

Expanding brackets with surds

Starter

1. (Review of last lesson) Without a calculator, simplify:
(a) $2\sqrt{54} \times \sqrt{6}$ (b) $2\sqrt{125} - 3\sqrt{80} = -2\sqrt{5}$.
2. (Review of previous material) Expand these brackets:
(a) $4x(x^2 + 3y)$ (b) $(3x - 2)(x + 7)$ (c) $(1 + \sqrt{3})(2 - \sqrt{3})$

Notes

When expanding brackets involving surds, use **FOIL**.

- First** = multiply the *first* terms in each bracket
Outside = multiply the *outside* terms in each bracket
Inside = multiply the *inside* terms in each bracket
Last = multiply the *last* terms in each bracket

Rather than writing $\sqrt{3} \times \sqrt{3} = \sqrt{9}$ write $\sqrt{3} \times \sqrt{3} = 3$ since $\sqrt{k} \times \sqrt{k} = k$

Remember to collect like terms where possible.

E.g. 1 Expand and simplify where possible:

- (a) $\sqrt{5}(4 - \sqrt{5})$ (b) $\sqrt{2}(5 + 4\sqrt{2})$
(c) $\sqrt{5}(2 + \sqrt{75})$ (d) $\sqrt{2}(\sqrt{32} - \sqrt{8})$

Working: (a) $\sqrt{5}(4 - \sqrt{5}) = 4\sqrt{5} - 5$

E.g. 2 Expand and simplify where possible:

- (a) $(\sqrt{7} + 6)(\sqrt{7} + 9)$ (b) $(\sqrt{2} + 2)(\sqrt{2} - 5)$
(c) $(\sqrt{6} - 2)^2$ (d) $(4 + \sqrt{7})(4 - \sqrt{7})$

Working: (a) $(\sqrt{7} + 6)(\sqrt{7} + 9) = 7 + 9\sqrt{7} + 6\sqrt{7} + 54 = 61 + 15\sqrt{7}$

Video: [Surds - expanding brackets](#)

[Solutions to Starter and E.g.s](#)

Exercise

- 9-1 class textbook: p15 E1.3 Qu 1ace, 2ac, 3, 4ace, 5-6
A*-G class textbook: p15 E1.3 Qu 1-3
9-1 homework book: p5 E1.3 Qu 1-8
A*-G homework book: p4 E1.3 Qu 1-4

Summary

When expanding brackets involving surds, use **FOIL**.

- First** = multiply the *first* terms in each bracket
Outside = multiply the *outside* terms in each bracket
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Last = multiply the *last* terms in each bracket

Remember: $\sqrt{k} \times \sqrt{k} = k$