of radicals

$$\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \ , \ b = 0$$

TOYO

#14

Examples:

1) $\sqrt{125}$

$\sqrt{25} \cdot \sqrt{5}$

$5\sqrt{5}$

3) $\sqrt[4]{96}$

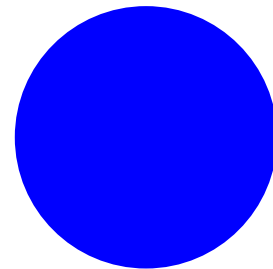$\sqrt[4]{16} \cdot \sqrt[4]{6}$

$2\sqrt[4]{6}$

2) $\sqrt[3]{135}$

$\sqrt[3]{27} \cdot \sqrt[3]{5}$

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

4) $\sqrt[3]{\frac{39}{64}}$

$\frac{\sqrt[3]{39}}{\sqrt[3]{64}} = \frac{\sqrt[3]{39}}{4}$

Simplifying a radical

1. $\sqrt{8}$

$\sqrt{4} \cdot \sqrt{2}$

$2\sqrt{2}$

2. $\sqrt{x^2}$ $\sqrt{x^2}\sqrt[3]{6}$

$(x^2)^{1/2} = x^1$ $\bigotimes$

3. $\sqrt[3]{64y^6}$

$4y^6$

$3\sqrt{27p^3q^{12}}$ $3.$

4. $(27p^3q^{12})^{1/3}$

$27^{1/3} p^{3 \cdot \frac{1}{3}} \cdot q^{12 \cdot \frac{1}{3}}$

$3p^1q^4$

Simplifying radicals

1. $\sqrt[3]{27x^2}$

$\sqrt{9}\ \sqrt{3}\ \sqrt{x^2}$

$\boxed{3\ x^1\sqrt{3}}$

$\sqrt[4]{16}\cdot\sqrt[4]{2}\ \sqrt[4]{x^4}$

$\boxed{2\ x^1\ \sqrt[4]{2}}$

2. $\sqrt[4]{32x^4}$

3. $\sqrt[4]{\dfrac{m^4}{n^8}}$

$\dfrac{\sqrt[4]{m^4}}{\sqrt[4]{n^8}}$

$\boxed{\dfrac{m^1}{n^2}}$

Write variable expression in simplest form.

a. $\sqrt[5]{4a^8b^{14}c^5}$

$$\boxed{a^1 b^2 c^1 \sqrt[5]{4 a^3 b^4}}$$

b. $\sqrt[3]{\dfrac{x^1}{y8}}$

$$\dfrac{\sqrt[3]{x}}{\sqrt[3]{y8}}$$

$$\sqrt{x}\,\sqrt{x}$$
$$\times$$

$$\dfrac{\sqrt[3]{x}}{y^2\sqrt[3]{y^2}} \cdot \dfrac{\sqrt[3]{y^2}}{\sqrt[3]{y^2}}$$

$$\dfrac{\sqrt[3]{xy^2}}{y^2 \cdot y^2}$$

Add and subtract expressions involving variables

a. $\dfrac{1}{5}\sqrt{w} + \dfrac{3}{5}\sqrt{w}$ b. $3xy^{1/4} - 8xy^{1/4}$

$\dfrac{4}{5}\sqrt{w}$

$-5xy^{1/4}$

$\sqrt[3]{54} = \sqrt[3]{27 \cdot 2}$

c. $12\sqrt[3]{2z^5} - z\sqrt[3]{54z^2}$

$12z^1 \sqrt[3]{2z^2} - 3z \quad \sqrt[3]{2z^2}$

$9z\sqrt[3]{2z^2}$

Add and subtract like radicals and roots

a. $\sqrt[4]{10} + 7\sqrt[4]{10}$

b. $2(8^{1/5})+10(8^{1/5})$

c. $\sqrt[3]{54} - \sqrt[3]{2}$

Add and subtract like radicals and roots   <u>TOYO</u>

a. $\sqrt{18} + 5\sqrt{2}$ b. $\sqrt[3]{5} - \sqrt[3]{40}$

c. 15 &16

Add and subtract expressions involving variables

TOYO

$\sqrt[3]{16} \cdot \sqrt[3]{2} \qquad \sqrt[3]{81} \cdot \sqrt[3]{2}$

a. $\sqrt[3]{9w^5} - w\sqrt[3]{w^3}$

b. $y\sqrt[4]{32x^6} + \sqrt[4]{162x^2y^4}$

$\boxed{2yx \sqrt[4]{2x^2} + 3y^1 \sqrt[4]{2x^2}}$

$3w^2 \sqrt[3]{w^1} - w^1 \cdot w^1 \sqrt[3]{w}$

$3w^2 \sqrt[3]{w} - 1w^2 \sqrt[3]{w}$

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

<u>Quick Check</u>

*Must answer an evaluation
flashcard before you leave.
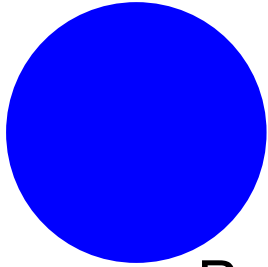
HOMEWORK

Page 424 # 3-27 odd, 43-55 odd, 84

*ws-packet

*Mad Minute Quiz-Monday/Tuesday