

### Surds Law

	Laws	Example
1	$a\sqrt{x} + b\sqrt{x} = (a + b)\sqrt{x}$	$4\sqrt{3} + 2\sqrt{3} = 6\sqrt{3}$
2	$a\sqrt{x} - b\sqrt{x} = (a - b)\sqrt{x}$	$2\sqrt{3} - 8\sqrt{3} = -6\sqrt{3}$
3	$\sqrt{x} * \sqrt{y} = \sqrt{xy}$	$\sqrt{5} * \sqrt{10} = \sqrt{50}$
4	$\frac{\sqrt{x}}{\sqrt{y}} = \sqrt{\frac{x}{y}}$	$\frac{\sqrt{10}}{\sqrt{5}} = \sqrt{\frac{10}{5}} = \sqrt{2}$
5	$\frac{a^m}{b^m} = \left(\frac{a}{b}\right)^m$	$8^3 * 3^3 = \left(\frac{8}{3}\right)^3 = 6^3$
6	$\sqrt{x} + \sqrt{y}$ and $\sqrt{x} - \sqrt{y}$ <i>are conjugates</i>  $(\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y})$ $= x - y$	Prove:  $(\sqrt{x} + \sqrt{y})(\sqrt{x} - \sqrt{y})$ $= \sqrt{x}\sqrt{x} - \sqrt{x}\sqrt{y} + \sqrt{y}\sqrt{x} - \sqrt{y}\sqrt{y}$ $= x - y$
E.g. 1	Solve	$\sqrt{48} + \sqrt{147} - \sqrt{75}$ $= \sqrt{16 * 3} + \sqrt{49 * 3} - \sqrt{25 * 3}$ $= \sqrt{16}\sqrt{3} + \sqrt{49}\sqrt{3} - \sqrt{25}\sqrt{3}$ $= 4\sqrt{3} + 7\sqrt{3} - 5\sqrt{3}$ $= 6\sqrt{3}$
E.g. 2	Solve	$\sqrt{50} + \sqrt{72} - \sqrt{160} \div \sqrt{5}$ $= \sqrt{25}\sqrt{2} + \sqrt{36}\sqrt{2} - \sqrt{\frac{160}{5}}$ $= 5\sqrt{2} + 6\sqrt{2} - \sqrt{32}$ $= 11\sqrt{2} - 4\sqrt{2}$ $= 7\sqrt{2}$
E.g. 3	Reduce	$\frac{5\sqrt{5} + 3\sqrt{7}}{4\sqrt{7} - 3\sqrt{5}}$ $= \frac{5\sqrt{5} + 3\sqrt{7}}{4\sqrt{7} - 3\sqrt{5}} + \frac{4\sqrt{7} + 3\sqrt{5}}{4\sqrt{7} + 3\sqrt{5}}$

		$= \frac{5\sqrt{5} \ 4\sqrt{7} + 3\sqrt{7} \ 4\sqrt{7} + 3\sqrt{5} \ 5\sqrt{5} + 3\sqrt{5}3\sqrt{7}}{16 * 7 - 9 * 5}$ $= \frac{20\sqrt{35} + 84 + 75 + 9\sqrt{35}}{112 - 45}$ $= \frac{29\sqrt{35} + 159}{67}$
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