Properties of Rational Exponents pp. 424-425 #1, 2, 4-40even, 41, 42, 44-64 even

(1) No, they do not have the same index.

(2) If the radicand has no perfect n^{th} powers as factors and any denominator has been rationalized.

(4) $(6^{\frac{3}{3}})^{\frac{1}{2}} = 6^{\frac{2}{6}} = \boxed{6^{\frac{1}{3}}}$

(6) $\frac{9}{9^{-4/5}} = \boxed{9^{9/5}}$

(8) $\left(\frac{7^3}{4^3}\right)^{-1/3} = \frac{7^{-1}}{4^{-1}} = \boxed{\frac{4}{7}}$

(10) $(12^{\frac{3}{5}} \cdot 8^{\frac{3}{5}})^5 = 12^3 \cdot 8^3 = 96^3 = \boxed{884{,}736}$

(12) $\frac{64^{\frac{5}{9}} \cdot 64^{\frac{2}{9}}}{4^{\frac{3}{4}}} = \boxed{\frac{64^{\frac{7}{9}}}{4^{3/4}}}$ ← this is ridiculous

(14) $\frac{13^{\frac{3}{7}}}{13^{\frac{5}{7}}} = 13^{-\frac{2}{7}} = \boxed{\frac{1}{13^{\frac{2}{7}}}}$

(16) $\sqrt[3]{16} \cdot \sqrt[3]{4} = \sqrt[3]{64} = \boxed{4}$

(18) $(\sqrt[3]{3} \cdot \sqrt[4]{3})^{12} = (3^{\frac{1}{3}} \cdot 3^{\frac{1}{4}})^{12} = (3^{\frac{7}{12}})^{12} = 3^7 = \boxed{2187}$

(20) $\frac{\sqrt{3}}{\sqrt{75}} = \frac{\sqrt{1}}{\sqrt{25}} = \boxed{\frac{1}{5}}$

(22) $\frac{\sqrt[4]{8} \cdot \sqrt[4]{16}}{\sqrt[8]{2} \cdot \sqrt[8]{3}} = \frac{\sqrt[4]{128}}{\sqrt[8]{6}}$ ← this is dumb

~~[illegible]~~ if you need to do magic tricks to rationalize)

(24) $\sqrt{72} = \sqrt{36}\sqrt{2} = \boxed{6\sqrt{2}}$

(26) $\sqrt[3]{108} \cdot \sqrt[3]{4} = \sqrt[3]{432} = \sqrt[3]{216}\sqrt[3]{2} = \boxed{6\sqrt[3]{2}}$

(28) $\sqrt[3]{\frac{1}{6}} = \frac{\sqrt[3]{1}}{\sqrt[3]{6}} \cdot \frac{\sqrt[3]{36}}{\sqrt[3]{36}} = \frac{\sqrt[3]{36}}{\sqrt[3]{216}} = \boxed{\frac{\sqrt[3]{36}}{6}}$

(30) $\sqrt[6]{\frac{81}{4}} = \frac{\sqrt[6]{81}}{\sqrt[8]{4}} \cdot \frac{\sqrt[8]{64}}{\sqrt[8]{64}} = \frac{\sqrt[6]{81} \cdot \sqrt[8]{64}}{\sqrt[8]{256}} = \boxed{\frac{\sqrt[6]{81} \cdot \sqrt[8]{64}}{2}}$

I hate this →

(32) $2\sqrt[6]{3} + 7\sqrt[6]{3} = \boxed{9\sqrt[6]{3}}$

(34) $25\sqrt[5]{2} - 15\sqrt[5]{2} = \boxed{10\sqrt[5]{2}}$

(36) $6\sqrt[3]{5} + 4\sqrt[3]{625}$

$6\sqrt[3]{5} + 4\sqrt[3]{125}\sqrt[3]{5}$

$6\sqrt[3]{5} + 4 \cdot 5\sqrt[3]{5}$

$6\sqrt[3]{5} + 20\sqrt[3]{5} = \boxed{26\sqrt[3]{5}}$

(38) $12\sqrt[4]{2} - 7\sqrt[4]{512}$

$12\sqrt[4]{2} - 7\sqrt[4]{256}\sqrt[4]{2}$

$12\sqrt[4]{2} - 7 \cdot 4\sqrt[4]{2}$

$12\sqrt[4]{2} - 28\sqrt[4]{2} = \boxed{-6\sqrt[4]{2}}$

(40) $5\sqrt[3]{48} - \sqrt[3]{750}$

$5\sqrt[3]{8}\sqrt[3]{6} - \sqrt[3]{125}\sqrt[3]{6}$

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

$10\sqrt[3]{6} - 5\sqrt[3]{6} = \boxed{5\sqrt[3]{6}}$

(41) The radicands are not the same, so they cannot be combined;

$2\sqrt[3]{10} + 6\sqrt[3]{5}$

(42) The numerator must also be multiplied by y;

$\sqrt[3]{\frac{x \cdot y}{y^3 \cdot y}} = \sqrt[3]{\frac{xy}{y^3}} = \frac{\sqrt[3]{xy}}{y}$

(44) $(y^4)^{\frac{1}{6}} = y^{\frac{4}{6}} = \boxed{y^{\frac{2}{3}}}$

(46) $\frac{2}{x^{-\frac{3}{2}}} = \boxed{2x^{\frac{3}{2}}}$

(48) $\sqrt[3]{\frac{x^{15}}{y^6}} = \boxed{\frac{x^5}{y^2}}$

(50) $\frac{\sqrt[3]{x} \cdot \sqrt{x^5}}{\sqrt{25x^{10}}} = \frac{x^{\frac{1}{3}} \cdot x^{\frac{5}{2}}}{5x^8} = \frac{x^{\frac{5}{6}}}{5x^8} = \frac{x^{-\frac{43}{6}}}{5} = \boxed{\frac{1}{5x^{43/6}}}$ ← why is this necessary?!

(52) $\sqrt{49x^2} = \boxed{7x}$

(54) $\sqrt[3]{4x^3y^5} \cdot \sqrt[3]{12y^2} = \sqrt[3]{48x^3y^7}$

$\sqrt[3]{8} \cdot \sqrt[3]{6} \cdot x \cdot \sqrt[3]{y^6} \cdot \sqrt[3]{y} = \boxed{2xy^2\sqrt[3]{6y}}$

(56) $\frac{-3}{\sqrt[5]{x^6}} \cdot \frac{\sqrt[5]{x^4}}{\sqrt[5]{x^4}} = \frac{-3\sqrt[5]{x^4}}{\sqrt[5]{x^{10}}} = \boxed{\frac{-3\sqrt[5]{x^4}}{x^2}}$

(58) $\sqrt{\frac{20x^3y^2}{9xz^3}} = \sqrt{\frac{20x^2y^2}{9z^3}} = \frac{xy\sqrt{20}}{3z\sqrt{z}} \cdot \frac{\sqrt{z}}{\sqrt{z}}$

$= \boxed{\frac{xy\sqrt{20z}}{3z^2}}$

(60) $3\sqrt[5]{x} + 9\sqrt[5]{x} = \boxed{12\sqrt[5]{x}}$

(62) $-7\sqrt[3]{y} + 16\sqrt[3]{y} = \boxed{9\sqrt[3]{y}}$

(64) $x\sqrt{9x^3} - 2\sqrt{x^5} = 3x\sqrt{x^2}\sqrt{x} - 2\sqrt{x^4}\sqrt{x} = 3x^2\sqrt{x} - 2x^2\sqrt{x} = \boxed{x^2\sqrt{x}}$