Multiplication Rule

P(A and B) = P(A)*P(B)

The Probability of the Independent Events $\{A \text{ and } B\}$

The multiplication rule: If *A* and *B* are independent events, then

$$P(A \text{ and } B) = P(A)*P(B)$$

P(rolling a 1) = 1/6 (one possible 1 out of 6 total possibilities)

P(rolling a 2) = 1/6

 \dots and so on. If we took all of the possible rolls and added their probabilities, they would add up to \dots ?

P(1) + P(2) + P(3) + P(4) + P(5) + P(6) = ? 1

What if we rolled two fair dice? How many possible outcomes would there be?



6 X 6 = **36**

What if we rolled two fair dice? How many possible outcomes would there be?

6 X 6 X 6 = **216**

What if we rolled <u>three</u> fair dice? How many possible outcomes would there be?

Relays in electrical circuits are often assumed to work (or fail) independently of each other. These relays can be set up in series as below. For current to flow through a relay, it must be closed. A switch is used to open or to close a relay. The circuit functions if current can flow through it.

If P(1) = the probability that relay 1 will fail = 0.03

and P(2) = the probability that relay 2 will fail = 0.05

Find the probability that this series will fail to deliver current from *a* to *b*

In other words, find P(1 & 2) = the probability that both relays will fail

 $P(1 \& 2) = P(1) \times P(2) = (0.03)(0.05) = 0.0015$

