Radicals – Multiply

$$\sqrt{a\,b} = \sqrt{a} \cdot \sqrt{b}$$

Strategy

Multiply radicals the same way you would multiply polynomials

Example $\sqrt{3}(2\sqrt{2} - \sqrt{3})$
$= 2\sqrt{6} - \sqrt{9}$
$= 2\sqrt{6} - 3$

Example $(2\sqrt{3} + \sqrt{6})(3\sqrt{3} - 2\sqrt{6})$
$= 2\sqrt{3}((3\sqrt{3} - 2\sqrt{6}) + \sqrt{6}(3\sqrt{3} - 2\sqrt{6})$
$= 18 - 4\sqrt{18} + 3\sqrt{18} - 12$
$= 6 - \sqrt{18}$
$= 6 - 3\sqrt{2}$

Recall your special products $(a + b)^2 = a^2 + 2ab + b^2$
$(a + b)(a - b) = a^2 - b^2$

Perform the following multiplications and simplify.

1. $\sqrt{5}\,(\sqrt{2} - 3\sqrt{6})$
2. $3\sqrt{2}(4\sqrt{2} - 1)$
3. $5\sqrt{3}(2\sqrt{3} - 3\sqrt{2})$
4. $3\sqrt{a}(\sqrt{a} + \sqrt{b})$
5. $(5\sqrt{3} + 2)(2\sqrt{3} - 1)$
6. $(2\sqrt{3} + 1)(5\sqrt{6} + 2)$
7. $(3\sqrt{5} - 1)(5\sqrt{7} + 2)$
8. $(3\sqrt{5} + 2)^2$
9. $(2\sqrt{3} - 7)^2$
10. $(2\sqrt{3} - 7)(2\sqrt{3} + 7)$
11. $(2\sqrt{5} + 1)(2\sqrt{5} - 1)$
12. $(\sqrt{x} + 1)(\sqrt{x} - 1)$