

Q. A fair coin is tossed a fixed number of times. If the probability of getting 7 heads is equal to that of getting 9 heads, then find the probability of getting 3 heads.

Soln:- let coin is tossed  $n$  times.

$$P(7 \text{ heads}) = {}^n C_7 \left(\frac{1}{2}\right)^7 \left(\frac{1}{2}\right)^{n-7} = {}^n C_7 \left(\frac{1}{2}\right)^n$$

$$P(9 \text{ heads}) = {}^n C_9 \left(\frac{1}{2}\right)^9 \left(\frac{1}{2}\right)^{n-9} = {}^n C_9 \left(\frac{1}{2}\right)^n$$

as given  $P(7 \text{ heads}) = P(9 \text{ heads})$

$$\Rightarrow {}^n C_7 = {}^n C_9 \Rightarrow n = 16$$

$$P(3 \text{ heads}) = {}^{16} C_3 \left(\frac{1}{2}\right)^3 \left(\frac{1}{2}\right)^{16-3} = {}^{16} C_3 \cdot \left(\frac{1}{2}\right)^{16}$$

$$= \frac{35}{2^{12}}$$