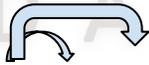


Equations and Brackets

- Brackets are mathematical feature that allows equations to be simplified by finding the common factor
- What is a common factor?
 - Any feature that is present in the parts of an equation
 - For example:
 $8x + 12$
 - Both $8x$ and 12 are multiple of 4
 - 4 is the common factor
- We place the common factor outside the bracket \rightarrow what is outside must be common within each part of the equation \rightarrow the value of 4 in the example above
- What is inside the bracket are the feature that are NOT common
 - For example with $8x + 12$
 - If we take the common feature outside $\rightarrow 4(\dots+\dots)$
 - Then $2x$ and 3 are not common \rightarrow these are the multiples that will make the value we are trying to simplify
 - So $8x$ using the common feature of 4 will give us $2x$
 - And 12 using the common feature of 4 will give us 3
 - Therefore, $8x + 12 = 4(2x + 3)$
- To check if we simplified the bracket correctly, we open up the bracket and this should give us what we started with



$$4(2x + 3) = 8x + 12$$

Type of questions:

- 1) Create a bracket, which is simplifying an equation \rightarrow an equation is given and you would need to put brackets in place to simplify the equation
- 2) Open a bracket to solve or simplify \rightarrow an equation with brackets is given and requires you to expand the brackets and simplify

Example 1

Simplify the equation $5x + 25 + 6y + 3y$

We know that:

- Both $5x$ and 25 have 5 as a common feature
- Both $6y$ and $3y$ have 3 and y
- Both the common value/feature/characteristic of 5 has NO connection to 3 and y
- This implies that we do two brackets \rightarrow one for the 5 and the other for $3y$
- Now create the bracket
 - $5x + 25 = 5(x + 5)$
 - $6y + 3y = 3y(2 + 1)$

The solution of simplifying $5x + 25 + 6y + 3y = 5(x + 5) + 3y(2 + 1)$

Opening up brackets

- Multiply the common value with each value inside the bracket and then merge any of the common parts or organise the equation

Example 2


$$\begin{aligned} & 2(3a - b) - 7(-2a + 3b) \\ &= 2 \cdot 3a - 2 \cdot b + (-7)(-2a) + (-7)(3b) \\ &= 6a - 2b + 14a - 21b \\ &= 20a - 23b \end{aligned}$$

Organize equations and then use brackets to further simplify

If we have an equation, we first try to find any of the parts of the equation we can merge together and then we try to find common factor or factors and simplify the equation by creating brackets.

Example 3

Simplify the equation $4x + 5xy - 3x^2 - 6xy + 6$

- There are parts of the equation that can be merged together, this consist of $5xy$ and $-6xy \rightarrow 5xy - 6xy = -xy$
- The equation will become $4x - xy - 3x^2 + 6$
- The common feature in the first 3 parts of the equation is x
- $x(4 - y - 3x) + 6$



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