

Exponents and Radicals Lesson #4: Entire Radicals and Mixed Radicals - Part Two

Converting Mixed Radicals (with an index of 2) to Entire Radicals

A mixed radical of index 2 may be expressed as an entire radical. This is done by i) converting the number outside the radical symbol into a radical and then 2) multiplying it by the radicand. The number outside the radical symbol can be converted into a radical by raising it to the power of 2.

Complete the following to convert $3\sqrt{14}$ to an entire radical.

$$\begin{aligned} \text{Mixed Radical} &= \text{Entire Radical} \\ 3\sqrt{14} &= \sqrt{9} \times \sqrt{14} \\ &= \sqrt{9 \times 14} \\ 3\sqrt{14} &= \sqrt{126} \end{aligned}$$

When we bring a coefficient inside a radical, we raise it to the index

Class Ex. #1

Convert the following mixed radicals to entire radicals.

a) $2\sqrt{5}$

b) $4\sqrt{7}$

c) $10\sqrt{6}$

$$\begin{aligned} &= \sqrt{4 \times 5} \\ &= \sqrt{20} \end{aligned}$$

$$\begin{aligned} &= \sqrt{16 \times 7} \\ &= \sqrt{112} \end{aligned}$$

$$\begin{aligned} &= \sqrt{100 \times 6} \\ &= \sqrt{600} \end{aligned}$$

Class Ex. #2

Convert the following mixed radicals to entire radicals.

a) $\frac{3}{2}\sqrt{8}$

b) $0.4\sqrt{50}$

c) $-5\sqrt{7}$

$$\begin{aligned} &= \sqrt{\frac{9}{4} \times 8} \\ &= \sqrt{18} \end{aligned}$$

$$\begin{aligned} &= \frac{2}{5} \sqrt{50} \\ &= \sqrt{\frac{4}{25} \times 50} \\ &= \sqrt{8} \end{aligned}$$

$$\begin{aligned} &= -\sqrt{25 \times 7} \\ &= -\sqrt{175} \end{aligned}$$

leave -ve outside a square root!

Complete Assignment Questions #1 - #2

Converting Mixed Radicals (with an index of 3 or greater) to Entire Radicals

A mixed radical of index 3 may be expressed as an entire radical by 1) converting the number outside the radical symbol into a radical and then 2) multiplying it by the radicand. The number outside the radical symbol can be converted into a radical by raising it to the power of 3.

Complete the following to convert $\frac{1}{2}\sqrt[3]{80}$ to an entire radical.

$$\begin{aligned} \text{Mixed Radical} &\Rightarrow \text{Entire Radical} \\ \frac{1}{2}\sqrt[3]{80} &= \sqrt[3]{\frac{1}{8}} \times \sqrt[3]{80} \\ &= \sqrt[3]{\frac{1}{8} \times 80} \\ \frac{1}{2}\sqrt[3]{80} &= \sqrt[3]{10} \end{aligned}$$



Convert the following mixed radicals to entire radicals.

- a) $2\sqrt[4]{3}$ b) $-4\sqrt[3]{7}$ c) $\frac{2}{5}\sqrt[3]{100}$ d) $-3\sqrt[4]{2}$

$$\begin{aligned} \text{a) } 2\sqrt[4]{3} &= \sqrt[4]{2^4 \cdot 3} = \sqrt[4]{16 \cdot 3} = \sqrt[4]{48} \\ \text{b) } -4\sqrt[3]{7} &= -\sqrt[3]{4^3 \cdot 7} = -\sqrt[3]{64 \cdot 7} = -\sqrt[3]{448} \\ \text{c) } \frac{2}{5}\sqrt[3]{100} &= \sqrt[3]{\frac{8}{125} \cdot 100} = \sqrt[3]{\frac{800}{125}} = \sqrt[3]{\frac{32}{5}} \\ \text{d) } -3\sqrt[4]{2} &= -\sqrt[4]{3^4 \cdot 2} = -\sqrt[4]{81 \cdot 2} = -\sqrt[4]{162} \end{aligned}$$

or $\sqrt[3]{-448}$

Complete Assignment Questions #3 - #8

Extension: Radicals involving Variables (Mixed to Entire)



Convert the following mixed radicals to entire radicals.

- a) $2\sqrt{x^3}$ b) $a^2\sqrt{a}$ c) $x^5\sqrt{xy}$ d) $(3xy^3)\sqrt[3]{2z^4}$

$$\begin{aligned} \text{a) } 2\sqrt{x^3} &= \sqrt{4x^3} \\ \text{b) } a^2\sqrt{a} &= \sqrt{a^4 \cdot a} = \sqrt{a^5} \\ \text{c) } x^5\sqrt{xy} &= \sqrt{x^{10} \cdot xy} = \sqrt{x^{11}y} \\ \text{d) } (3xy^3)\sqrt[3]{2z^4} &= \sqrt[3]{27x^3y^9 \cdot 2z^4} = \sqrt[3]{54x^3y^9z^4} \end{aligned}$$

Complete Assignment Question #9

Do# 1-9
Quiz L3+4 Friday