Radical Form	Exponential Form
$\sqrt[n]{a^m}$	$= a^{m/n}$

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① $\sqrt[3]{5^1 x^1 y^2} = 5^{1/3} x^{1/3} y^{2/3}$

↓ radical form

exponential form

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② $\sqrt{14^1 x^5 y^1 w^7} = 14^{\frac{1}{2}} x^{\frac{5}{2}} y^{\frac{1}{2}} w^{\frac{7}{2}}$

Radical form

Exponential form

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③ $25^{\frac{1}{3}} x^{\frac{2}{3}} y^{\frac{4}{3}} = \sqrt[3]{25^1 x^2 y^4} = y^1 \sqrt[3]{25^1 x^2 y}$

index = 3

exponential form

Radical Form

Simplified Radical Form

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④ $10^{\frac{1}{2}} x^{\frac{7}{2}} y^1 = y^1 \sqrt{10^1 x^7} = y^1 x^3 \sqrt{10^1 x^1}$

index of 2

Radical Form

Simplified Radical Form

(5) $\sqrt{100x^3y^4} = (100)^{1/2} x^{\frac{3}{2}} y^{\frac{4}{2}}$

$= (10^2)^{1/2} x^{1\frac{1}{2}} y^2$

$= 10^{2/2} x^{1+\frac{1}{2}} y^2$

$= 10^1 x^1 x^{\frac{1}{2}} y^2$

$= \boxed{10xy^2\sqrt{x^1}}$ correct

OR $\sqrt{100}\sqrt{x^3}\sqrt{y^4} = 10\sqrt{x^2}\sqrt{x^1} y^{4/2}$

$= 10 x^{2/2} \sqrt{x^1} y^2$

$= 10x^1 \sqrt{x} y^2$

$= \boxed{10xy^2\sqrt{x}}$ correct

Error Analysis

① last $\sqrt{x}$?

② $\sqrt{100} \neq 50$

(6) $\sqrt[3]{27x^9y^{12}} = \sqrt[3]{3^3 x^9 y^{12}}$

$= 3^{3/3} x^{9/3} y^{12/3}$

$= 3^1 x^3 y^4$

$= \boxed{3x^3y^4}$ correct

$\sqrt[3]{27}\sqrt[3]{x^9}\sqrt[3]{y^{12}} = 3x^{9/3}y^{12/3}$

$= \boxed{3^1 x^3 y^4}$

Error Analysis

$\sqrt{27}$ ✓ $= 3$

$x^6 \neq \sqrt[3]{x^9}$ subtracted instead of ÷

$y^{12} \neq \sqrt[3]{y^{12}}$ subtracted instead of ÷

(+) $\frac{1}{\sqrt[3]{5}} \neq \frac{1}{\sqrt[3]{5}} \cdot \frac{\sqrt[3]{5}}{\sqrt[3]{5}} \neq \frac{\sqrt[3]{5}}{5}$

$\frac{1}{\sqrt[3]{5^1}} = \frac{1}{\sqrt[3]{5^1}} \cdot \frac{\sqrt[3]{5^2}}{\sqrt[3]{5^2}} = \frac{\sqrt[3]{5^2}}{\sqrt[3]{5^3}} = \frac{\sqrt[3]{5^2}}{5^{3/3}}$

$= \frac{\sqrt[3]{25}}{5} \quad = \frac{\sqrt[3]{5^2}}{5}$

OR

$\frac{1}{\sqrt[3]{5}} \cdot \frac{\sqrt[3]{25}}{\sqrt[3]{25}} = \frac{\sqrt[3]{25}}{\sqrt[3]{125}} = \frac{\sqrt[3]{25}}{5}$

Error analysis

need $\frac{1}{\sqrt[m]{x^1}} \cdot \frac{\sqrt[m]{x^{m-1}}}{\sqrt[m]{x^{m-1}}}$

$\frac{1}{\sqrt[3]{5^1}} \quad \frac{\sqrt[3]{5^{②}}}{\sqrt[3]{5^{②}}}$ instead of ①

OR results

Power in denominator is always = to index

(8) $\sqrt{4x^{81}y^9} = \sqrt{4}\sqrt{x^{80}}\sqrt{x^1}\sqrt{y^8}\sqrt{y^1}$

$= 2\ x^{80/2}\sqrt{x^1}\ y^{8/2}\sqrt{y^1}$

$= 2\ x^{40}\sqrt{x^1}\ y^4\sqrt{y^1}$

$= \boxed{2x^{40}y^4\sqrt{xy}}$

Error Analysis

$\sqrt{4} = 2$

$\sqrt{x^{81}} \neq x^9$ } took $\sqrt{}$ of exponent

$\sqrt{y^9} \neq y^3$ }

(9) $\sqrt[3]{32x^9y^{11}} = \sqrt[3]{8}\sqrt[3]{4}\,x^{9/3}\sqrt[3]{y^9}\sqrt[3]{y^2}$

$= 2\sqrt[3]{4}\,x^3\,y^{9/3}\sqrt[3]{y^2}$

$= \boxed{2x^3y^3\sqrt[3]{4y^2}}$

$32 = 2^5$

(9) $\sqrt[3]{32x^9y^{11}} = \sqrt[3]{2^5x^9y^{11}}$

$= 2^{\frac{5}{3}}x^{\frac{9}{3}}y^{\frac{11}{3}}$

$= 2^{1\frac{2}{3}}x^3y^{3\frac{2}{3}}$

$= 2^{1+\frac{2}{3}}x^3y^{3+\frac{2}{3}}$

$= 2^1 \cdot 2^{\frac{2}{3}}x^3y^3y^{\frac{2}{3}}$

$= 2^1x^3y^3\,2^{\frac{2}{3}}y^{\frac{2}{3}}$

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

$= \boxed{2x^3y^3\sqrt[3]{4y^2}}$

(10) $\sqrt[3]{-8x^6y^2} = \sqrt[3]{-8}\ x^{6/3}\sqrt[3]{y^2}$

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

$= \boxed{-2x^2\sqrt[3]{y^2}}$

$\sqrt[3]{-8x^6y^2} = \sqrt[3]{(-2)^3x^6y^2} = (-2)^{3/3}x^{6/3}y$

$= (-2)^1 x^2 y^{2/3}$

$= \boxed{-2x^2\sqrt[3]{y^2}}$

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(11) $\sqrt{1200x^4y^1w^8} = \sqrt{400}\sqrt{3}\sqrt{x^4}\sqrt{y^1}\sqrt{w^8}$

$= 20\sqrt{3}\ x^{4/2}\sqrt{y^1}\ w^{8/2}$

$= \boxed{20x^2y^4\sqrt{3y}}$

$\sqrt{1200x^4y^1w^8} = \sqrt{2^4 3^1 5^2}\sqrt{x^4}\sqrt{y^1}\sqrt{w^8}$

$= 2^{\frac{4}{2}} 3^{\frac{1}{2}} 5^{\frac{2}{2}} x^{\frac{4}{2}} y^{\frac{1}{2}} w^{\frac{8}{2}} = 2^2 3^{\frac{1}{2}} 5^1 x^2 y^{\frac{1}{2}} w^4$

$= 2^2 5^1 x^2 w^4 3^{\frac{1}{2}} y^{\frac{1}{2}} = \boxed{2^2 5^1 x^2 w^4 \sqrt{3^1 y^1}}$

(12) $\sqrt{\frac{25}{80xy^4}} = \sqrt{\frac{25}{80}}\sqrt{\frac{1}{x^1}}\sqrt{\frac{1}{y^4}}$

$= \sqrt{\frac{5}{16}}\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y^4}}$

$= \frac{\sqrt{5}}{\sqrt{16}} \cdot \frac{1}{\sqrt{x}}\frac{\sqrt{x}}{\sqrt{x}}\frac{1}{y^{4/2}}$

$= \frac{\sqrt{5}}{4}\frac{\sqrt{x}}{\sqrt{x^2}}\frac{1}{y^2}$

$= \boxed{\frac{\sqrt{5x}}{4xy^2}}$

$\frac{\sqrt{25}}{\sqrt{80}}\frac{1}{\sqrt{x}}\frac{1}{\sqrt{y^4}} = \frac{5}{\sqrt{16}\sqrt{5}} \cdot \frac{1}{\sqrt{x}\sqrt{x}} \cdot \frac{1}{y^{4/2}}$

$= \frac{5}{4\sqrt{5}} \cdot \frac{\sqrt{x}}{\sqrt{x^2}} \cdot \frac{1}{y^2} = \frac{5\sqrt{x}}{4xy^2\sqrt{5}}$

$= \frac{5\sqrt{x}}{4xy^2\sqrt{5}}\frac{\sqrt{5}}{\sqrt{5}} = \frac{5\sqrt{5x}}{4xy^2\sqrt{25}} = \frac{5\sqrt{5x}}{4 \cdot 5xy^2}$

$= \frac{5}{20}\frac{\sqrt{5x}}{xy^2} = \frac{1}{4} \cdot \frac{\sqrt{5x}}{xy^2} = \boxed{\frac{\sqrt{5x}}{4xy^2}}$

(12) $\sqrt{\frac{25}{80xy^4}} = \frac{\sqrt{5^2}}{\sqrt{2^4 5^1}} \sqrt{\frac{1}{xy^4}}$

$= \frac{\sqrt{5^1}}{\sqrt{2^4}} \frac{1}{\sqrt{x}} \frac{1}{y^{4/2}} = \frac{\sqrt{5}}{2^{4/2}} \frac{1}{\sqrt{x}} \frac{\sqrt{x}}{\sqrt{x}} \frac{1}{y^2}$

$= \frac{\sqrt{5}\ x}{2^2 \sqrt{x^2}\ y^2} = \boxed{\frac{\sqrt{5x}}{4y^2 \cdot x}}$

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(13) $\sqrt{\frac{3\ x^5\ y^4}{27\ x^1\ y^{41}}} = \sqrt{\frac{3}{27}} \sqrt{\frac{x^4}{1}} \cdot \sqrt{\frac{1}{y^{37}}}$

$= \sqrt{\frac{1}{9}}\ \frac{\sqrt{x^4}}{1} \sqrt{\frac{1}{y^{36}}} \sqrt{\frac{1}{y}}$

$= \frac{1}{3}\ \frac{x^{4/2}}{1}\ \frac{1}{y^{36/2}}\ \frac{1}{\sqrt{y}}$

$= \frac{1}{3}\ \frac{x^2}{1}\ \frac{1}{y^{18}}\ \frac{1}{\sqrt{y}}$

$= \frac{x^2}{3y^{18}\sqrt{y}} = \frac{x^2}{3y^{18}} \cdot \frac{1}{\sqrt{y}} \cdot \frac{\sqrt{y}}{\sqrt{y}}$

$= \frac{x^2\sqrt{y}}{3y^{18}\sqrt{y^2}} = \frac{x^2\sqrt{y}}{3\ y^{18} y^1} = \boxed{\frac{x^2\sqrt{y}}{3y^{19}}}$

(13) $\sqrt{\dfrac{3x^5y^4}{27x^1y^{41}}} = \sqrt{\dfrac{3^1}{3^3}\dfrac{x^5}{x^1}\dfrac{y^4}{y^{41}}}$ $\sqrt{3x^4y^1}$ $\sqrt{3x^4y^1}$

$$= \frac{\sqrt{3^2}\sqrt{x^6}\sqrt{y^5}}{\sqrt{3^4}\sqrt{x^2}\sqrt{y^{42}}}$$

$$= \frac{3^{2/2}\,x^{6/2}\,y^{5/2}}{3^{4/2}\,x^{2/2}\,y^{42/2}}$$

$$= \frac{3^1\,x^3\,y^{2\frac{1}{2}}}{3^2\,x^1\,y^{21}}$$

$$= \frac{1}{3^1}\,\frac{x^2}{1}\,\frac{y^2y^{\frac{1}{2}}}{y^{21}}$$

$$= \frac{1}{3}\,\frac{x^2}{1}\,\frac{1}{y^{19}}\,\frac{y^{\frac{1}{2}}}{1}$$

$$= \boxed{\frac{x^2\sqrt{y}}{3y^{19}}}$$

(14) $\sqrt[3]{\dfrac{125x^{12}}{16x^{24}y^{3}}} = \dfrac{\sqrt[3]{125}\,\sqrt[3]{x^{12}}}{\sqrt[3]{8\cdot 2}\,\sqrt[3]{x^{24}}\,\sqrt[3]{y^{3}}\sqrt[3]{y^{2}}}$

$= \dfrac{5x^{12/3}}{\sqrt[3]{8}\sqrt[3]{2}\,x^{24/3}y^{3/3}\sqrt[3]{y^{2}}}$

$= \dfrac{5}{2}\dfrac{x^{4}}{\sqrt[3]{2}}\dfrac{1}{x^{8}}\dfrac{1}{y^{1}}\dfrac{1}{\sqrt[3]{y^{2}}}$

$= \dfrac{5x^{4}}{2x^{8}y^{1}\sqrt[3]{2y^{2}}}$

$= \dfrac{5}{2}\dfrac{1}{x^{4}}\dfrac{1}{y^{1}}\dfrac{1}{\sqrt[3]{2y^{2}}}\dfrac{\sqrt[3]{2^{2}y^{1}}}{\sqrt[3]{2^{2}y^{1}}}$

$= \dfrac{5}{2}\dfrac{1}{x^{4}}\dfrac{1}{y^{1}}\dfrac{1}{\sqrt[3]{8y^{3}}}\dfrac{\sqrt[3]{4y^{1}}}{1}$

$= \dfrac{5}{2}\cdot\dfrac{1}{x^{4}}\cdot\dfrac{1}{y^{1}}\dfrac{1}{2y^{1}}\dfrac{\sqrt[3]{4y^{1}}}{1}$

$$\boxed{\dfrac{5\sqrt[3]{4y}}{4x^{4}y^{2}}}$$

(14) $\sqrt[3]{\frac{125}{16}\frac{x^{12}}{x^{24}}\frac{1}{y^5}} = \frac{\sqrt[3]{125}}{\sqrt[3]{8}\sqrt[3]{2}} \cdot \sqrt[3]{\frac{1}{x^{12}}}\sqrt[3]{\frac{1}{y^5}}$

$= \frac{5}{2\sqrt[3]{2}} \frac{1}{x^{12/3}} \cdot \frac{1}{\sqrt[3]{y^3}\sqrt[3]{y^2}}$

$= \frac{5}{2}\frac{1}{\sqrt[3]{2}}\frac{1}{x^4}\frac{1}{y^{3/3}}\frac{1}{\sqrt[3]{y^2}}$

$= \frac{5}{2}\frac{1}{x^4}\frac{1}{y^1}\frac{1}{\sqrt[3]{2y^2}} \cdot \frac{\sqrt[3]{2^2y^1}}{\sqrt[3]{2^2y^1}}$

$= \frac{5}{2}\frac{\sqrt[3]{4y^1}}{x^4y^1}\frac{1}{\sqrt[3]{8y^3}}$

$= \frac{5}{2}\frac{\sqrt[3]{4y^1}}{x^4y^1}\frac{1}{2y}$

$= \frac{5}{4}\frac{1}{x^4}\frac{1}{y^2}\frac{\sqrt[3]{4y^1}}{1}$

$= \boxed{\frac{5\sqrt[3]{4y}}{4x^4y^2}}$

(16) $\frac{3}{4} \cdot \frac{x^{\frac{3}{2}}}{x^{-\frac{1}{2}}} \cdot \frac{y^{-\frac{7}{2}}}{y^{-2}} \cdot \frac{2}{9} \cdot \frac{x^0}{x^{\frac{5}{2}}} \frac{y^3}{y^1}$

$\frac{3}{4} \cdot \frac{2}{9} \frac{x^{\frac{3}{2}} x^0}{x^{-\frac{1}{2}} x^{\frac{5}{2}}} \cdot \frac{y^{-7/2} y^3}{y^{-2} y^1}$

$\frac{6}{36} \cdot \frac{x^{\frac{3}{2}} x^{\frac{1}{2}} \cdot 1}{x^{\frac{5}{2}}} \quad \frac{y^3 y^2}{y^{\frac{7}{2}} y^1}$

$\frac{1}{6} \cdot \frac{x^{\frac{4}{2}}}{x^{\frac{5}{2}}} \cdot \frac{y^5}{y^{9/2}}$

$\frac{1}{6} \cdot \frac{1}{x^{\frac{1}{2}}} \cdot \frac{y^{\frac{1}{2}}}{1}$

$\frac{\sqrt{y^1}}{6\sqrt{x^1}} = \frac{\sqrt{y}}{6} \frac{1}{\sqrt{x}} \frac{\sqrt{x}}{\sqrt{x}} = \frac{\sqrt{x \cdot y}}{6\sqrt{x^2}}$

$= \frac{\sqrt{xy}}{6x}$

(16) $$\frac{3x^{\frac{3}{2}}y^{-\frac{7}{2}}2x^{0}y^{3}}{4x^{-\frac{1}{2}}y^{-2}\,9x^{\frac{5}{2}}y^{1}}$$

$$\frac{3}{4}\,\frac{2}{9}\,\frac{x^{\frac{3}{2}+0}}{x^{-\frac{1}{2}+\frac{5}{2}}}\cdot\frac{y^{-\frac{7}{2}+3}}{y^{-2+1}}$$

$$\frac{6}{36}\cdot\frac{x^{\frac{3}{2}}}{x^{\frac{4}{2}}}\cdot\frac{y^{-\frac{1}{2}}}{y^{-1}}$$

$$\frac{1}{6}\;\frac{1}{x^{\frac{1}{2}}}\;\frac{y^{1}}{y^{\frac{1}{2}}}$$

$$\frac{1}{6}\;\frac{1}{x^{1/2}}\cdot\frac{y^{\frac{1}{2}}}{1}$$

$$\frac{1}{6}\;\frac{1}{\sqrt{x}}\;\frac{\sqrt{y}}{1}=\frac{\sqrt{y}}{6}\cdot\frac{1}{\sqrt{x}}\,\frac{\sqrt{x}}{\sqrt{x}}$$

$$=\frac{\sqrt{yx}}{6\sqrt{x^2}}$$

$$=\frac{\sqrt{xy}}{6x}$$