

ALGEBRAIC TECHNIQUES...

Indices

@whisto_maths

What do I need to be able to do?

By the end of this unit you should be able to:

- Add/ Subtract expressions with indices
- Multiply expressions with indices
- Divide expressions with indices
- Know the addition law for indices
- Know the subtraction law for indices

Keywords

Base: The number that gets multiplied by a power

Power: The exponent – or the number that tells you how many times to use the number in multiplication

Exponent: The power – or the number that tells you how many times to use the number in multiplication

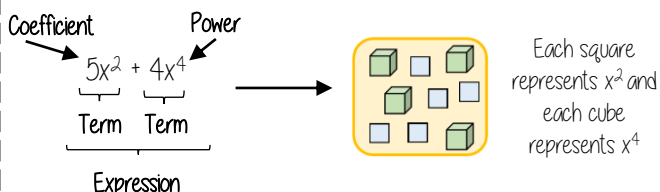
Indices: The power or the exponent

Coefficient: The number used to multiply a variable

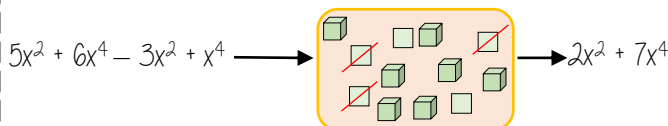
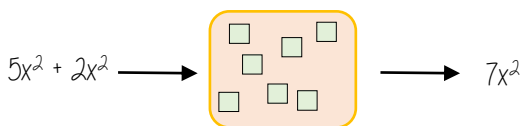
Simplify: To reduce a power to its lowest term

Product: Multiply

Addition/ Subtraction with indices



Only similar terms can be simplified
If they have different powers, they are unlike terms



Multiply expressions with indices

$$\begin{aligned} 4b \times 3a & \\ \equiv 4 \times b \times 3 \times a & \\ \equiv 4 \times 3 \times b \times a & \\ \equiv 12ab & \end{aligned}$$

$$\begin{aligned} 5t \times 9t & \\ \equiv 5 \times t \times 9 \times t & \\ \equiv 5 \times 9 \times t \times t & \\ \equiv 45t^2 & \end{aligned}$$

$$\begin{aligned} 2b^4 \times 3b^2 & \\ \equiv 2 \times b \times b \times b \times b \times 3 \times b \times b & \\ \equiv 2 \times 3 \times b \times b \times b \times b \times b \times b & \\ \equiv 6b^6 & \end{aligned}$$

There are often misconceptions with this calculation but break down the powers

Addition/ Subtraction laws for indices

$$3^5 \times 3^2 \longrightarrow 3^7$$

$$= (3 \times 3 \times 3 \times 3 \times 3) \times (3 \times 3)$$

The base number is all the same so the terms can be simplified

Addition law for indices

$$a^m \times a^n = a^{m+n}$$

$$3^5 \div 3^2 \longrightarrow 3^3$$

$$\frac{3 \times 3 \times 3 \times 3 \times 3}{3 \times 3} \longrightarrow \frac{3^3}{3^0} \longrightarrow \frac{3^3}{1}$$

Subtraction law for indices

$$a^m \div a^n = a^{m-n}$$

Divide expressions with indices

$$\frac{24}{36} \longrightarrow \frac{\cancel{2} \times \cancel{2} \times 2 \times \cancel{3}}{\cancel{2} \times \cancel{3} \times 2 \times \cancel{3}} \longrightarrow \frac{2}{3}$$

$$\frac{5a^3b^2}{15ab^6} \longrightarrow \frac{\cancel{5} \times \cancel{a} \times a \times a \times \cancel{b} \times \cancel{b}}{3 \times \cancel{5} \times \cancel{a} \times \cancel{b} \times b \times b \times b \times b} \longrightarrow \frac{a^2}{3b^4}$$

Cross cancelling factors shows cancels the expression

$$\left. \frac{23a^7y^2}{5db^6} \right\} \text{ This expression cannot be divided (cancelled down) because there are no common factors or similar terms}$$