Algebra Rules

A term in algebra is any combination of numbers and/or letters.

The 3 in 3y is called the "coefficient".

The y in 3y is called the "variable" or the "pronumeral".

Like terms in algebra are any terms with the same letter and power.

Adding and Subtracting Algebra Terms

Main Rule:

You can only add and subtract like terms.

$7a + 4b + 2a + 3b = 9a + 7b$

5m	+ 3n	- 2m	+ 4n	= 3m + 7n

Simplify $3n^2 + 6n + 4n^2 - 8$

The only terms with the same letter and power are $3n^2 + 6n + 4n^2 - 8$.

Final answer is $7n^2 + 6n - 8$

Multiplying Algebra Terms

1. Multiply numbers normally
2. List letters beside each other

Simplify $2ab \times 5c = 10abc$

Simplify $3cd \times 7d = 21cd^2$

Note: $a \times a = a^2$

$a \times a \times a = a^3$

$a \times a \times a \times a = a^4$

Simplify $-4ab \times -3abc = 12a^2b^2c$

Dividing Algebra Terms

1. Write any divisions in fraction form
2. Divide numbers normally
3. Cancel down letters where possible

Simplify $25mn \div 5m$

$$= \frac{25mn}{5m}$$

We cancel down by finding a number and/or letter to divide into the top and bottom of the fraction.

$$= \frac{{}^{5}\cancel{25}\,{}^{1}\cancel{m}n}{{}_{1}\cancel{5}\,\cancel{m}_{1}}$$

$$= \frac{5 \times 1 \times n}{1 \times 1}$$

$$= \frac{5n}{1} \text{ or } 5n$$

Simplify $8m \div 32mn$

$$= \frac{{}^{1}\cancel{8}\,{}^{1}\cancel{m}}{{}_{4}\cancel{32}\,\cancel{m}_{1}n}$$

$$= \frac{1 \times 1}{4 \times 1 \times n}$$

$$= \frac{1}{4n}$$

Algebra Using Substitution

1. Substitute each letter with its number
2. Calculate the overall value

If a=4, b=2 and c= 5, find the value of

$a + 3b - c$

$4 + 3 \times (2) - 5$

$= 4 + 6 - 5$

$= 5$

Expanding Algebra Expressions

To expand an expression, multiply the front term by each term inside the brackets.

Expand $5(a+2) = 5 \times a + 5 \times 2$

$= 5a + 10$

Expand $5bc(4b+6a) = 20b^2c + 30abc$

Factorising Algebra Expressions

1. Find the largest term that is common to both terms.
2. Put this out the front of brackets.
3. Fill in the brackets with appropriate terms

Factorise $3y + 6 = 3(y + 2)$

Check by expanding our answer.

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

(We are correct if we get back to the original question.)

Factorise $5m - 15 = 5(m - 3)$

Factorise $6 - 12g = 6(1 - 2g)$

Factorise $8ap - 12cp = 4p(2a - 3c)$

Factorise $3m^2n + 9m = 3m(mn + 3)$