Expanding Single Brackets

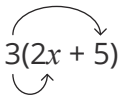
Prior Knowledge:

- Multiply an algebraic term by a whole number.
- Multiply an algebraic term by an algebraic term.
- Simplify by collecting like terms.

When you **expand** a bracket, you are removing a set of brackets from an expression. To do this, you multiply the term outside the bracket by **each separate term** inside the bracket.

Example 1

Here, we need to multiply both terms inside the bracket by 3. Sometimes, it helps to draw lines to represent each multiplication, so you don't forget one:



$3 \times 2x = 6x$

$3 \times 5 = 15$

We combine these into a single expression for our answer:

$6x + 15$

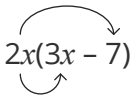
The terms can be written in any order ($15 + 6x$ is also correct) but, generally, we write them in decreasing powers of x.

Example 2

Expand the following bracket:

$2x(3x - 7)$

In this example, we follow the same process, but our multiplications will be a little trickier:



First, we need to multiply $2x$ by $3x$. You can do this in two stages, multiply 2 by 3 to get 6, then multiply x by x to get x^2:

$2x \times 3x = 6x^2$

Secondly, we need to multiply $2x$ by -7. Here, you need to take note of the sign:

$2x \times -7 = -14x$

This gives us a final answer of:

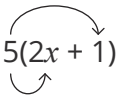
$6x^2 - 14x$

Example 3

Expand and simplify:

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

Sometimes, you'll be asked to expand and simplify two brackets. This means you expand both brackets individually, then simplify the answer. For the first bracket:

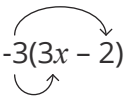


$5 \times 2x = 10x$

$5 \times 1 = 5$

$5(2x + 1) = 10x + 5$

For the second bracket, be careful with the signs. We're multiplying by -3, not by 3:



$-3 \times 3x = -9x$

$-3 \times -2 = 6$

$-3(3x - 2) = -9x + 6$

Now, we'll bring the expanded brackets together:

$10x + 5 - 9x + 6$

Collect the x terms:

$10x - 9x = x$

Collect the numbers:

$5 + 6 = 11$

Finally, combine these for our answer:

$5(2x + 1) - 3(3x - 2) = x + 11$

Your Turn

1. Expand the following brackets.

a. $2(x + 5)$

b. $3(x + 6)$

c. $5(y + 7)$

d. $10(t - 2)$

e. $7(2 - x)$

f. $4(8 - x)$

g. $x(x - 2)$

h. $a(a - 4)$

i. $r(2r + 3)$

j. $10m(2m + 7)$

k. $-4(3y - 2)$

l. $-2(4 - 2g)$

2. Expand and fully simplify:

a. $9(x + 2) + 4(x + 3)$

b. $2(x + 3) + 2(x + 8)$

c. $3(z - 6) + 4(z + 4)$

d. $2(5 - x) + 7(2 + x)$

e. $6(p + 5) - 2(p - 2)$

f. $-4(y + 3) - 3(y - 5)$

g. $10x(x + 2) + x(x + 6)$

h. $3a(a - 4) - 2a(a - 2)$

i. $2y(y + 7) + y(y + 3) + 4(y + 5)$

j. $4b(2 - b) - b(3b + 2) + 6(b - 5)$

Challenge

Write an expression to find the area of this rectangle. Expand and simplify the expression.