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(3) Let  $a \in \mathbb{Z}$  be a fixed,  $(a)$  denote the set of all integral multiples of  $a$  i.e

$(a) = \{na \mid n \in \mathbb{Z}\}$  then the triple  $((a), +, \cdot)$

form an ideal of the ring  $(\mathbb{Z}, +, \cdot)$  where,

$$\left. \begin{array}{l} na - ma = (n-m)a \\ m(na) = (mn)a \end{array} \right\} n, m \in \mathbb{Z}$$

in particular  $(2) = \mathbb{Z}_e$  is an ideal  $(\mathbb{Z}_e, +, \cdot)$  of  $(\mathbb{Z}, +, \cdot)$ .

Remark: - If  $\forall a \in I$  and  $\forall r \in R$  then  $ra \in I$

$I$  is called left ideal

- the same for right ideal, if it is left and right then we called  $I$  a two-sided ideal.