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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 $X=2$.

$$
P(A)=P(X=3) * P((Y=3) /(X=3))+P(X=4) * P((Y=3) /(X=4))+P(X=5) * P((Y=
$$ 3) $/(X=5))+P(X=6) * P((Y=3) /(X=6))$

$$
\begin{aligned}
& =(1 / 6) *(1 / 8)+(1 / 6)\left(4 C 3 *(1 / 2)^{4}\right)+(1 / 6)\left(5 C 3 *(1 / 2)^{5}\right)+(1 / 6)\left(6 C 3 *(1 / 2)^{6}\right) \\
& =1 / 48+1 / 24+5 / 96+5 / 96=1 / 6
\end{aligned}
$$

