IIITB COMET FOUNDATION

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MATHEMATICS
APPLICATION OF MATRICES
Word Problem Using Matrix Method

SECTION A

1. In an orphanage, an amount of money was distributed among the children.

   If there were 8 children less, each child would have received Rs. 10 more.

   If there were 16 children more, each child would have received Rs. 10 less.

   Using the matrix method, find:

   (a) Number of children.

   (b) Total amount distributed.

   (c) What values are reflected by this decision?

   Solution using matrix method

   Let number of children be x and share per child be y.

   Total amount $= xy$.

   Conditions give:

$$(x-8)(y+10) = xy$$

$$(x+16)(y-10) = xy$$

   Expanding,

$$10x - 8y = 80$$

$$-10x + 16y = 160$$

Matrix form:

$$\begin{bmatrix} 10 & -8 \\ -10 & 16 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 80 \\ 160 \end{bmatrix}$$

Solving,

$$x = 24, \quad y = 20$$

Number of children = 24.

Total amount:

$$24 \times 20 = 480$$

Total amount distributed = Rs. 480.

Values reflected: fairness, care, and equal distribution.