Expanding Brackets
www.m4ths.com – Steve Blades

'Expand' and 'multiply out' mean the same thing! Sometimes you will have to expand, other times you will expand **and** simplify.

Section 1 – Single Brackets

(1) Expand the following:

(a) $3(x+5)$

(b) $4(x-3)$

(c) $6(2x+5)$

(d) $7(3x-2)$

(e) $x(x+3)$

(f) $x(3x+4)$

(g) $2x(x-7)$

(h) $3x(4x+5)$

(i) $x(x+y)$

(j) $x^2(x-4y)$

Sectio 2 – A Pair of Single Brackets (Not Double Brackets)

(1) Expand **AND** simplify each:

(a) $3(x+1)+4(x+5)$

(b) $5(2x+3)+6(x+1)$

(c) $3(x-3)+5(2x+1)$

(d) $x(x+3)+x(2x-4)$

(e) $3(4x+3)-4(2x+7)$

(f) $5(3x-2)-6(x-7)$

(g) $x(x-3)-2x(x+1)$

(h) $3x(y+x)-x(5x-y)$

(i) $a(b+c)+b(2a+c)$

(j) $a(a+b)+b(b-a)$

Section 3 – Double Brackets

(1) Expand **AND** simplify each:

(a) $(x+1)(x+3)$

(b) $(x+3)(x+5)$

(c) $(x+3)(x-7)$

(d) $(x-6)(x+2)$

(e) $(x-2)(x-5)$

(f) $(3-x)(4+x)$

(g) $(2x+3)(x+1)$

(h) $(5x+3)(4x-1)$

(i) $2(6x-5)(2x-7)$

(j) $(x+1)^2$

(k) $(x-3)^2$

(l) $(2x+3)^2$

(m) $3(5x-1)^2$

(n) $(A+B)^2$

Section 4 – A pair of Double Brackets

(1) Expand **AND** simplify each:

(a) $(x-2)(x-5)+(x+3)^2$

(b) $(2x+1)(x-3)+(2x-1)^2$

(c) $x(2x-3)-(x+4)^2$

(d) $3(2x-3)-(3x-2)^2$

(e) $(x-2)^2+(4x+5)^2$

(f) $(2x-1)^2-(3x+2)^2$

(g) $(A+B)^2+(A-B)^2$

(h) $(Ax+B)^2-(Ax-B)^2$

Section 5 – Triple Brackets

(1) Expand **AND** simplify each:

(a) $(x+1)(x+3)(x+5)$

(b) $(x+2)(x-1)(x+4)$

(c) $x(x-1)(x+3)$

(d) $(2x-1)(x+5)(x-3)$

(e) $(1-x)(1+x)(3-x)$

(f) $(x+2)^3$

(g) $(x-3)(x+4)^2$

(h) $2x(3x-1)^2$

(i) $(4-3x)^3$

(j) $(a+b)^3$

(2) Using your answer to part (j) above, WRITE DOWN the expansion of $(a-b)^3$

Section 5 – Basic Identities

(1) In each question below, find the value(s) of the missing constants $A, B, C\ etc.$

(a) $2(3x+1) \equiv Ax+2$

(b) $3x(4x+5) \equiv Ax^2+Bx$

(c) $(x+1)(x+2) \equiv x^2+Ax+B$

(d) $(3x+1)^2 \equiv Ax^2+Bx+C$

(e) $5(x+4)+7(x-2) \equiv Ax+B$

(f) $3(1-8x)+B=Ax+7$

(g) $3(1-4x)^2 \equiv Ax^2+Bx+C$

(h) $(x+1)-3(x+2) \equiv Ax+B$

(i) $(x+3)^2+(x-3)^2 \equiv Ax^2+Bx+C$

Section 6 – Mixed! Anything Goes!

(1) Expand **AND** simplify each:

(a) $x(x-y)-y(y-x)$

(b) $(x-y)(x+y)^2$

(c) $-3(4x-9)+5(3x-1)$

(2)* Show that the expression

$$3x(4x+7)-3x(x-1)+16$$

Can be written in the form

$$(Px+Q)^2$$

(3)* Given that a cuboid has side lengths $(x+2), (x-3)$ and $(x+5)$ and has volume 54, show that: $x^3+4x^2-11x-84=0$

(4)* (a) Without a calculator, show that

$$(2+\sqrt{2})^3+(2-\sqrt{2})^3$$

is an integer.

(b) Without any further work, explain why

$$(2+\sqrt{2})^3-(2-\sqrt{2})^3$$

is an irrational number.

(4)* Expand and simplify

$$\left(x^{\frac{1}{3}}+y^{\frac{1}{4}}\right)^2$$