SIMPLE RADICAL FORM

*Definition: An expression is written in **simple radical form** if and only if...*

a) The expression under the radical contains no perfect square factors other than 1
b) No radical appears in the denominator

How to do it:

1) **Find the LARGEST PERFECT SQUARE FACTOR of the number under the radical** (this number is called the *radicand*).

Remember: perfect square numbers are numbers that have whole-number square roots. The first few perfect square numbers are 1, 4, 9, 16, 25, 36, etc...

2) Write the *radicand* as the product of two factors—with one of these factors being the LARGEST PERFECT SQUARE FACTOR you found in (1).

3) "Break up" the product and simplify. **If an expression is written in simple radical form, the radicand should have no perfect square factors other than 1.** See the example below.

4) If necessary, rationalize the denominator (illustrated on the back page).

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Example: Write $\sqrt{48}$ in simple radical form.

1) The factors of 48 are 1, 2, 3, 4, 6, 8, 12, 16, 24, and 48. Even though 4 is a perfect square factor, it's not the largest one. **16** is the **LARGEST** perfect square factor.

2) Rewrite $\sqrt{48}$ as $\sqrt{16 \cdot 3}$.

3) Here's how it looks:

$\sqrt{48}$
$\sqrt{16 \cdot 3}$
$\sqrt{16} \cdot \sqrt{3}$ ←Breaking up the radical
$4\sqrt{3}$ ←**Simple Radical Form**

Note: Here's how it would look if you didn't choose the largest perfect square factor. Say you chose to use 4 instead of 16. Here's how it would look:

$\sqrt{48}$
$\sqrt{4 \cdot 12}$
$\sqrt{4} \cdot \sqrt{12}$ ←Breaking up the radical
$2\sqrt{12}$ ←Not in simple radical form yet because 12 has a perfect square factor. Got more work to do.
$2\sqrt{4 \cdot 3}$ ←4 is the biggest perfect square factor of 12

$2\sqrt{4}\cdot\sqrt{3}$ ←Breaking up the radical

$2\cdot 2\cdot\sqrt{3}$

$4\sqrt{3}$ ←**Simple Radical Form**

4) Write the expression $\frac{5}{\sqrt{2}}$ in simple radical form.

$\frac{5}{\sqrt{2}}$ ←The $\sqrt{2}$ in the denominator doesn't need to be written in simple radical form because it has no perfect square factors other than 1.

$=\frac{5}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$ ←Rationalizing the denominator

$=\frac{5\sqrt{2}}{\sqrt{4}}$

$=\frac{5\sqrt{2}}{2}$ ←Notice how the denominator has no radical and the expression under the radical has no perfect square factor other than 1.

5) Write the expression $\frac{10}{\sqrt{32}}$ in simple radical form.

$\frac{10}{\sqrt{32}}$

$=\frac{10}{\sqrt{16}\cdot\sqrt{2}}$ ←Write $\sqrt{32}$ in simple radical form first, even though it's in the deonominator

$=\frac{10}{4\cdot\sqrt{2}}$

$=\frac{5}{2\sqrt{2}}$ ←Since (10/4 simplifies to 5/2)

$=\frac{5}{2\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$ ←Now rationalize the denominator

$=\frac{5\sqrt{2}}{2\sqrt{4}}$

$=\frac{5\sqrt{2}}{2\cdot 2}$

$=\frac{5\sqrt{2}}{4}$ ←Expression is now in simple radical form