Ideals, Nik Van Rompaey

In abstract algebra, rings are an expansion on groups. A **ring** is notated (R,$+$,$\cdot$) where

- (R,$+$) is a group
- $+$ is its closed associative binary operation
- (R,$+$) must be abelian.
- The $\cdot$ is a ring's second binary operation, which must be associative and distributive.

A **subgroup** of a group G is a subset of G, such that the subset is a group under the same binary operation as G.

A **subring** of a ring R is a subset of R, such that the subset is a ring under both binary operations.

An **ideal**, I, is a subring where r is closed under $\cdot$ with every element in R.

Group	**Ring**
Given a nonempty set G There is a binary operation ∘ ∘ is associative:(a∘b)∘c = a∘(b∘c) ∘ is closed:aϵG and bϵG ⇒ a∘bϵG Identity eϵG and ∀aϵG, an inverse a^{-1}	Given a nonempty set R Binary operations +,· (R,+) is abelian · is both associative, and distributive: a·(b+c)=a·b+a·c
Subgroup	**Subring**
Set H ⊆ G Same associative binary operation ∘ H is a group under ∘	Set S ⊆ R Same binary operations +,· S is a ring under +,·
Right Ideal	**Left Ideal**
Subring S in ring R, notated I ∀sϵI,∀rϵR, s·rϵI	Subring S in ring R, notated I ∀sϵI,∀rϵR, r·sϵI

References

- Saracino, Dan. Abstract Algebra A First Course. 2nd ed. Long Grove, Illinois: Waveland, 2008. Print.