Alice and Bob each toss a six-sided die. The person with the larger face value wins. If the values are equal the result is a draw. You find out that Bob won. What is the probability that Bob's face value was a 6 ?

Solution: Let $B$ be the event Bob wins and $S$ be the event that Bob's face value is a 6 . As all 36 outcomes are equally likely, $\mathrm{P}(S \mid B)=\frac{|S \cap B|}{|B|} . S \cap B$ has size 5 as Bob's roll must be a 6 and Alice's cannot be a 6 . If $A$ is the event Alice wins then $A \cup B$ consists of all outcomes that do not result in a draw so $|A|+|B|=|A \cup B|=36-6=30$. By symmetry $|B|=15$. Finally $\mathrm{P}(S \mid B)=5 / 15=1 / 3$.

