Factorisation by Regrouping Terms

Factorisation by regrouping terms:

Look at the expression 2xy + 2y + 3x + 3. You will notice that the first two terms have common factors 2 and y and the last two terms have a common factor 3. But there is no single factor common to all the terms. How shall we proceed?

Let us write (2xy + 2y) in the factor form:

$2xy + 2y = (2 \times x \times y) + (2 \times y)$

$= (2 \times y \times x) + (2 \times y \times 1)$

$= (2y \times x) + (2y \times 1) = 2y\,(x + 1)$

Similarly, $3x + 3 = (3 \times x) + (3 \times 1)$

$= 3 \times (x + 1) = 3\,(x + 1)$

Hence, $2xy + 2y + 3x + 3 = 2y\,(x + 1) + 3\,(x + 1)$

Observe, now we have a common factor (x + 1) in both the terms on the right hand side. Combining the two terms,

$2xy + 2y + 3x + 3 = 2y\,(x + 1) + 3\,(x + 1) = (x + 1)\,(2y + 3)$

The expression 2xy + 2y + 3x + 3 is now in the form of a product of factors. Its factors are (x + 1) and (2y + 3). Note, these factors are irreducible.

What is regrouping?

Suppose, the above expression was given as 2xy + 3 + 2y + 3x; then it will not be easy to see the factorisation. Rearranging the expression, as 2xy + 2y + 3x + 3, allows us to form groups (2xy + 2y) and (3x + 3) leading to factorisation. This is regrouping.

Regrouping may be possible in more than one ways. Suppose, we regroup the **Expression as:** $2xy + 3x + 2y + 3$. This will also lead to factors. Let us try:

$2xy + 3x + 2y + 3 = 2 \times x \times y + 3 \times x + 2 \times y + 3$

$= x \times (2y + 3) + 1 \times (2y + 3)$

$= (2y + 3)(x + 1)$