



U8T5D2

Learning Objectives

- To understand the following identities through geometrical proof
 - ◆ $(x + a)(x + b) = x^2 + x(a + b) + ab$
 - ◆ $(a + b)^2 = a^2 + 2ab + b^2$
 - ◆ $(a - b)^2 = a^2 - 2ab + b^2$ and
 - ◆ $(a + b)(a - b) = a^2 - b^2$.
- Able to apply the identities in numerical problems.
- Able to recognise expressions that are factorisable.
- To represent inequalities in one variable, graphically.

3.1 Introduction to Identities

In earlier classes, we have learnt to construct algebraic expressions using exponential notations. For example, $x^2 + 3x + 2$ is an algebraic expression in the variable x . This can also be written as an equation $x^2 + 3x = -2$.

By substituting numerical values for x , we can verify this equation.

$$\begin{aligned} \text{If } x = -2, \text{ then } \quad \text{L.H.S} &= x^2 + 3x = (-2)^2 + 3(-2) \\ &= 4 - 6 \\ &= -2 = \text{R.H.S} \end{aligned}$$

Hence, this equation is true when $x = -2$.

$$\begin{aligned} \text{If } x = -1, \text{ then } \quad \text{L.H.S} &= x^2 + 3x = (-1)^2 + 3(-1) \\ &= 1 - 3 \\ &= -2 = \text{R.H.S} \end{aligned}$$

Hence, this equation is true when $x = -1$.

$$\begin{aligned} \text{But when } x = 1, \quad \text{L.H.S} &= x^2 + 3x = (1)^2 + 3(1) \\ &= 1 + 3 \\ &= 4 \neq \text{R.H.S} \end{aligned}$$

Thus, this equation is not true when $x = 1$.

Thus, $x^2 + 3x = -2$ is an equation which is true only when x takes the values -1 and -2 . Hence, an equation is true only for certain values of the variable in it.

It is not true for all values of the variables.

Now, consider the algebraic expression, $(a + b)^2 = a^2 + 2ab + b^2$. Let us try to find the values of the expression for the given values of a and b .