Expanding brackets

## Topic A: Expanding brackets

Bridging to Ch2.1

You know how to find the product of two binomials by multiplying every combination of terms together and simplifying. Take extra care when squaring a binomial, and remember that $(x+a)^2=(x+a)(x+a)=x^2+2ax+a^2$ NOT $x^2+a^2$


**Example 1**

Expand and simplify $(3x-5)^2$

$(3x-5)^2=(3x-5)(3x-5)$ — Always write in this form until you are confident.

$=9x^2-15x-15x+25$

$=9x^2-30x+25$ — Simplify the $x$-terms.

**Try It 1**

Expand and simplify **a** $(x-7)^2$ **b** $(5x+1)^2$

To find the product of three binomials, first expand any pair, then multiply by the third.

**Example 2**

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

$(x+3)(x-2)=x^2-2x+3x-6$ — Expand the first two pairs.

$=x^2+x-6$ — Simplify $-2x+3x$ to $x$

$(x^2+x-6)(x+1)=x^3+x^2+x^2+x-6x-6$ — 3 terms × 2 terms = 6 terms

$=x^3+2x^2-5x-6$ — Add the $x^2$-terms and simplify $x-6x$ to $-5x$

**Try It 2**

Expand and simplify **a** $(x-3)(x-1)(x+1)$ **b** $(x+2)^2(x-4)$

## Bridging Exercise Topic A

Bridging to Ch2.1

**1** Expand and simplify each of these expressions.

**a** $(x-4)^2$ **b** $(x+6)^2$ **c** $(x-9)^2$ **d** $(x+5)^2$ **e** $(2x+1)^2$ **f** $(3x-2)^2$

**g** $(4x+3)^2$ **h** $(5x+2)^2$ **i** $(3-x)^2$ **j** $(7-2x)^2$ **k** $(8-3x)^2$ **l** $(10-9x)^2$

**2** Expand and simplify each of these expressions.

**a** $(x+5)(x+2)(x+4)$ **b** $(x+2)(x+7)(x-1)$ **c** $(x-3)(x+8)(2-x)$

**d** $(x+6)(2x-5)(x-8)$ **e** $(3x+1)(2x-1)(x+5)$ **f** $(2x-3)(3x-4)(5-4x)$

**g** $(x+5)^2(x+9)$ **h** $(3-x)^2(x-8)$ **i** $(x+7)(x-9)^2$

**j** $(2x+3)^2(4-x)$ **k** $(3x+7)^2(x-8)$ **l** $(2x-11)^2(3-2x)$

## Bridging Exercise Topic B

Bridging to Ch2.1

**1** Simplify these fractions.

**a** $\dfrac{x(x-5)(x+2)}{x^3(x+2)}$ **b** $\dfrac{(x+3)^2}{x(x+3)}$ **c** $\dfrac{(x-4)}{2x(x-4)}$ **d** $\dfrac{x^2(x+5)}{x(x+5)^2}$

**2** Simplify these fractions by first factorising the numerator and the denominator.

**a** $\dfrac{x^2-2x-8}{x^2+4x+4}$ **b** $\dfrac{x^2-10x+21}{x^2-x-6}$ **c** $\dfrac{x^2-3x-10}{x^2-10x+25}$ **d** $\dfrac{x^2+10x+24}{2x+8}$

**e** $\dfrac{x^2+6x}{x^2-36}$ **f** $\dfrac{3x^2+6x}{x^2-5x-14}$ **g** $\dfrac{5x^3+15x^2}{x^2+6x+9}$ **h** $\dfrac{x^2-64}{3x^2-24x}$

**i** $\dfrac{25-x^2}{45-4x-x^2}$ **j** $\dfrac{2x^2-x-28}{2x^3+7x^2}$ **k** $\dfrac{15x^2+7x-4}{10x^2+13x+4}$ **l** $\dfrac{x^3-100x}{6x^2+56x-40}$

**m** $\dfrac{12x^3+36x}{2x^2+6}$ **n** $\dfrac{42x^2-x-1}{36x^2-12x+1}$ **o** $\dfrac{9x^3-x}{24x^2-x-3}$ **p** $\dfrac{9x^2-34x-8}{2x^4-8x^3}$