Scalar Multiplication of Matrices.

Let $A = [a_{ij}]_{m\times n}$ be a matrix and *k* be a number, then the matrix which is obtained by multiplying every element of *A* by *k* is called scalar multiplication of *A* by *k* and it is denoted by *kA*.

Thus, if $A = [a_{ij}]_{m\times n}$, then $kA = Ak = [ka_{ij}]_{m\times n}$. *Example*: If $A = \begin{bmatrix} 2 & 4 \\ 3 & 1 \\ 4 & 6 \end{bmatrix}$, then $5A = \begin{bmatrix} 10 & 20 \\ 15 & 5 \\ 20 & 30 \end{bmatrix}$

Properties of scalar multiplication:

If A, B are matrices of the same order and λ, μ are any two scalars then

(i) $\lambda(A + B) = \lambda A + \lambda B$ (ii) $(\lambda + \mu)A = \lambda A + \mu A$

(iii) $\lambda(\mu A) = (\lambda\mu A) = \mu(\lambda A)$ (iv) $(-\lambda A) = -(\lambda A) = \lambda(-A)$

Note: All the laws of ordinary algebra hold for the addition or subtraction of matrices and their multiplication by scalars.