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Question: we roll a die and then flip that number of coins. what is the probability of A that we get exactly 3 heads?

Solution: Let X be the outcome when a die is rolled and let Y be the numbers of head when tossing some coins. It is clear that, P(Y = 3) = 0 when X = 1 or X = 2.

 $\begin{array}{l} P(A) = P(X=3)*P((Y=3)/(X=3)) + P(X=4)*P((Y=3)/(X=4)) + P(X=5)*P((Y=3)/(X=5)) + P(X=6)*P((Y=3)/(X=6)) \end{array}$

 $= (1/6) * (1/8) + (1/6)(4C3 * (1/2)^4) + (1/6)(5C3 * (1/2)^5) + (1/6)(6C3 * (1/2)^6)$

= 1/48 + 1/24 + 5/96 + 5/96 = 1/6.