Identity and Inverse elements

(1) **Identity element:**Let * be a binary operation on a set S. An element e ∈ S is said be an identity element for the binary operation * if a * e = a = e * a for all a ∈ S.

For addition on Z, 0 is the identity element, since a + 0 = a = 0 + a for all a ∈ Z.

For multiplication on R, 1 is the identity element, since 1 × a = a = a × 1 for all a ∈ R.

(2) **Inversible element for a binary operation with identity:**An element a of a set A is said to be inversible for a binary operation * with identity e if ∃ b ∈ A such that a * b = e = b * a.

Also, then b is said to be an inverse of a and is denoted by a^{-1}. The inversible elements in A are also called the units in A. The identity element is always inversible and is its own inverse, since e * e = e * e = e. Thus e^{-1} = e.