Solutions RIGHT Side of 7.1

(1d) $\sqrt[4]{a^2} = a^{\frac{2}{4}} = \boxed{a^{\frac{1}{2}}}$

(1e) $\sqrt[5]{7^1} = \boxed{7^{\frac{1}{5}}}$

(1f) $\sqrt[3]{y^6} = y^{\frac{6}{3}} = \boxed{y^2}$

(2d) Method ① $x^{\frac{4}{3}} = x^{\frac{3}{3}+\frac{1}{3}} = x^{\frac{3}{3}} x^{\frac{1}{3}} = x^1 \cdot x^{\frac{1}{3}}$

$= x^1 \sqrt[3]{x^1}$

$= \boxed{x\sqrt[3]{x}}$ ← simplest form

$\boxed{x^{\frac{4}{3}} = \sqrt[3]{x^4}}$ ↑ not simplest form

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method ② $x^{\frac{4}{3}} = x^{1\frac{1}{3}} = x^1 x^{\frac{1}{3}} = \boxed{x^1 \sqrt[3]{x^1}}$

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method ③ $x^{\frac{4}{3}} = \sqrt[3]{x^4} = \sqrt[3]{x^3}\sqrt[3]{x^1}$

$= x^{\frac{3}{3}}\sqrt[3]{x^1}$

$= \boxed{x^1\sqrt[3]{x}}$

(2e) $a^{\frac{2}{3}} = \boxed{\sqrt[3]{a^2}}$

(2f) $x^{\frac{3}{2}} = \boxed{\sqrt{x^3}}$ ← also simplest form

↓

$x^{\frac{1}{2}} = \sqrt[2]{x^1} = \boxed{\sqrt{x}}$ ← simplest form

(3d) $\sqrt[3]{-64} = \sqrt[3]{(-4)^3} = \sqrt[3]{-1 \cdot 4^3}$

$= (-4)^{3/3} = (-4)^1 = \boxed{-4}$

$= \sqrt[3]{-1}\ \sqrt[3]{4^3} = -1 \cdot 4^{3/3} = \boxed{-1 \cdot 4}$

Method ② $\sqrt[3]{-64} = \sqrt[3]{-1 \cdot 2^6}$

$= \sqrt[3]{-1}\ \sqrt[3]{2^6}$

$= -1 \cdot 2^{6/3}$

$= -1 \cdot 2^2$

$= -1 \cdot 4$

$= \boxed{-4}$

(3e) $\sqrt[5]{32} = 32^{1/5} = (2^5)^{1/5} = 2^{5/5} = 2^1 = \boxed{2}$

(3f) $\sqrt[3]{-1} = \boxed{-1}$

(3g) $-27^{-\frac{4}{3}} = -1 \cdot 27^{-\frac{4}{3}} = \frac{-1}{1} \cdot \frac{1}{27^{4/3}}$

$= \frac{-1}{1} \cdot \frac{1}{(3^3)^{4/3}} = \frac{-1}{1} \cdot \frac{1}{3^{\frac{12}{3}}} = \frac{-1}{1} \cdot \frac{1}{3^4}$

$= \boxed{\frac{-1}{81}}$

(3l) Method ② $-1 \cdot 27^{-4/3}$

$$= -1 \cdot \frac{1}{27^{\frac{4}{3}}} = \frac{-1}{27^{4/3}} = \frac{-1}{\sqrt[3]{27^4}}$$

$$= \frac{-1}{\sqrt[3]{27^3}\sqrt[3]{27^1}} = \frac{-1}{27 \cdot \sqrt[3]{27}} = \frac{-1}{27 \cdot 3}$$

$$= \boxed{-\frac{1}{81}}$$

3l Method ③ $-1 \cdot 27^{-\frac{4}{3}} = -1 \cdot (3^3)^{-4/3}$

$$= -1 \cdot 3^{-\frac{12}{3}}$$

$$= -1 \cdot 3^{-4}$$

$$= \frac{-1}{3^4} = \boxed{\frac{-1}{81}}$$

(3m) $\left(\frac{49}{100}\right)^{1/2} = \frac{\sqrt{49}}{\sqrt{100}} = \boxed{\frac{7}{10}}$

$$\left(\frac{49}{100}\right)^{\frac{1}{2}} = \left(\frac{7^2}{10^2}\right)^{1/2} = \frac{7^{2/2}}{10^{2/2}} = \frac{7^1}{10^1} = \boxed{\frac{7}{10}}$$

(3n) $\left(\frac{49}{100}\right)^{-\frac{1}{2}} = \left(\frac{7^2}{10^2}\right)^{-\frac{1}{2}} = \frac{7^{-\frac{2}{2}}}{10^{-\frac{2}{2}}} = \frac{7^{-1}}{10^{-1}} = \frac{10^1}{7^1} = \boxed{\frac{10}{7}}$

$$\left[\left(\frac{49}{100}\right)^{-1}\right]^{1/2} = \left[\frac{49^{-1}}{100^{-1}}\right]^{1/2} = \left(\frac{100}{49}\right)^{1/2} = \frac{\sqrt{100}}{\sqrt{49}} = \boxed{\frac{10}{7}}$$

(3n) $\left(\frac{49}{100}\right)^{-\frac{1}{2}} = \left[\left(\frac{49}{100}\right)^{1/2}\right]^{-1} = \left(\frac{\sqrt{49}}{\sqrt{100}}\right)^{-1} = \left(\frac{7}{10}\right)^{-1}$

$= \left(\frac{7^{-1}}{10^{-1}}\right) = \frac{10^1}{7^1} = \boxed{\frac{10}{7}}$

(3o) $\left(\frac{100}{9}\right)^{-\frac{3}{2}} = \left(\frac{10^2}{3^2}\right)^{-\frac{3}{2}} = \frac{10^{-\frac{6}{2}}}{3^{-\frac{6}{2}}} = \frac{10^{-3}}{3^{-3}}$

$= \frac{3^3}{10^3} = \boxed{\frac{27}{1000}}$

$\left(\frac{100}{9}\right)^{-\frac{3}{2}} = \left[\left[\frac{10^2}{3^2}\right]^{-1}\right]^{\frac{3}{2}} = \left[\frac{10^{-2}}{3^{-2}}\right]^{\frac{3}{2}} = \left[\frac{3^2}{10^2}\right]^{\frac{3}{2}} = \frac{3^{\frac{6}{2}}}{10^{\frac{6}{2}}} = \frac{3^3}{10^3}$

$= \boxed{\frac{27}{1000}}$

$\left(\frac{100}{9}\right)^{-\frac{3}{2}} = \left[\left(\frac{100}{9}\right)^{\frac{1}{2}}\right]^{-3} = \left(\frac{\sqrt{100}}{\sqrt{9}}\right)^{-3} = \left(\frac{10}{3}\right)^{-3} = \frac{10^{-3}}{3^{-3}} = \frac{3^3}{10^3}$

$= \boxed{\frac{27}{1000}}$

(4d) $\dfrac{p^{\frac{5}{3}}}{p^{\frac{2}{3}}} \quad p^{\frac{5}{3}-\frac{2}{3}} = p^{\frac{3}{3}} = \boxed{p^1}$

$$\frac{p^{5/3}}{p^{2/3}} = \left(\frac{p^5}{p^2}\right)^{1/3} = \left(p^3\right)^{1/3} = p^{3/3} = \boxed{p^1}$$

(4e) $\left(a^{\frac{1}{3}} a^{\frac{1}{4}}\right)^{12} = a^{\frac{12}{3}} a^{\frac{12}{4}} = a^4 a^3 = \boxed{a^7}$

$$\left(a^{\frac{1}{3}} a^{\frac{1}{4}}\right)^{12} = \left(a^{\frac{4}{12}} a^{\frac{3}{12}}\right)^{12} = a^4 a^3 = \boxed{a^7}$$

(4f) $\left(\dfrac{m^{-1/4}}{n^{-1/2}}\right)^{-4} = \dfrac{m^{\frac{4}{4}}}{n^{\frac{4}{2}}} = \boxed{\dfrac{m^1}{n^2}}$

$$\left(\frac{m^{-\frac{1}{4}}}{n^{-\frac{1}{2}}}\right)^{-4} = \left(\frac{n^{\frac{1}{2}}}{m^{\frac{1}{4}}}\right)^{-4} = \frac{n^{-\frac{4}{2}}}{n^{-\frac{4}{4}}} = \frac{n^{-2}}{m^{-1}} = \boxed{\frac{m^1}{n^2}}$$
