Let's get Radical!

(1) Simplifying

always looking for the biggest perfect square factor

$\sqrt{98} = \sqrt{49 \cdot 2}$

$= \sqrt{49} \cdot \sqrt{2}$

$\sqrt{98} = 7\sqrt{2}$

can't take the square root of 2 exactly so it stays as is.

(1) $\sqrt{18} = 3\sqrt{2}$

(2) $\sqrt{63} = 3\sqrt{7}$

(3) $\sqrt{125} = 5\sqrt{5}$

(4) $\sqrt{72} = 6\sqrt{2}$

$3\sqrt{8}$

$3 \cdot \sqrt{4} \cdot \sqrt{2}$

$3 \cdot 2 \cdot \sqrt{2}$

$6\sqrt{2}$

(5) $\sqrt{175} = \sqrt{25 \cdot 7}$

$= 5\sqrt{7}$

(6) $\sqrt{300} = 10\sqrt{3}$

(7) $\sqrt{196} = 14$

(8) $\sqrt{180} = \sqrt{36} \cdot \sqrt{5}$

$18 \cdot 10$

$3 \cdot 2 \cdot 3 \cdot 2 \cdot 5$

$= 6\sqrt{5}$

$$\sqrt{300} = 5\sqrt{12}$$

$$= 5 \cdot \sqrt{4} \cdot \sqrt{3}$$

$$5 \cdot 2 \cdot \sqrt{3}$$

$$10\sqrt{3}$$

"Perfect Square Numbers" are:

1 since $1^2 = 1$

4 since $2^2 = 4$

9 since $3^2 = 9$

16

25

They all have a perfect (or EXACT) square root

$\sqrt{9} = 3$

$27^{\frac{2}{3}} = (\sqrt[3]{27})^2$

$(3)^2 = 9$

Multiplying Radicals

- You can multiply radicals IF their indexes are the same

$\sqrt[2]{7} \cdot \sqrt[3]{5} = \sqrt{35}$

$2\sqrt[3]{6} \cdot 3\sqrt[3]{5} = 6\sqrt[3]{30}$

$\sqrt[3]{15}$ (index: 3, radicand: 15)

$\sqrt[3]{7} \cdot \sqrt[5]{9}$ can't do it indexes are not the same

$\sqrt{6} \cdot \sqrt{12} = \sqrt{72}$ sigh

$= \sqrt{36} \cdot \sqrt{2}$

$= 6\sqrt{2}$ ☺

$\frac{4}{8} = \frac{1}{2}$ sigh ☺

$\sqrt{40x^2} \cdot \sqrt{10x} = \sqrt{400x^3}$

$= \sqrt{400} \cdot \sqrt{x^2} \cdot \sqrt{x}$

$20x\sqrt{x}$

$\sqrt[3]{y^7} \cdot \sqrt[3]{y^1} = \sqrt[3]{y^8}$

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

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

$y^2\sqrt[3]{y^2}$

Mult & then Simplify

(1) $\sqrt{5} \cdot \sqrt{3} = \sqrt{5 \cdot 3} = \sqrt{15}$

(2) $\sqrt{10} \cdot \sqrt{20} = \sqrt{200} = \sqrt{100 \cdot 2} = 10\sqrt{2}$

Square root of 100 is

↖ no perfect square root

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

$= x\sqrt{6}$ or $\sqrt{6} \cdot x$

(4) $\sqrt{3x} \cdot \sqrt{8x^3} = \sqrt{24x^4} = \sqrt{24} \cdot \sqrt{x^4}$

$= 2\sqrt{6} \cdot x^2 = 2x^2\sqrt{6}$

$\sqrt{24} = \sqrt{4 \cdot 6}$; $\sqrt{x^4} = x^2$

rewrite as

(5) $4\sqrt{10} \cdot (-3\sqrt{2}) = -12\sqrt{20}$

$= -12 \cdot \sqrt{4 \cdot 5}$

$= -12 \cdot 2\sqrt{5}$

$= -24\sqrt{5}$

(7) $\sqrt{8ab^2} \cdot \sqrt{10a^3b^4}$

$= \sqrt{80a^4b^6}$

$= \sqrt{80} \cdot \sqrt{a^4} \cdot \sqrt{b^6}$

$\sqrt{80} = \sqrt{16 \cdot 5}$

$= 4\sqrt{5} \cdot a^2 \cdot b^3 = 4a^2b^3\sqrt{5}$ or $4\sqrt{5} \cdot a^2b^3$

since $a^2 \cdot a^2 = a^4$, then $\sqrt{a^4} = a^2$

3
16
5
80