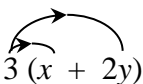


## Chapter 1: REMOVING BRACKETS

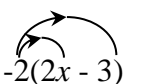
To remove a single bracket, we multiply every term in the bracket by the number or the expression on the outside:

### Examples

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



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



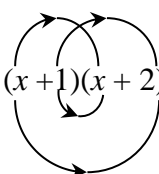
To expand two brackets, we must multiply everything in the first bracket by everything in the second bracket. We can do this in a variety of ways, including

- \* 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

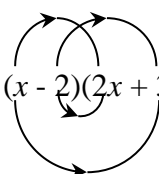
	$x$	$1$
$x$	$x^2$	$x$
$2$	$2x$	$2$

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

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:**

$$(x + a)^2 = (x + a)(x + a) = x^2 + 2ax + a^2$$

$$(2x - 3)^2 = (2x - 3)(2x - 3) = 4x^2 - 12x + 9$$

**Difference of two squares:**

$$(x - a)(x + a) = x^2 - a^2$$

$$(x - 3)(x + 3) = x^2 - 3^2 \\ = x^2 - 9$$

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

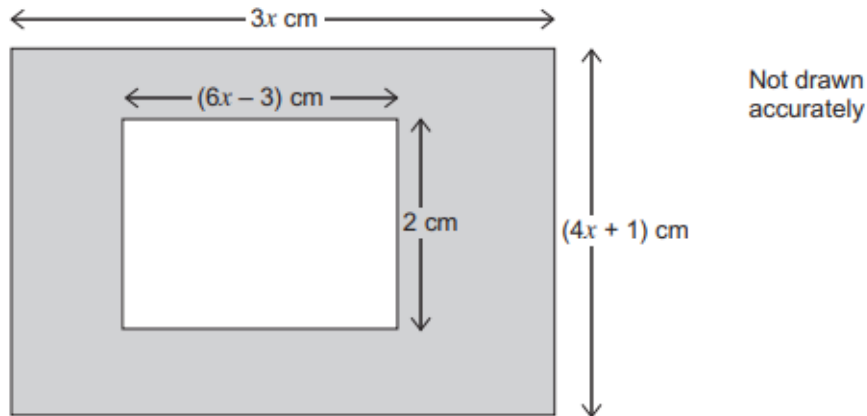
More help:

<http://www.mymaths.co.uk/tasks/library/loadLesson.asp?title=brackets/bracketsMovie&taskID=1150>

**CHALLENGE QUESTIONS:**

**Question 1**

The diagram shows two rectangles.



Show the shaded area, in  $\text{cm}^2$ , is given by  $12x^2 + bx + c$

.....  
**(2 marks)**

**Question 2**

$$3a(2x - 1) + 4(ax + 5) \equiv 60x + b$$

Work out the values of  $a$  and  $b$ .

.....

**Question 3**

Simplify  $(1 + x + y)^2 - (1 - x - y)^2$ .

.....

**Question 4**

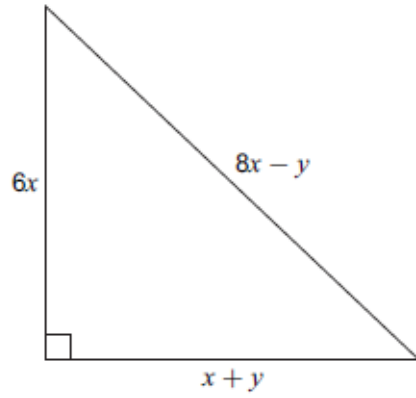
The  $n$ th term of a sequence is  $n^2 + 2n + 1$ .

Find a fully simplified expression (in expanded form) for the  $(n + 1)$ th term of the sequence.

.....

**Question 5**

The diagram shows a right-angled triangle.



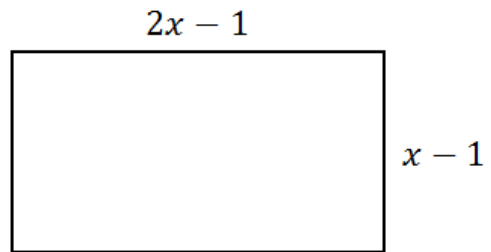
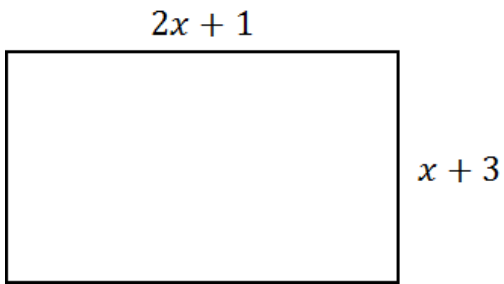
Not drawn accurately

Find the ratio  $x : y$ , giving your answer in its simplest form.

..... : .....  
**(6 marks)**

**Question 6**

The difference in area between the two rectangles below is 22. What is  $x$ ?



$x = \dots\dots\dots$