

Simplifying Algebraic Expressions:

We can often simplify algebraic expressions by 'combining like terms'.

Look at the expression: $2x + 5y + x - 3y$.

There are four terms and $2x$, $5y$, x and $3y$.

Two of the terms involve x , and two involve y .

We can re-order the terms in the expression so that the x terms are together and the y terms are together:

Now we can combine the x terms and combine the y terms to get: $2x + x + 5y - 3y$

So, when simplified, becomes: $3x + 2y$

Example:

Combine like terms and simplify this algebraic expression:

$$a + 4b + 3a - 3b$$

- Change the order to: $a + 3a + 4b - 3b$
- Simplify to: $4a + b$

Distribution Property (To remove brackets, we multiply them out).

Example: Look at the expression:

$4(y - 5)$ This expression means everything inside the brackets is multiplied by 4.

$$4(y - 5) = 4y - 4 \times 5 = 4y - 20$$

Therefore $4(y - 5)$ becomes $4y - 20$, when the brackets is removed.

Simplifying algebraic expressions Distribution and combining like terms, to simplify algebraic expressions.

Example: We want to simplify the expression: $5(a + b) - 2b$

$$5(a + b) - 2b$$

$$= 5a + 5b - 2b \text{ (when the brackets are multiplied out)}$$

$$= 5a + 3b \text{ (when like terms are combined)}$$

$$\text{Therefore } 5(a + b) - 2b = 5a + 3b$$

Example 2: Simplify: $3(x - 2y) + 4x$

Distribute: $(3 \cdot x) - (3 \cdot 2y) + 4x$

$$3x - 6y + 4x$$

Reorganize: $3x + 4x - 6y$

Combine like terms: $7x - 6y$

Factoring algebraic expressions:

The largest factor of the expression: $10 + 4x$, is 2 because 2 is the largest number that divides exactly into both 10 and $4x$.

$$\frac{10}{2} = 5 \quad \text{and} \quad \frac{4x}{2} = 2x$$

Therefore: $10 + 4x = 2(5 + 2x)$

We say that the expression $10 + 4x$ has been factorized (the factors being 2 and $5 + 2x$)

Example: Factor $6a - 9$

$$\frac{6a}{3} = 2a \quad \text{and} \quad \frac{9}{3} = 3$$

The largest number dividing $6a$ and 9 exactly is 3.

Therefore, $6a - 9$, becomes $3(2a - 3)$ when factorized.