

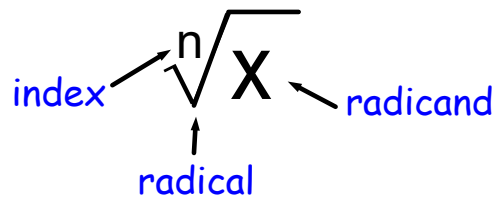
Simplifying Radicals

A perfect square is the product of a number multiplied by itself.

Ex) 81 is a perfect square since $81 = (9)(9)$

Square root	Perfect square	Square root	Perfect square
2	4	9	81
3	9	10	100
4	16	11	121
5	25	12	144
6	36	13	169
7	49	14	196
8	64	15	225

Definitions



EX: $\sqrt[3]{8}$
 3 → index
 8 → radicand

A radical is simplified when the radicand has no perfect square factors.

Ex 1) $\sqrt{33}$ cannot be simplified

To put a radical in its simplest form we use the Radical Multiplication Property

$$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b} \quad \text{if } a \geq 0, b \geq 0$$

Ex 2) $\sqrt{18} = \sqrt{9 \cdot 2} = \sqrt{9} \cdot \sqrt{2} = 3\sqrt{2}$

An expression of the form \sqrt{x} is called an entire radical.

An expression of the form $a\sqrt{x}$ is called a mixed radical.

Mixed radicals, such as $3\sqrt{2}$ means $3 \times \sqrt{2}$
 just as $3n$ means $3 \times n$ or $(3)(n)$

Ex 3) Simplify the following:

$\sqrt{1} = 1$	$\sqrt{11} \times$	$\sqrt{21} \times$
$\sqrt{2} \times$	$\sqrt{12} \sqrt{4\sqrt{3}} = 2\sqrt{3}$	$\sqrt{22} \times$
$\sqrt{3} \times$	$\sqrt{13} \times$	$\sqrt{23} \times$
$\sqrt{4} = 2$	$\sqrt{14} \times$	$\sqrt{24} \sqrt{4\sqrt{6}} = 2\sqrt{6}$
$\sqrt{5} \times$	$\sqrt{15} \times$	$\sqrt{25} = 5$
$\sqrt{6} \times$	$\sqrt{16} = 4$	$\sqrt{26} \times$
$\sqrt{7} \times$	$\sqrt{17} \times$	$\sqrt{27} = \sqrt{9\sqrt{3}} = 3\sqrt{3}$
$\sqrt{8} \sqrt{4\sqrt{2}} = 2\sqrt{2}$	$\sqrt{18} \sqrt{9\sqrt{2}} = 3\sqrt{2}$	$\sqrt{28} = \sqrt{4\sqrt{7}} = 2\sqrt{7}$
$\sqrt{9} = 3$	$\sqrt{19} \times$	$\sqrt{29} \times$
$\sqrt{10} \times$	$\sqrt{20} \sqrt{4\sqrt{5}} = 2\sqrt{5}$	$\sqrt{30} \times$

$\sqrt{500} \quad \frac{\sqrt{100}\sqrt{5}}{10\sqrt{5}}$	$\sqrt{72} \quad \frac{\sqrt{36}\sqrt{2}}{6\sqrt{2}}$
$\sqrt{125} \quad \frac{\sqrt{25}\sqrt{5}}{5\sqrt{5}}$	$\sqrt{48} \quad \frac{\sqrt{16}\sqrt{3}}{4\sqrt{3}}$
$\sqrt{96} \quad \frac{\sqrt{16}\sqrt{6}}{4\sqrt{6}}$	$\sqrt{32} \quad \frac{\sqrt{16}\sqrt{2}}{4\sqrt{2}}$
$\sqrt{45} \quad \frac{\sqrt{9}\sqrt{5}}{3\sqrt{5}}$	$\sqrt{27} \quad \frac{\sqrt{9}\sqrt{3}}{3\sqrt{3}}$
$\sqrt{60} \quad \frac{\sqrt{4}\sqrt{15}}{2\sqrt{15}}$	$\sqrt{40} \quad \frac{\sqrt{4}\sqrt{10}}{2\sqrt{10}}$
$\sqrt{117} \quad \frac{\sqrt{9}\sqrt{13}}{3\sqrt{13}}$	$\sqrt{80} \quad \frac{\sqrt{16}\sqrt{5}}{4\sqrt{5}}$
$\sqrt{200} \quad \sqrt{4}\sqrt{50}$	
$\sqrt{100}\sqrt{2} \quad 2\sqrt{50}$	
\uparrow $10\sqrt{2} \quad 2\sqrt{25}\sqrt{2}$	
(largest square)	$2 \cdot 5 \cdot \sqrt{2}$
	$10\sqrt{2}$