

NCERT 11.16.3.3

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In a family having three children , there may be no girl, one girl, two girls , or three girls. So the probability of each is $1/4$. Is this correct ? Justify your answer.

Solution:

NO, it is not correct.

Let,

$$X = \{0, 1\} \quad (1)$$

$$p_X(k), k = \{0, 1, 2, 3\} \quad (2)$$

$$p_X(0) = C(3, 0) \left(\frac{1}{2}\right)^0 \left(\frac{1}{2}\right)^3 \quad (3)$$

$$p_X(1) = C(3, 1) \left(\frac{1}{2}\right)^1 \left(\frac{1}{2}\right)^2 \quad (4)$$

$$p_X(2) = C(3, 2) \left(\frac{1}{2}\right)^2 \left(\frac{1}{2}\right)^1 \quad (5)$$

$$p_X(3) = C(3, 3) \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^0 \quad (6)$$

$$\Rightarrow p_X(0) = \frac{1}{8} \quad (7)$$

$$\Rightarrow p_X(1) = \frac{3}{8} \quad (8)$$

$$\Rightarrow p_X(2) = \frac{3}{8} \quad (9)$$

$$\Rightarrow p_X(3) = \frac{1}{8} \quad (10)$$

Parameter	Value	Description
X=0	$\frac{1}{8}$	no girl
X=1	$\frac{3}{8}$	1 girl
X=2	$\frac{3}{8}$	2 girls
X=3	$\frac{1}{8}$	3 girls

TABLE 0: Random Variables