

27 A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of two successes.

Ans: The repeated tosses of a pair of dice are Bernoulli trials. Let X denote the number of times of getting doublets in an experiment of throwing two dice simultaneously four times. Probability of getting doublets in a single throw of the pair of dice is $p = \frac{6}{36} = \frac{1}{6}$

$$\therefore q = 1 - p = 1 - \frac{1}{6} = \frac{5}{6}$$

clearly, X has the binomial distribution with $n=4$, $p=\frac{1}{6}$, and $q=\frac{5}{6}$

$$\therefore P(X=x) = {}^n C_x p^x q^{n-x}, \text{ where } x=0, 1, 2, 3, \dots, n$$

$$= {}^4 C_x \left(\frac{1}{6}\right)^x \left(\frac{5}{6}\right)^{4-x}$$

$$= {}^4 C_x \cdot \frac{5^{4-x}}{6^4}$$

$$\therefore P(2 \text{ successes}) = P(X=2)$$

$$= {}^4 C_2 \cdot \frac{5^{4-2}}{6^4} = 6 \cdot \frac{25}{1296} = \frac{25}{216}$$