Name:______________________________ Date:__________

Class worksheet: Alg2H

Powers and Roots (II): Dividing, Adding, and more multiplication.

(book chapter 7, page 300 to 305)

Dividing:

$\sqrt{\frac{16}{9}} = \frac{4}{3}$ $\frac{\sqrt{16}}{\sqrt{9}} = \frac{4}{3}$

$\boxed{\sqrt[k]{\frac{a}{b}} = \frac{\sqrt[k]{a}}{\sqrt[k]{b}}}$ and $\frac{\sqrt[k]{a}}{\sqrt[k]{b}} = \sqrt[k]{\frac{a}{b}}$ $b \neq 0$ all nice.

$\sqrt{\frac{4}{9}} = \frac{2}{3}$

Elen.

$\sqrt[4]{\frac{16}{x^4}} = \frac{2}{|x|}$

$\sqrt{\frac{8x}{4y^2}} = \frac{\sqrt{4 \cdot 2x}}{2 \cdot |y|} = \frac{\sqrt{2x}}{|y|}$

$\sqrt[5]{\frac{32a^5}{243b^5}} = \frac{\sqrt[5]{2^5a^5}}{\sqrt[5]{3^5b^5}} = \frac{2}{3}\frac{a}{b}$

$\frac{\sqrt{200}}{\sqrt{2}} = \sqrt{\frac{200}{2}} = \sqrt{100} = 10$

$\frac{\sqrt[5]{64a^2b^6}}{\sqrt[5]{2a^7b}} = \sqrt[5]{\frac{64a^2b^6}{2a^7b}} = \sqrt[5]{\frac{32b^5}{a^5}} = \frac{2b}{a}$

Addition and subtraction:

$$\sqrt{a}+\sqrt{b} \cancel{\neq} \sqrt{a+b}$$

$$\sqrt{4}+\sqrt{9} = 2+3 = 5$$
$$\sqrt{4+9} = \sqrt{13} \quad ??$$

Only thing you can do: Take as common terms.

$$5\sqrt{3}+4\sqrt{3} = (5+4)\sqrt{3} = \boxed{9\sqrt{3}}$$

$$5\sqrt{12}+2\sqrt{3} = 5\cdot\sqrt{4\cdot 3}+2\sqrt{3} = 5\cdot\sqrt{4}\cdot\sqrt{3}+2\sqrt{3} =$$
$$= 10\cdot\sqrt{3}+2\sqrt{3} = \boxed{12\sqrt{3}}$$

$$3\cdot\sqrt[4]{32x^5}+5\sqrt[4]{2x} =$$
$$3\cdot\sqrt[4]{16\cdot x^4\cdot 2x}+5\sqrt[4]{2x} = 3\cdot 2|x|\sqrt[4]{2x}+5\sqrt[4]{2x} =$$
$$= \boxed{(6|x|+5)\sqrt[4]{2x}}$$

$$8\sqrt{12x^3}+3\sqrt{75x^3} = 16\cdot x\sqrt{3x}+3\cdot 5\cdot x\sqrt{3x} =$$
$$= \boxed{31\cdot x\cdot\sqrt{3x}}$$

Two challenging ① $\frac{2}{3}\sqrt{4{,}5}+\frac{3}{2}\sqrt[3]{16}+\frac{1}{4}\sqrt{72} = \frac{5}{2}\sqrt{2}+3\sqrt[3]{2}$

② w/o calculator, determine which is larger: $5\cdot\sqrt[3]{2}$ or $2\sqrt[3]{31}$?

$$\frac{5\sqrt[3]{2}}{2\sqrt[3]{31}} = \frac{\sqrt[3]{250}}{\sqrt[3]{248}} = \sqrt[3]{1,\ldots} > 1$$

Multiplication (again):

$$\sqrt{3}\left(\sqrt{2}+\sqrt{3}\right) = \sqrt{3}\cdot\sqrt{2}+\sqrt{3}\sqrt{3} = \boxed{\sqrt{6}+3}$$

$$\left(\sqrt{2}+1\right)\left(\sqrt{2}-1\right) = \left(\sqrt{2}\right)^2 - 1^2 = 2-1 = \boxed{1}$$

$$\left(\sqrt{3}+\sqrt{2}\right)^2 = \left(\sqrt{3}\right)^2 + 2\cdot\sqrt{3}\cdot\sqrt{2} + \left(\sqrt{2}\right)^2 =$$

$$= 3 + 2\sqrt{6} + 2 = \boxed{5+2\sqrt{6}}$$

You try:

$$\left(2\sqrt{5}-y\right)^2 = 20 - 4y\sqrt{5} + y^2$$

Rationalizing denominator (I):

$$\sqrt{\frac{2}{3}} = \frac{\sqrt{2}}{\sqrt{3}} = \frac{\sqrt{2}}{\sqrt{3}} \cdot \left(\frac{\sqrt{3}}{\sqrt{3}}\right) = \frac{\sqrt{6}}{\sqrt{9}} = \boxed{\frac{\sqrt{6}}{3}}$$

Conjugate Term:

$$\frac{2}{3+\sqrt{2}} = \frac{2}{(3+\sqrt{2})} \frac{(3-\sqrt{2})}{(3-\sqrt{2})} =$$

conjugate

$$= \frac{2(3-\sqrt{2})}{9-2} = \boxed{\frac{2}{7}(3-\sqrt{2})}$$

math conjugate:
Binomial term - changing sign of second term

$$\frac{3}{2+\sqrt{7}} = -2+\sqrt{7}$$

$$\frac{3(2-\sqrt{7})}{4-7} = \boxed{-2+\sqrt{7}}$$

$$\frac{1}{\sqrt{2}+\sqrt{3}} = \boxed{-\sqrt{2}+\sqrt{3}}$$

$$\frac{2\sqrt{3}-3}{3\sqrt{3}-3} = \boxed{\frac{3-\sqrt{3}}{6}}$$