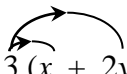# Chapter 1: REMOVING BRACKETS
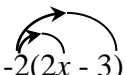
To remove a single bracket, we multiply every term in the bracket by the number or the expression on the outside:

Examples

1) $3(x + 2y)$ $= 3x + 6y$

2) $-2(2x - 3)$ $= (-2)(2x) + (-2)(-3)$
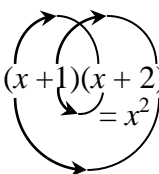 $= -4x + 6$

To expand two brackets, we must multiply everything in the first bracket by everything in the second bracket. We can do this in a variety of ways, including
     * the smiley face method
     * FOIL (Fronts Outers Inners Lasts)
     * using a grid.

Examples:

1) $(x + 1)(x + 2) = x(x + 2) + 1(x + 2)$

     or

     $(x + 1)(x + 2)$ $= x^2 + 2 + 2x + x$
                                $= x^2 + 3x + 2$

     or

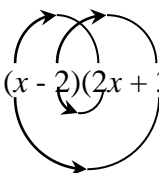|	x	1
x	x^2	x
2	$2x$	2

$(x + 1)(x + 2)$ $= x^2 + 2x + x + 2$
                            $= x^2 + 3x + 2$

2) $(x - 2)(2x + 3) = x(2x + 3) - 2(2x + 3)$
                            $= 2x^2 + 3x - 4x - 6$
                                  $= 2x^2 - x - 6$

     or

     $(x - 2)(2x + 3) = 2x^2 - 6 + 3x - 4x = 2x^2 - x - 6$

     or

	x	-2
$2x$	$2x^2$	$-4x$
3	$3x$	-6

$(2x + 3)(x - 2)$ $= 2x^2 + 3x - 4x - 6$
                            $= 2x^2 - x - 6$

EXERCISE A   Multiply out the following brackets and simplify.

1. $7(4x + 5)$

2. $-3(5x - 7)$

3. $5a - 4(3a - 1)$

4. $4y + y(2 + 3y)$

5. $-3x - (x + 4)$

6. $5(2x - 1) - (3x - 4)$

7. $(x + 2)(x + 3)$

8. $(t - 5)(t - 2)$

9. $(2x + 3y)(3x - 4y)$

10. $4(x - 2)(x + 3)$

11. $(2y - 1)(2y + 1)$

12. $(3 + 5x)(4 - x)$

Two Special Cases

Perfect Square:	Difference of two squares:
$(x + a)^2 = (x + a)(x + a) = x^2 + 2ax + a^2$	$(x - a)(x + a) = x^2 - a^2$
$(2x - 3)^2 = (2x - 3)(2x - 3) = 4x^2 - 12x + 9$	$(x - 3)(x + 3) = x^2 - 3^2$
	$= x^2 - 9$

EXERCISE B   Multiply out

1. $(x - 1)^2$

2. $(3x + 5)^2$

3. $(7x - 2)^2$

4. $(x + 2)(x - 2)$

5. $(3x + 1)(3x - 1)$

6. $(5y - 3)(5y + 3)$