Chapter- 12

Identities

An identity is an equality which is true for every value of the variable but an equation is true for only some of the values of the variables.

So an equation is not an identity.

Like, $x^2 = 1$, is valid if x is 1 but is not true if x is 2.so it is an equation but not an identity.

Some of the Standard Identities

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

$(a - b)^2 = a^2 – 2ab + b^2$

$a^2 – b^2 = (a + b)(a - b)$

$(x + a)(x + b) = x^2 + (a + b)x + ab$

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

These identities are useful in carrying out squares and products of algebraic expressions. They give alternative methods to calculate products of numbers and so on.

Applying Identities

Example

$(4x – 3y)^2$

$= (4x)^2 – 2(4x)(3y) + (3y)^2$

$= 16x^2 – 24xy + 9y^2$

Example

Use the Identity $(x + a)(x + b) = x^2 + (a + b)x + ab$ to find the value of 501×502

Solution:

501×502

$= (500 + 1) \times (500 + 2)$

$= 500^2 + (1 + 2) \times 500 + 1 \times 2$

$= 250000 + 1500 + 2$

$= 251502$