SIMPLIFYING SQUARE ROOTS

PERFECT SQUARES

$1^2 = 1$
$2^2 = 4$
$3^2 = 9$
$4^2 = 16$
$5^2 = 25$
$6^2 = 36$
$7^2 = 49$
$8^2 = 64$
$9^2 = 81$
$10^2 = 100$
$11^2 = 121$
$12^2 = 144$

1. Look for biggest "perfect square"
2. Rewrite Root
3. Simplify & Leave Extra

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EXAMPLES:

$\sqrt{32}$	$\sqrt{12}$	$\sqrt{6}$
$\sqrt{4 \cdot 8}$	$\sqrt{4 \cdot 3}$	$\sqrt{2 \cdot 3}$
$\sqrt{16 \cdot 2}$	$2\sqrt{3}$	$\sqrt{6}$
$4\sqrt{2}$		

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RADICAL EXPRESSIONS

Radical Expressions: Anything w/ Root

RULES FOR RADICALS

1. No Perfect Squares Under Root.
2. No Fractions underneath √
3. No Roots on Bottom Fraction

ADD-SUB RADICALS

FOR ADDING & SUBTRACTING RADICALS

THEY MUST BE ***PERFECT MATCHES***

$1\sqrt{2} + 3\sqrt{2} =$ $4\sqrt{2}$	$\sqrt{5} - \sqrt{2} =$ $\emptyset$ Not Solvable

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MULTIPLY RADICALS

MULTIPLY OUTSIDE & INSIDE,

THEN SIMPLIFY CORRECTLY

$\sqrt{2} \bullet \sqrt{6} =$	$3\sqrt{5} \bullet 2\sqrt{2} =$	$\sqrt{3} \bullet \sqrt{3} =$
$\sqrt{12}$	$6\sqrt{10}$	$\sqrt{9}$
$\sqrt{4 \cdot 3}$		3
$2\sqrt{3}$		

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MULTIPLY RADICALS

EXAMPLE: $3\sqrt{5}(2\sqrt{5} + 5\sqrt{3})$

$3\sqrt{5} \cdot 2\sqrt{5} + 3\sqrt{5} \cdot 5\sqrt{3}$

$6\sqrt{25} + 15\sqrt{15}$

$6 \cdot 5 + 15\sqrt{15}$

$30 + 15\sqrt{15}$

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DIVIDING RADICALS

FOR DIVIDING RADICALS THEY MUST ALSO HAVE THE ***SAME ROOT***

1. Give Root to Top & Bottom $\sqrt{\frac{1}{2}}$

2. Multiply by Factor of One using bottom root. $\frac{\sqrt{1}}{\sqrt{2}}$

3. Simplify & Leave Behind.

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EXAMPLES:

$\sqrt{\frac{4}{6}}$

$\frac{\sqrt{4}}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} = \frac{\sqrt{4 \cdot 6}}{\sqrt{36}}$

$\frac{2\sqrt{6}}{6}$

$\sqrt{\frac{8}{3}}$

$\frac{\sqrt{8}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{4 \cdot 6}}{\sqrt{9}} = \frac{\sqrt{24}}{\sqrt{9}}$

$\frac{2\sqrt{6}}{3}$

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VARIABLES & RADICALS

VARIABLES CAN APPEAR IN RADICALS,

BUT DO NOT CHANGE THE OPERATION.

THEY ONLY CHANGE THE SIMPLIFYING

1. Operation 1st
2. Expand Variables $x^2 \rightarrow x \cdot x$
3. Simplify by making pairs

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EXAMPLES:

$\sqrt{90x^3y^4z^5}$

$\sqrt{9 \cdot 10 x x x y y y y z z z z z}$

$3 x y^2 z^2 \sqrt{10xz}$

$\sqrt{\frac{6y}{12}}$

$\frac{\sqrt{6y}}{\sqrt{12}} \cdot \frac{\sqrt{12}}{\sqrt{12}} = \frac{\sqrt{72y}}{\sqrt{144}}$

$\frac{\sqrt{2 \cdot 36 y}}{12} = \frac{6\sqrt{2y}}{12}$

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