70. $\frac{5^{-\frac{3}{4}}}{5^{1}} = 5^{-\frac{7}{4}} = \frac{1}{5^{\frac{7}{4}}}$

96. $\sqrt[5]{\sqrt[4]{3a}} = \left((3a)^{\frac{1}{4}}\right)^{\frac{1}{5}} = (3a)^{\frac{1}{20}}$

$= 3^{\frac{1}{20}} a^{\frac{1}{20}}$

94. $\sqrt[3]{\sqrt{2x}} = \left((2x)^{\frac{1}{2}}\right)^{\frac{1}{3}} = (2x)^{\frac{1}{6}}$

$= 2^{\frac{1}{6}} x^{\frac{1}{6}}$

86. $\left(\frac{3m^{1/6} n^{1/3}}{4n^{-2/3}}\right)^{2}$

$\frac{9m^{2/6} n^{2/3}}{16 n^{-4/3}}$

$\frac{9m^{2/6} n^{6/3}}{16}$

$\frac{9m^{1/3} n^{2}}{16}$

0-5 +

6-10 ✓

11 -

5.3 Simplifying Radicals

Multiplicative Property of Radicals:

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

Division Property of Radicals

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

perfect squares: $\sqrt{0}$, $\sqrt{1}$, $\sqrt{4}$, $\sqrt{9}$, $\sqrt{16}$, $\sqrt{25}$, $\sqrt{36}$, $\sqrt{49}$, $\sqrt{64}$, $\sqrt{81}$, $\sqrt{100}$, $\sqrt{121}$, $\sqrt{144}$, $\sqrt{169}$, $\sqrt{196}$, $\sqrt{225}$

$\sqrt{4}, \sqrt{9}, \sqrt{25}, \sqrt{16}, \sqrt{36},$

$\sqrt{72}$

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

$6\sqrt{2}$

simplest radical form

$\sqrt{50}$

$\sqrt{25} \cdot \sqrt{2}$

$5\sqrt{2}$

$\sqrt{\frac{15}{36}} = \frac{\sqrt{15}}{\sqrt{36}} = \frac{\sqrt{15}}{6}$

$\sqrt[3]{8}\ \sqrt[3]{27}$

$\sqrt[3]{64}\ \sqrt[3]{125}$

$\sqrt[3]{40}$

$\sqrt[3]{8} \cdot \sqrt[3]{5}$

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

$\sqrt[3]{81}$

Removing variable factors

divide out as many possible & leave the remainders in the root.

$$\sqrt[4]{x^5} = x^{\frac{5}{4}} = x^1\sqrt[4]{x^1} = x\sqrt[4]{x}$$

$$\sqrt[4]{x^7} = x^{\frac{7}{4}} = x\sqrt[4]{x^3}$$

$$\sqrt{25x^3} = \sqrt{25}\sqrt{x^3} \qquad x^{\frac{3}{2}}$$
$$= 5x\sqrt{x}$$

$$\sqrt{72x^5y^2} \qquad x^{\frac{5}{2}} \quad y^{\frac{2}{2}}$$
$$\sqrt{72}\ \sqrt{x^5}\ \sqrt{y^2}$$
$$\sqrt{36}\cdot\sqrt{2}\ x^2\sqrt{x}\ y$$
$$6x^2y\sqrt{2x}$$

$$\sqrt[3]{54x^3y^5}$$