

13. Algebraic Formulae- Expansion of Square

- An identity is an equality which is true for all values of the variables in it. It helps us in shortening our calculations.
- Identities for "Square of Sum or Difference of Two Terms" are:
 - $(a + b)^2 = a^2 + 2ab + b^2$
 - $(a - b)^2 = a^2 - 2ab + b^2$

Example:

Evaluate $(5x + 2y)^2 - (3x - y)^2$.

Solution:

Using identities (i) and (ii), we obtain

$$\begin{aligned}(5x + 2y)^2 &= (5x)^2 + 2(5x)(2y) + (2y)^2 \\ &= 25x^2 + 20xy + 4y^2\end{aligned}$$

$$\begin{aligned}(3x - y)^2 &= (3x)^2 - 2(3x)(y) + (y)^2 \\ &= 9x^2 - 6xy + y^2\end{aligned}$$

$$\therefore (5x + 2y)^2 - (3x - y)^2 = 25x^2 + 20xy + 4y^2 - 9x^2 + 6xy - y^2 = 16x^2 + 26xy + 3y^2$$

- $(a + b)(a - b) = a^2 - b^2$

Example:

Evaluate 95×105 .

Solution:

We have, $95 \times 105 = (100 - 5) \times (100 + 5)$

$$\begin{aligned}&= (100)^2 - (5)^2 \quad [\text{Using identity } (a + b)(a - b) = a^2 - b^2] \\ &= 10000 - 25 \\ &= 9975\end{aligned}$$

- Algebraic expressions are formed by combining variables with constants using operations of addition, subtraction, multiplication and division.

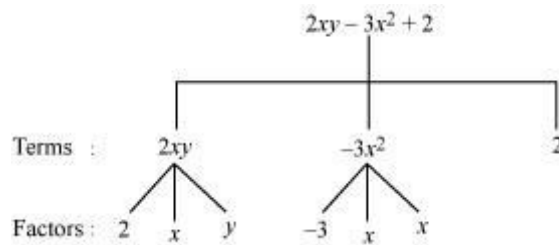
For example: $4xy$, $2x^2 - 3$, $7xy + 2x$, etc.

In an algebraic expression, say $2xy - 3x^2 + 2$; $2xy$, $(-3x^2)$, 2 are known as the terms of the expression.

The expression $2xy - 3x^2 + 2$ is formed by adding the terms $2xy$, $(-3x^2)$ and 2 where 2 , x , y are factors of the term $2xy$; (-3) , x , x are factors of the term $(-3x^2)$; 2 is the factor of the term 2 .

For an expression, the terms and its factors can be represented easily and elegantly by a tree diagram.

Tree diagram for the expression $2xy - 3x^2 + 2$:



Note: In an expression, 1 is not taken as separate factor.

- The numerical factor of a term is known as its coefficient. For example, for the term $-3x^2y$, the coefficient is (-3) .
- The terms having the same algebraic factors are called like terms, while the terms having different algebraic factors are called unlike terms.

For example: $13x^2y$, $-23x^2y$ are like terms; $12xy$, $3x^2$ are unlike terms