

Assignment

Write

Explain two different instances when the expression $\sqrt[n]{x^n}$ can be written as x .

Remember

To extract a variable from a radical, the expression $\sqrt[n]{x^n}$ can be written as $|x|$, when n is even, or x , when n is odd.

A radical expression $\sqrt[n]{x^a}$ can be rewritten as an exponential expression for $x^{\frac{a}{n}}$ all real values of x if the index n is odd, and for all real values of x greater than or equal to 0 if the index n is even.

Practice

1. Analyze Luke's and Elena's incorrect work. Identify the error(s) and correctly rewrite each radical after extracting all possible roots.

Luke

$$\begin{aligned}\sqrt{9a^5b^2} &= \sqrt{9} \cdot \sqrt{a^5} \cdot \sqrt{b^2} \\ &= \sqrt{9} \cdot \sqrt{a^4} \cdot \sqrt{a} \cdot \sqrt{b^2} \\ &= 3a^2b\sqrt{a}\end{aligned}$$



Elena

$$\begin{aligned}\sqrt[3]{24x^3y^6} &= \sqrt[3]{24} \cdot \sqrt[3]{x^3} \cdot \sqrt[3]{y^6} \\ &= \sqrt[3]{8} \cdot \sqrt[3]{3} \cdot |x| \cdot y^2 \\ &= 2 \cdot 1 \cdot |x| \cdot y^2 \\ &= 2|x|y^2\end{aligned}$$



2. Extract all possible roots to rewrite each expression.

a. $\sqrt{50a^3b^4}$
b. $\sqrt[4]{48x^5y^{16}}$
c. $\sqrt{(x-5)^2}$

3. Analyze Leland's and Kata's incorrect work. Identify the error(s) and correctly rewrite each radical after performing each operation and extracting all possible roots.

Leland

$$\begin{aligned}4\sqrt[3]{x^2} \cdot 5\sqrt{x^3} &= 4x^{\frac{2}{3}} \cdot 5x^{\frac{3}{2}} \\ &= 20x^{\frac{6}{5}} \\ &= 20x\end{aligned}$$



Kata

$$\begin{aligned}12\sqrt[3]{m^2} + 5\sqrt{m^2} - 8\sqrt[3]{m^2} &= 9\sqrt{m^2} \sqrt[3]{m^2} \\ &= 9|m|\sqrt[3]{m^2}\end{aligned}$$



4. Rewrite $6\sqrt[3]{x^2}(15\sqrt[3]{x} - 13\sqrt[3]{x}) + 8x$ with the fewest terms possible.

Stretch

Perform each operation, extract all roots, and write your final answers in radical form, without radicals in the denominator.

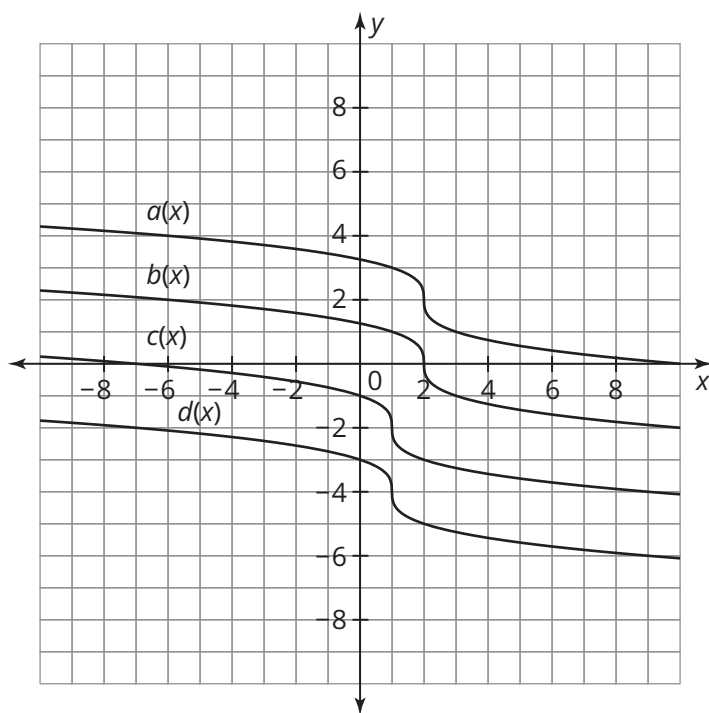
1. $\frac{8\sqrt{20x^7}}{3\sqrt[3]{8x^5}}$, given $x > 0$

2. $\frac{-2\sqrt[3]{24a^4}}{15\sqrt{27a^3}}$, given $a > 0$

3. $\frac{4\sqrt{28a^2b^2}}{5\sqrt{12ab^3}}$

Review

1. Each of the four curves shown on the graph are transformations of $f(x) = \sqrt[3]{x}$ with a restricted domain.



- Describe each transformation of $f(x) = \sqrt[3]{x}$ that was used to create the four functions in the design.
 - Write each function used in the design. For each function, write the domain as an inequality.
2. Perform each operation. List any restrictions on the variables.
- $\frac{5}{x^3 - x^2 - 2x} - \frac{8}{x^2 + 2x + 1}$
 - $\frac{x^2 - 16}{4(x + 1)} \cdot \frac{x^2 - 1}{x - 4}$
3. Describe the end behavior of the function $f(x) = -x^5 + 4x^3 - 2x - 2$.