

we divide our problem ~~in~~ in some states:

1. we have exactly one 6:

we can choose it in $\binom{4}{1} = 4$ ways.

$\overset{\downarrow}{\text{X}} \text{ --- } \text{ --- } \text{ ---}$ for example. and it should be
6. $\Rightarrow$ 1 way.

for the other 3 positions we have $5 \times 5 \times 5$ ways.

so totally we have: $\binom{4}{1} \times 1 \times 5 \times 5 \times 5$ ways.

2. we have exactly two 6:

similarly $\binom{4}{2}$ ways for finding 6's.

5×5 for the others.

$\binom{4}{2} \times 5 \times 5$ ways.

3. three 6: $\binom{4}{3} \times 5$

4. for 6: $\binom{4}{4}$

$\Rightarrow$ totally we have:

$$\binom{4}{1} \times 5^3 + \binom{4}{2} \times 5^2 + \binom{4}{3} \times 5 + \binom{4}{4} = 671$$

$$\Rightarrow P = \frac{671}{6^4}$$

$$\text{from the tutorial: } P = 1 - \left(\frac{5}{6}\right)^4 = \frac{671}{6^4} \quad \checkmark$$