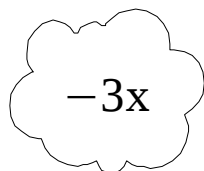# Simplifying expressions

## Collecting terms

$$-3x$$

Remember that a 'term' has a sign, a number and a letter. The sign stays 'glued' onto the number and letter so you can move them around...

E.G. 1. So $5x+3y-3x+2y$ is the same as $5x-3x+3y+2y$ because I just moved the -3x. This works out to be $2x+5y$

E.G. 2. Sometimes you have to think about the directed numbers, so $7x-4y-3x-6y$ is the same as $7x-3x-4y-6y=4x-10y$

E.G. 3. Powers must be treated as different symbols, so in the expression $5p^2-3p-2p^2+7p$ , you treat $p^2$ as different to p, giving
$5p^2-2p^2+7p-3p=3p^2-4p$

Try the ones on the practice sheet **now** before moving on...

## Multiplying terms

Remember

- $Y \times X = YX$
- $P \times P = P^2$
- $-4 \times 5 = -20$
- $-7 \times -9 = +63$

So

$$-3x \times 2y = -6xy$$

The steps
1. Sort out the signs
2. Multiply the numbers
3. Multiply the letters

Some examples

1. $-4r \times 3q = -12rq$
2. $-6x \times 8y = -48xy$
3. $x \times x \times x \times x = x^4$
4. $3 \times r \times r \times h = 3r^2h$
5. $2x \times -3y \times 12x = -72x^2y$

Make sure you know how the examples work, and then try the ones on the practice sheet **before** moving on...

## Dividing terms

Remember

- You can divide powers of the same number by **subtracting** the powers, so

$$\frac{5^8}{5^6}=5^2$$

- $\frac{-12}{8}=\frac{-3}{2}$ The rules are the same as for multiplying

The steps
1. Sort out the signs
2. Cancel the numbers
3. Work out the powers of the letters

A few examples

1. $\frac{15xy}{5x}=3y$ Xs cancelled
2. $\frac{12x^2y^2}{9xy}=\frac{4}{3}xy$
3. $\frac{21pq^3}{14p^2q^3}=\frac{3}{2p}$

Your turn, try cancelling the algebraic fractions on the practice sheet...

## Multiply out brackets

BODMAS says

- $3(4+7)=3\times11=33$

You can also do the sum like this

- $3(4+7)=3\times4+3\times7=33$

So, look at the lines...

$3(2x+4)=3\times2x+3\times4=6x+12$

Try to follow these examples (and remember your directed numbers)

1. $2(3x-5)=6x-10$
2. $-3(2x-1)=-6x+3$
3. $-5(3-2x)=-15+10x$
4. $-2y(3x+4)=-6xy-8y$

A minus sign outside the bracket simply switches all the signs in the bracket.

If there are two brackets, just
1. Multiply out the first
2. Multiply out the second
3. Collect the terms!

Your turn...