MATH 0270/1314 COLLEGE ALGEBRA Week 4 2/11/19 ~~Thu~~ Mon

(1) $\sqrt{18x^3} = \sqrt[2]{2\cdot 3\cdot 3\cdot x\cdot x\cdot x} = \boxed{3x\sqrt{2x}}$

2 9

3 3

something under the radical will appear TWICE (2), bring out the 3X IN FRONT OF RADICAL AS A FACTOR, not as index ($\sqrt[3x]{2x}$ is wrong)

(2) $\sqrt[3]{40a^3b^4} = \sqrt[3]{5\cdot 2\cdot 2\cdot 2\cdot a^3\cdot a\cdot a\cdot b\cdot b\cdot b\, b} = \boxed{2ab\sqrt[3]{5b}}$

5 8

2 2 2

Two Types of Problems

(1) something under the radical appear "index" # of times

(2) something under the radical share a common factor with "index"

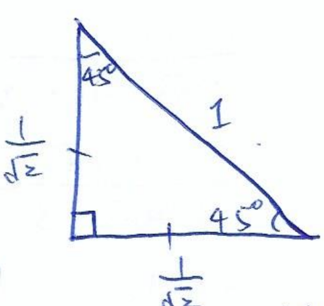
(3) $\sqrt[9]{a^3b^6} = \sqrt[9/3]{a^{3/3}b^{6/3}} = \boxed{\sqrt[3]{ab^2}}$

Index and inside the radicals share a common factor

(4) $\sqrt[6]{27x^3} = \sqrt[6]{3^3x^3} = \sqrt[6/3]{3^{3/3}x^{3/3}} = \sqrt[2]{3x} = \boxed{\sqrt{3x}}$

a chart number.

III. NO RADICAL MAY APPEAR IN THE DENOMINATOR



- Right triangle.
- isosceles → two sides of equal length.
- If the hypotenuse = 1, then each sides on the right angle has length $\frac{1}{\sqrt{2}}$
- To get rid of the radical in the denominator, multiply this number by the "radical/radical" = 1, to change how it looks.

multiply by 1

$$\frac{1}{\sqrt{2}}\cdot\boxed{\frac{\sqrt{2}}{\sqrt{2}}} = \frac{\sqrt{2}}{2}$$

- Rationalization of Denominator.
  - change the denominator from irrational to rational.
  - the whole thing still remains as an irrational number.

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

irrational — rational denominator

※ you multiple a "square root $\sqrt{\ }$" by itself, you get just the radicant (aka what's under the radical)

- here in this example, we just rewrite the irrational number, $\frac{2}{\sqrt{6}}$, as $\frac{\sqrt{6}}{3}$. They are the same number but we've rationalized the denominator from irrational $\sqrt{6}$ to rational 3.

e.g. $\frac{2}{2+\sqrt{3}}$

multiply the number by 1 $= \frac{2}{\underbrace{2+\sqrt{3}}} \cdot \frac{(2-\sqrt{3})}{\underbrace{(2-\sqrt{3})}}$ → "CONJUGATES"

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

add to zero.

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

$$= \frac{4-2\sqrt{3}}{1} = \boxed{4-2\sqrt{3}}$$

These are wrong simplification stategies

(1). $\frac{2}{2+\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{\boxed{2\sqrt{3}}+3}$ ← still has a radical on bottom

distributive property

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

f.o.i.l.

$$= \frac{2 \cdot 2 + 2\sqrt{3}}{2+4\sqrt{3}+3}$$

$$= \frac{4+2\sqrt{3}}{5+4\sqrt{3}}$$

still has a radical here

e.g. $\dfrac{5}{\sqrt{7}+\sqrt{2}}$

$$= \frac{5}{\underbrace{\sqrt{7}+\sqrt{2}}} \cdot \boxed{\frac{\sqrt{7}-\sqrt{2}}{\underbrace{\sqrt{7}-\sqrt{2}}}} \quad = 1$$

conjugate

$$= \frac{5\cdot(\sqrt{7}-\sqrt{2})}{\sqrt{7}\cdot\sqrt{7}-\underbrace{\sqrt{2}\cdot\sqrt{7}+\sqrt{2}\sqrt{7}}-\sqrt{2}\cdot\sqrt{2}}$$

$$= \frac{5(\sqrt{7}-\sqrt{2})}{7-\cancel{\sqrt{14}}+\cancel{\sqrt{14}}-2}$$

$$= \frac{5(\sqrt{7}-\sqrt{2})}{7-2}$$

$$= \frac{\cancel{5}(\sqrt{7}-\sqrt{2})}{\cancel{5}}$$

$$= \boxed{\sqrt{7}-\sqrt{2}}$$

STRATEGY.

- recognize the expression for the denominator involves the addition/subtraction of ~~ato~~ at least one radical.
- multiply this radical expression by its conjugate, meaning, change the sign between the two numbers to get the conjugate

=> the middle term ~~of~~ of $(a+b)(a-b)$ will always add up to zero.

③