

Expanding trinomials

A LEVEL LINKS

Scheme of work: 1a. Algebraic expressions – basic algebraic manipulation, indices and surds

Example 1 Expand and simplify $(x + 3)(x + 2)(x - 4)$

$\begin{aligned}(x + 3)(x + 2) &= x(x + 2) + 3(x + 2) \\ &= x^2 + 2x + 3x + 6 \\ &= x^2 + 5x + 6\end{aligned}$ $\begin{aligned}(x^2 + 5x + 6)(x - 4) &= x(x^2 + 5x + 6) - 4(x^2 + 5x + 6) \\ &= x^3 + 5x^2 + 6x - 4x^2 - 20x - 24 \\ &= x^3 + x^2 - 14x - 24\end{aligned}$	<p>1 Expand the first two brackets first by multiplying $(x + 2)$ by x and $(x + 2)$ by 3</p> <p>2 Simplify by collecting like terms: $2x + 3x = 5x$</p> <p>3 Expand the two brackets by multiplying $(x^2 + 5x + 6)$ by x and $(x^2 + 5x + 6)$ by -4</p> <p>4 Simplify by collecting like terms: $5x^2 - 4x^2 = x^2$ $6x - 20x = -14x$</p>
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Practice questions

- 1** Expand and simplify.
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| <p>a $3(x - 2)(x + 4)$</p> <p>c $y(x - 3)(x + 2)$</p> <p>e $y(x - 3y + 3)(2x + 1)$</p> <p>g $(x - 3)(x + 2)(2x - 7)$</p> <p>i $(x - 3)(x - 4)(x + 5)$</p> <p>k $(x - 3y)^3$</p> | <p>b $x(x - 5)(x - 3)$</p> <p>d $x(2x + 1)(4x - 1)$</p> <p>f $3x(2x - y - 3)(2x + y)$</p> <p>h $(3x - 2)(7 + 4x)(x - 2)$</p> <p>j $(3x - 2)(2x + 2)(x + 1)$</p> <p>l $(2x - 5y)^3$</p> |
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Answers

- 1** Expand and simplify.
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| <p>a $3x^2 + 6x - 24$</p> <p>c $x^2y - xy - 6y$</p> <p>e $2x^2y - 6xy^2 - 3y^2 + 7xy + 3y$</p> <p>g $2x^3 - 9x^2 - 5x + 42$</p> <p>i $x^3 - 2x^2 - 23x + 60$</p> <p>k $x^3 - 9x^2y + 27xy^2 - 27y^3$</p> | <p>b $x^3 - 8x^2 + 15x$</p> <p>d $8x^3 + 2x^2 - x$</p> <p>f $12x^3 - 3xy^2 - 18x^2 - 9xy$</p> <p>h $12x^3 - 11x^2 - 40x + 28$</p> <p>j $6x^3 + 8x^2 - 2x - 4$</p> <p>l $8x^3 - 60x^2y + 150xy^2 - 125y^3$</p> |
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