A **ring** is a set R with binary operations $+$ and multiplication such that:

1–4. The operation $+$ gives R the structure of an abelian group with identity 0 and the inverse of a written $-a$.

5. For all $a, b, c \in R$, $(ab)c = a(bc)$. (Assoc)

6. For all $a, b, c \in R$, $a(b + c) = ab + ac$ and $(a + b)c = ac + bc$. (Distrib)

Other types of rings include:

I. If $\exists\ 1 \in R$ such that $1a = a1 = a$ for all $a \in R$, we say that 1 is a **unity** (or **identity**) in R.

C. If $ab = ba$ for all $a, b \in R$, we say that R is **commutative**.