Mathematics - Algebra

3 + s *means "3 plus s" or "s" more than 3*

a - 5 *means "take 5 from a" or "5" less than a"*

4b *means "4 multiplied by b" or "4 lots of b"*

k/2 *means "k divided by 2"*

v^2 *means "v x v" "v squared"*

Simplifying by collecting like terms

e.g. 3a + 4b -za + b -3c

Circle the first type of like terms. Collect them together.

= 3a + 4b -2a + b -3c

= 3a -2a + 4b +b -3c

Underline the next set of like terms. Collect them together.

= 3a -za + 4b +b -3C

= a + 5b -3C

Continue and tidy up!

=a +5b -3c

Indices (Powers)

p^2 *means* p x p

p^3 *means* p x p x p

p^n *means* p x p x ... x p *(n times)*

p^1 = p

p^0 = 1

p^{-n} *means* $\frac{1}{p^n}$

e.g. $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$

$p^{1/n}$ *means* $\sqrt[n]{p}$

e.g. $27^{1/3} = \sqrt[3]{27} = 3$

Remember - common mistake!

a^2 = a x a and 2a = 2 x a

so

a^2 + 2a *cannot be simplified further as a^2 is not LIKE a !!!*

Rules of Indices

$a^x \times a^y = a^{x+y}$

$a^2 \div a^y = a^{x-y}$

$(a^x)^y = a^{xy}$

Simplifying Expressions

DEAL WITH THE DIGITS AND THEN WITH THE INDICES!!!

e.g. $6a^2b \times 3ab^3$

= 6 x 3 x a^2 x a x b x b^3

= 18 x $a^{(2+1)}$ x $b^{(1+3)}$

= $18a^3b^4$

e.g. $6a^2b \div 3ab^3$

= 6 ÷ 3 x a^2 ÷ a x b ÷ b^3

= 2 x $a^{(2-1)}$ x $b^{(1-3)}$

= $2ab^{-2}$

Multiplying brackets grid method

Multiplying brackets
Grid method
a(b+c)

x	b	c
a	ab	ac

= ab + ac

Multiplying brackets
Grid method
a(b-c)

x	b	-c
a	ab	-ac

= ab - ac

Multiplying Double Brackets
(a+b)(a+c)

x	a	b
a	a^2	ab
c	ac	cb

= a^2 + ab + ac = bc

An example of multiplying to get a quadratic equation
(a+2)(a-3)

x	a	-3
a	a^2	-3a
2	2a	-6

= a^2 -3a + 2a -6
= a^2 -2 -6

Quadratic formula

For solving $ax^2+bx+c = 0$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Other useful websites:

Useful Web Addresses

www.mathsnet.net
www.counton.org
www.schoolzone.co.uk
www.nrich.maths.org
www.bbc.co.uk/schools/revision/index.shtml
www.bbc.co.uk/education/numberwork
www.bbc.co.uk/education/megamaths
www.learn.co.uk
www.standards.dfee.gov.uk/numeracy