

N.RN.A.2: Radicals and Rational Exponents 2

1 Write $\sqrt[3]{x} \cdot \sqrt{x}$ as a single term with a rational exponent.

2 Kenzie believes that for $x \geq 0$, the expression $\left(\sqrt[7]{x^2}\right)\left(\sqrt[5]{x^3}\right)$ is equivalent to $\sqrt[35]{x^6}$. Is she correct? Justify your response algebraically.

3 For n and $p > 0$, is the expression $\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4}$ equivalent to $p^{18} n^6 \sqrt{p}$? Justify your answer.

4 When $\left(\frac{1}{\sqrt[3]{y^2}}\right)^4$ is written in the form y^n , what is the value of n ? Justify your answer.

5 Write $\frac{x\sqrt{x^3}}{\sqrt[3]{x^5}}$ as a single term in simplest form, with a rational exponent.

6 Use the properties of rational exponents to determine the value of y for the equation:

$$\frac{\sqrt[3]{x^8}}{\left(x^4\right)^{\frac{1}{3}}} = x^y, x > 1$$

7 Given $a > 1$, use the properties of rational exponents to determine the value of x for the equation below.

$$\frac{\sqrt[5]{a^{10}}}{\left(a^3\right)^{\frac{1}{2}}} = a^x$$

8 Justify why $\frac{\sqrt[3]{x^2 y^5}}{\sqrt[4]{x^3 y^4}}$ is equivalent to $x^{\frac{-1}{12}} y^{\frac{2}{3}}$ using properties of rational exponents, where $x \neq 0$ and $y \neq 0$.

9 Express the fraction $\frac{2x^{\frac{3}{2}}}{\left(16x^4\right)^{\frac{1}{4}}}$ in simplest radical form.

10 For $x \neq 0$ and $y \neq 0$, $\sqrt[3]{81x^{15}y^9} = 3^a x^5 y^3$. Determine the value of a .

11 Given that $\left(\frac{\frac{17}{8}}{y^{\frac{5}{4}}}\right)^{-4} = y^n$, where $y > 0$, determine the value of n .

12 Given the equal terms $\sqrt[3]{x^5}$ and $y^{\frac{5}{6}}$, determine and state y , in terms of x .

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Answer Section

1 ANS:

$$\sqrt[3]{x} \cdot \sqrt{x} = x^{\frac{1}{3}} \cdot x^{\frac{1}{2}} = x^{\frac{2}{6}} \cdot x^{\frac{3}{6}} = x^{\frac{5}{6}}$$

REF: 061731aii

2 ANS:

$$\text{No. } \left(\sqrt[7]{x^2}\right)\left(\sqrt[5]{x^3}\right) = x^{\frac{2}{7}} \cdot x^{\frac{3}{5}} = x^{\frac{31}{35}} = \sqrt[35]{x^{31}}$$

REF: 061929aii

3 ANS:

$$\left(p^2 n^{\frac{1}{2}}\right)^8 \sqrt{p^5 n^4} = \left(p^{16} n^4\right) p^2 n^2 \sqrt{p} = p^{18} n^6 \sqrt{p}$$

REF: 012025aii

4 ANS:

$$\left(\frac{1}{\sqrt[3]{y^2}}\right)^4 = \frac{y^{\frac{12}{3}}}{y^{\frac{2}{3}}} = y^{\frac{10}{3}} \quad n = \frac{10}{3}$$

REF: 012428aii

5 ANS:

$$\frac{x \cdot x^{\frac{3}{2}}}{x^{\frac{5}{3}}} = \frac{x^{\frac{6}{6}} \cdot x^{\frac{9}{6}}}{x^{\frac{10}{6}}} = x^{\frac{5}{6}}$$

REF: 082331aii

6 ANS:

$$\frac{x^{\frac{8}{3}}}{x^{\frac{4}{3}}} = x^y$$

$$x^{\frac{4}{3}} = x^y$$

$$\frac{4}{3} = y$$

REF: spr1505aii

7 ANS:

$$\frac{\sqrt[5]{a^{10}}}{(a^3)^{\frac{1}{2}}} = \frac{a^{\frac{10}{5}}}{a^{\frac{3}{2}}} = \frac{a^{\frac{20}{10}}}{a^{\frac{15}{10}}} = a^{\frac{5}{10}} \quad x = \frac{1}{2}$$

REF: 012528aii

8 ANS:

$$\frac{\sqrt[3]{x^2y^5}}{\sqrt[4]{x^3y^4}} = \frac{x^{\frac{2}{3}}y^{\frac{5}{3}}}{x^{\frac{3}{4}}y^{\frac{12}{4}}} = \frac{x^{\frac{8}{12}}y^{\frac{20}{12}}}{x^{\frac{9}{12}}y^{\frac{12}{12}}} = x^{-\frac{1}{12}}y^{\frac{2}{3}}$$

REF: 011925aii

9 ANS:

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

REF: 081826aii

10 ANS:

$$\sqrt[3]{81} = \sqrt[3]{3^4} = 3^{\frac{4}{3}} \quad a = \frac{4}{3}$$

REF: 062230aii

11 ANS:

$$\left(\frac{y^{\frac{17}{8}}}{y^{\frac{10}{8}}} \right)^{-4} = y^n \quad n = -\frac{7}{2}$$

$$\left(y^{\frac{7}{8}} \right)^{-4} = y^n$$

$$y^{-\frac{7}{2}} = y^n$$

REF: 082228aii

12 ANS:

$$\left(\frac{x^{\frac{5}{3}}}{x^3} \right)^{\frac{6}{5}} = \left(y^{\frac{5}{6}} \right)^{\frac{6}{5}}$$

$$x^2 = y$$

REF: 011730aii