# Sec. 3.4 - Operations with Radicals

Learning Goal: By the end of today, I will be able to multiply expressions with radicals together and reduce to lowest term mixed terms (simplest radical form).

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Evaluate - leave answer in lowest terms

$$\frac{14}{8} \times \frac{16}{42}$$

Improper Fractions -- Mixed Fractions

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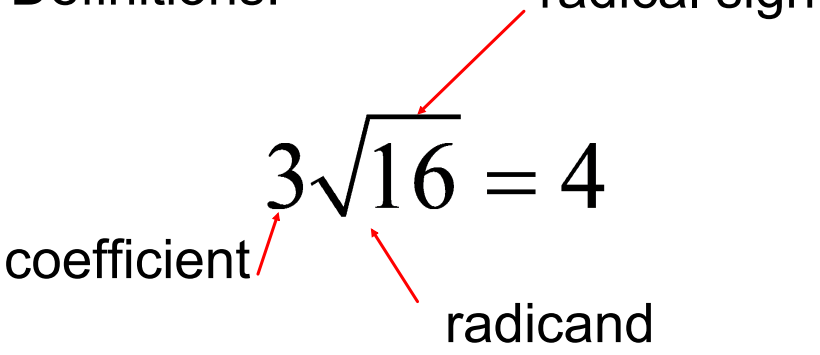
Definitions:




Entire Radicals - Mixed Radicals

$$\sqrt{12} = 2\sqrt{3}$$

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Pattern Observation:

$\sqrt{25} \times \sqrt{4} = 5 \times 2 =$

$\sqrt{25 \times 4} = \sqrt{100} =$

$\sqrt{16} \times \sqrt{9} =$

$\sqrt{16 \times 9} =$

$\sqrt{4} \times \sqrt{36} =$

$\sqrt{4 \times 36} =$

$\sqrt{100} \times \sqrt{9} =$

$\sqrt{100 \times 9} =$

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## Does it work for cubed roots?

$$\sqrt[3]{27} \times \sqrt[3]{8} = 3 \times 2 =$$

$$\sqrt[3]{27 \times 8} = \sqrt[3]{216} =$$

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## Key Ideas

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

Note: both radicals must be of the same type

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We can bring radicals together, but we can also tear them apart. This leads to something called SIMPLEST RADICAL FORM.

together ⟶

$\sqrt{7} \times \sqrt{8} =$

tear apart ⟶

$\sqrt{80} = \sqrt{16} \times \sqrt{5} = 4\sqrt{5}$

To create SRF we have to look for perfect square that are factors of the original number.

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## Write in SRF

$\sqrt{75} =$

$\sqrt{98} =$

$\sqrt{108} =$

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Small Tweak

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Simplify the following

$(3a)(4a^3) =$

$(2a-3b)(5a+7b) =$

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$3\sqrt{5} \times 4\sqrt{6} =$

$(4-\sqrt{3})(2+\sqrt{7}) =$

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Multiply the following, leave answers in SRF

$$4\sqrt{6} \times 2\sqrt{12} =$$

$$(4\sqrt{3} - 1)(5 + \sqrt{3}) =$$

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Key Ideas

$$c\sqrt{a} \times d\sqrt{b} = cd\sqrt{ab}$$

Note: both radicals must be of the same type

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# Big Finish....

Simplify the following:

3a + 4b + 6a - 8b =

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$3\sqrt{2}+4\sqrt{3}+6\sqrt{2}-8\sqrt{3}=$

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# Last One...

Is the following true?

$\sqrt{8}+\sqrt{50}=\sqrt{58}$

What if we apply SRF?

$\sqrt{8}+\sqrt{50}=$

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## Summary

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

Note: both radicals must be of the same type

$$c\sqrt{a} \times d\sqrt{b} = cd\sqrt{ab}$$

Adding radicals is a completing different approach than multiplying radicals.

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## Homework

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