

Rules for algebraic notation

$a + a = 2a$ (the number needs to go in front of the letter)

A number after a letter is a power

Eg. $a^3 = a \times a \times a$

Fractional indices

The denominator of a fractional power acts as a 'root'.

The numerator of a fractional power acts as a normal power.

Eg.

$$27^{\frac{2}{3}} = (\sqrt[3]{27})^2 = 3^2 = 9$$

Simplify expressions

Collect 'like terms' means collecting the terms with the same letters together.

Eg. $2x + 3y + 4x - 5y + 3 = 6x - 2y + 3$

Be careful with negatives.

x^2 and x are not like terms.

Eg. $3x + 4 - x^2 + 2x - 1 = 5x - x^2 + 3$



Year 9 foundation topic 2

Algebra

What careers would use these skills?

Engineers, architects, economists, dieticians, paramedics, air traffic controllers, computer analysts, carpenters

Laws of indices

When multiplying with the same base (number or letter), add the powers. $a^m \times a^n = a^{m+n}$

Eg. $c^5 \times c^3 = c^8$

When dividing, subtract the powers. $a^m \div a^n = a^{m-n}$

Eg. $n^5 \div n^3 = n^2$

When raising a power to another power, multiply the powers together. $(a^m)^n = a^{m \times n}$

Eg. $(j^5)^3 = j^{15}$

$p = p^1$

Anything to the power of zero is 1.

Eg. $p^0 = 1$

A negative power is the reciprocal

$$a^{-m} = \frac{1}{a^m}$$

Multiply terms

x times x is x^2 not $2x$

$p \times p \times p = p^3$

$2 \times a \times b = 2ab$

$4a \times -5a = -20a^2$

$7a \times 3b \times 2c = 42abc$

Expand single brackets

To expand a bracket, multiply each term in the bracket by the expression outside the bracket.

Eg. $3(x + 2) = 3x + 6$

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

$4(2x - 5) = 8x - 20$

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

Substitution

Replace letters with numbers. Be careful of $5x^2$. You need to square first then multiply by 5.

Eg. $a=3$, $b=2$ and $c=5$

$2a = 2 \times 3 = 6$

$3a - 2b = 3 \times 3 - 2 \times 2 = 5$

$7b^2 - 5 = 7 \times 2^2 - 5 = 23$

Don't forget to use BIDMAS

Factorising into 1 bracket

The reverse of expanding. Factorising is writing an expression as a product of terms by taking out a common factor.

Eg. $6x - 15 = 3(2x - 5)$ where 3 is the common factor

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

Always take out the highest common factor that you can

Eg. $2x^2 + 4x = 2x(x + 2)$