x_2 = x^2
subscript
exponent

$$d = \sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$$

$$d = \sqrt{(\sqrt{3}-0)^2 + (0-(-3\sqrt{6}))^2}$$

$$d = \sqrt{(\sqrt{3}-0)^2 + (0+3\sqrt{6})^2}$$

$$d = \sqrt{(\sqrt{3})^2 + (3\sqrt{6})^2}$$

$$d = \sqrt{3+54}$$

$$\boxed{d = \sqrt{57}}$$ final answer

or

$$\boxed{d \approx 7.550}$$

57
3 19
(we can't simplify more)

SW:
$(\sqrt{3})^2 = \sqrt{3}\cdot\sqrt{3}$

$= \sqrt{3\cdot 3} = \sqrt{9}$

$= 3$

Obs:
$(\sqrt{3})^2 = 3$
$(\sqrt{5})^2 = 5$
$(\sqrt{6})^2 = 6$
$(\sqrt{7})^2 = 7$
$(\sqrt{4})^2 = 4$

SW:
$(3\sqrt{6})^2 = 3\sqrt{6}\cdot 3\sqrt{6}$

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

$= 9\cdot 6 = 54$

7.389 Find the midpoint of $\left(-\frac{7}{5}, \frac{1}{2}\right)$ and $\left(\frac{8}{5}, \frac{5}{2}\right)$

First, label the points: (x_1, y_1) (x_2, y_2)

Midpoint formula = $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$$\left(\frac{-\frac{7}{5}+\frac{8}{5}}{2}, \frac{\frac{1}{2}+\frac{5}{2}}{2}\right)$$

$$\left(\frac{\frac{1}{5}}{\frac{2}{1}}, \frac{\frac{6}{2}}{2}\right)$$ ÷3

Mar 26, 2019

Announcements:
1. Please complete the SFI survey
2. "No notes challenge"
3. Mastery Points (3/30 and 4/4)

- Finish § 7.4 - Adding, Subtracting, Multiplying Radicals (pp 113-114)
- All of § 7.5 - Rationalizing Denominators of Radicals (pp 115 - 117)
- Start § 7.6 - Radical Equations and Problem Solving (pp 118 - ??)

→ 7 days until the Chapter 7 Test
To study, complete the ch 7 Review Problems over and over ... # correctly Quickly Confidently

Obs: $x_2 \neq x^2$ (subscript vs exponent)

7.4.39 Add; $x > 0$, x is real

$$\sqrt{\frac{63}{x^8}} + \sqrt{\frac{7}{4x^8}}$$

(The Quotient Rule)

$$\frac{\sqrt{63}}{\sqrt{x^8}} + \frac{\sqrt{7}}{\sqrt{4x^8}}$$

63 = 7 · 9 = 7 · 3 · 3

$$\frac{\sqrt{3 \cdot 3 \cdot 7}}{\sqrt{x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}} + \frac{\sqrt{7}}{\sqrt{2 \cdot 2 \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x}}$$

$$\frac{3 \cdot \sqrt{7}}{x \cdot x \cdot x \cdot x} + \frac{\sqrt{7}}{2 \cdot x \cdot x \cdot x \cdot x} = \frac{3 \cdot \sqrt{7}}{x^4} + \frac{\sqrt{7}}{2x^4}$$ } we need the LCD

"jealous method" } $\frac{3\sqrt{7}\,(2)}{x^4\,(2)} + \frac{1\sqrt{7}}{2x^4} = \frac{6\sqrt{7} + 1\sqrt{7}}{2x^4} = \boxed{\frac{7\sqrt{7}}{2x^4}}$

final answer

Multiply Radical Expressions

Warning: $\sqrt{x} + \sqrt{y} \neq \sqrt{x+y}$

$\sqrt{x} - \sqrt{y} \neq \sqrt{x-y}$

This works if we are multiplying or diving, but NOT for addition and subtraction

7.4.65 Multiply. Simplify.

$(\sqrt{7} + x)^2$

$= (\sqrt{7} + x)(\sqrt{7} + x)$ "FOIL"

$= \sqrt{7} \cdot \sqrt{7} + \sqrt{7} \cdot x + x \cdot \sqrt{7} + x \cdot x$

$7 + x\sqrt{7} + x\sqrt{7} + x^2$

$7 + (x + x)\sqrt{7} + x^2$

$\boxed{7 + 2x\sqrt{7} + x^2}$ final answer

SW:
$\sqrt{7} \cdot \sqrt{7}$
$\sqrt{7 \cdot 7}$
$\sqrt{49} = 7$

OBS:
$\sqrt{7}\, x \rightarrow$ we have to move the $\sqrt{\ }$ to the end. $x\sqrt{7}$

7.4.91 Multiply. Simplify.

$\sqrt{5x}\,(\sqrt{5} - \sqrt{x})$ Distributive Property

$\sqrt{5x} \cdot \sqrt{5} - \sqrt{5x} \cdot \sqrt{x}$

$\sqrt{5 \cdot 5}\, x - \sqrt{5 \cdot x \cdot x}$

$\boxed{5\sqrt{x} - x\sqrt{5}}$ final answer

DBS:

Adding & Subtracting Radicals:
we must have the same radicand and the same kind of root

Multiplying & Dividing Radicals:
we must have the same kind of root only.
(Product Rule and Quotient Rule)

§7.5: Rationalizing Denominators

2 processes → (A) One term in the Denominator

→ (B) Two terms in the Denominator

(A) One term in the denominator: we must multiply top and bottom by the numbers/& variables we need to form perfect groups (so they will be sent out of the radical). ← in the denominator

Ex: $\frac{8}{\sqrt{2}} = \frac{8\cdot\sqrt{x}}{\sqrt{x}\cdot\sqrt{x}} = \frac{8\sqrt{x}}{\sqrt{x\cdot x}} = \frac{8\sqrt{x}}{x}$

The goal is to get rid of the radical in the denominator

7.5.11 Rationalize the denominator:

$$\frac{6}{\sqrt[3]{25x^2}} = \frac{6}{\sqrt[3]{5\cdot 5}\cdot x\cdot x}\cdot\frac{\sqrt[3]{5x}}{\sqrt[3]{5x}}$$

missing a 5; missing an x

$$= \frac{6\cdot\sqrt[3]{5x}}{\sqrt[3]{5\cdot 5\cdot 5\cdot x\cdot x\cdot x}} = \boxed{\frac{6\sqrt[3]{5x}}{5x}}$$ final answer

7.525 Rationalize the denominator

$$\frac{1}{\sqrt{45z}}$$

$$= \frac{1}{\sqrt{3\cdot 3\cdot 5\cdot z}} \cdot \frac{\sqrt{5z}}{\sqrt{5z}}$$

missing a 5 | missing a z

$$= \frac{1\cdot\sqrt{5z}}{\sqrt{3\cdot 3\cdot 5\cdot 5\cdot z\cdot z}} = \frac{1\sqrt{5z}}{3\cdot 5\cdot z} = \frac{\sqrt{5z}}{15z}$$

final answer

SW: 45 → 5, 9 → 3, 3

(B) Two terms in the denominator: we must multiply top and bottom by the conjugate of the denominator

Obs: conjugate: we can get it by changing the sign of the second term

Ex: conjugate of $x - \sqrt{2}$ is $x + \sqrt{2}$

7.5.42 Rationalize the denominator. Simplify. $a \geq 0$, $b \geq 0$

2 terms

$$\frac{(\sqrt{a} - 5)}{(2\sqrt{a} - \sqrt{b})} \cdot \frac{(2\sqrt{a} + \sqrt{b})}{(2\sqrt{a} + \sqrt{b})}$$

FOIL

conjugate of the denominator is $2\sqrt{a} + \sqrt{b}$

$$\frac{\sqrt{a}\cdot 2\sqrt{a} + \sqrt{a}\sqrt{b} - 5\cdot 2\sqrt{a} - 5\cdot\sqrt{b}}{2\sqrt{a}\cdot 2\sqrt{a} + 2\sqrt{a}\cdot\sqrt{b} - \sqrt{b}\cdot 2\sqrt{a} - \sqrt{b}\cdot\sqrt{b}}$$

$$= \frac{2a + \sqrt{ab} - 10\sqrt{a} - 5\sqrt{b}}{4a + 2\sqrt{ab} - 2\sqrt{ab} - b}$$

$$= \boxed{\frac{2a + \sqrt{ab} - 10\sqrt{a} - 5\sqrt{b}}{4a - b}}$$ final answer

sw: $\sqrt{a} \cdot \sqrt{a} = \sqrt{a \cdot a}$

$= a$

7.5.55

$$\left(\frac{3\sqrt{5} + \sqrt{10}}{6\sqrt{5} - \sqrt{10}}\right)\left(\frac{6\sqrt{5} + \sqrt{10}}{6\sqrt{5} + \sqrt{10}}\right)$$

(multiply top and bottom by the conjugate because we have 2 terms in the denominator)

2 terms

FOIL

$$= \frac{3 \cdot 6 \cdot 5 + 3\sqrt{5 \cdot 5 \cdot 2} + 6\sqrt{5 \cdot 5 \cdot 2} + 10}{6 \cdot 6 \cdot 5 + 6\sqrt{5 \cdot 5 \cdot 2} - 6\sqrt{5 \cdot 5 \cdot 2} - 10}$$

step by step

$$= \frac{(3\sqrt{5} \cdot 6\sqrt{5}) + (3\sqrt{5} \cdot \sqrt{10}) + (\sqrt{10} \cdot 6\sqrt{5}) + (\sqrt{10} \cdot \sqrt{10})}{(6\sqrt{5} \cdot 6\sqrt{5}) + (6\sqrt{5} \cdot \sqrt{10}) - (\sqrt{10} \cdot 6\sqrt{5}) - (\sqrt{10} \cdot \sqrt{10})}$$

$$= \frac{18 \cdot 5 + 3\sqrt{5\,10} + 6\sqrt{10 \cdot 5} + 10}{36 \cdot 5 + 6\sqrt{5 \cdot 10} - 6\sqrt{10 \cdot 5} - 10}$$

$$= \frac{18 \cdot 5 + 3\sqrt{5 \cdot 2 \cdot 5} + 6\sqrt{5 \cdot 2 \cdot 5} + 10}{180 - 10}$$

$$= \frac{90 + 3 \cdot 5\sqrt{2} + 5 \cdot 6\sqrt{2} + 10}{170}$$

$$= \frac{90 + 15\sqrt{2} + 30\sqrt{2} + 10}{170}$$

$$= \frac{100 + 45\sqrt{2}}{170}$$

$$= \boxed{\frac{20 + 9\sqrt{2}}{34}}$$ final answer

Ryan's Triangle

$\frac{\# \pm \# \sqrt{}}{\#}$

if the 3 #s have a common factor, we can divide the

7.6. Radical Equations and Problem Solving

Steps:

1. Isolate one radical on one side of the equation
2. Raise each side of the equation to a power equal to the index of the radical and simplify.
3. If the equation still contains another radical, repeat steps 1 and 2. If not, solve the equation
4. Check (This is mandatory!!)

7.6.29 Solve: $\sqrt[4]{3x+2} - 3 = 0$

① Isolate the radical.

$$\sqrt[4]{3x+2} - 3 = 0$$
$$+3 \quad +3$$
$$\sqrt[4]{3x+2} = 3$$

② Raise.

$$\left(\sqrt[4]{3x+2}\right)^4 = (3)^4$$
$$3x+2 = 81$$

③ No other radical, so we solve the equation:

$$3x+2 = 81$$
$$-2 \quad -2$$
$$\frac{3x}{3} = \frac{79}{3}$$
$$\boxed{x = \frac{79}{3}}$$

④ Check (mandatory!!)

$\sqrt[4]{3x+2} - 3 = 0$

Replace x with $\frac{79}{3}$ and simplify both sides.

$\sqrt[4]{3\left(\frac{79}{3}\right)+2} - 3 = 0$

$\sqrt[4]{79+2} - 3 = 0$

$\sqrt[4]{81} - 3 = 0$

$3 - 3 = 0$

$0 = 0$ ✓

So, our final answer is $\boxed{x = \frac{79}{3}}$