



Probability

An Experiment

- Flipping coins
- Rolling dice
- Choosing cards from a deck
- Picking colored marbles from a bag



A Trial

Every repetition or observation of an experiment:

- Flip a coin once
- Roll a die once
- Choosing one card from a deck
- Picking one colored marble from a bag



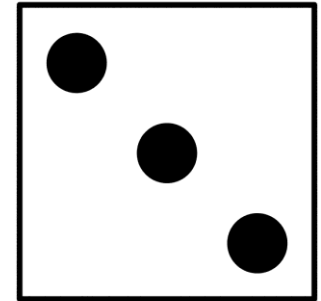
Think of the TRIAL as the CAUSE.

An Outcome

The result of each trial is an outcome:

- You get heads.
- You roll a 3.
- You choose a jack of hearts.
- You pick a red marbles from the bag.

Think of the **OUTCOME** as the **EFFECT**.



An Event.

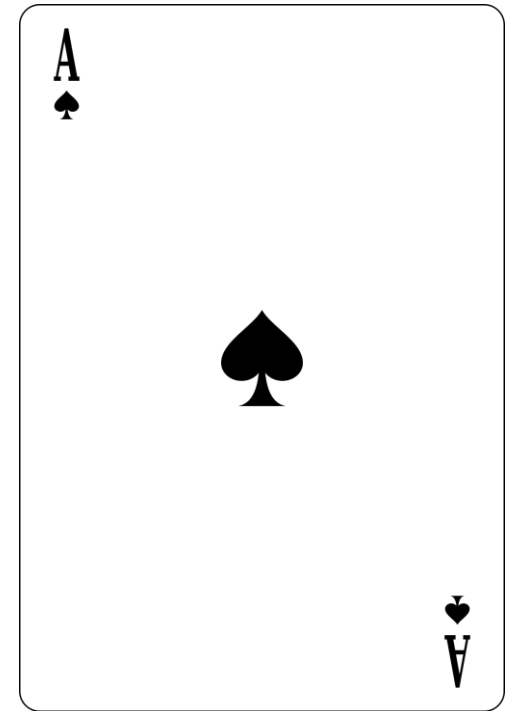
A set of one or more outcomes is an event.

- You roll a 5 = an event with one outcome. There is only one outcome possible in a roll of a die that will get you a 5.
- You roll an even number with a die = an event with more than one outcome. You could do that with a 2, a 4, or a 6.

Simple Event

A simple event has a single possible outcome:

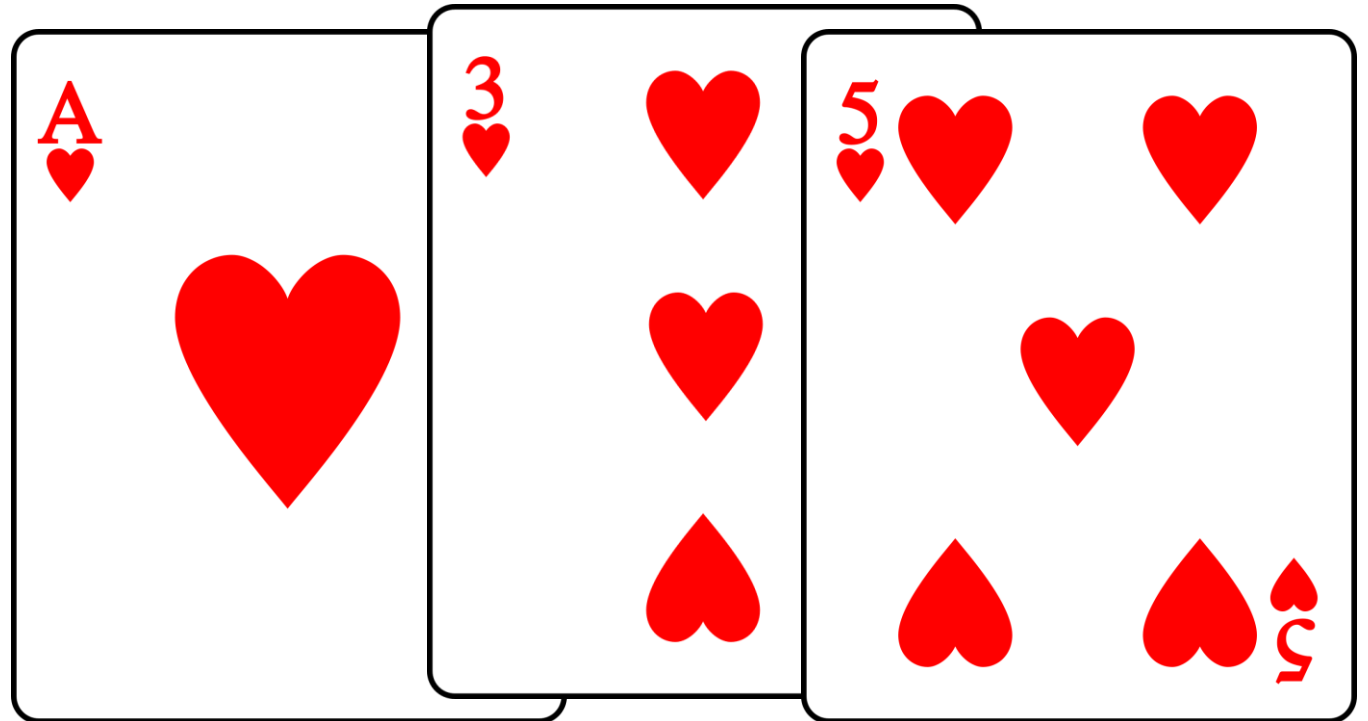
- Roll a heads.
- Roll a tails.
- Pull an ace of spades.



Compound Event

A compound event is two or more simple events:

- Roll an odd.
- Pull a heart.





$P(\text{event})$

The probability of an event, written $P(\text{event})$, is the measure of how likely the event is to occur.

P(heads)

$$P(\text{heads}) = 0.5$$

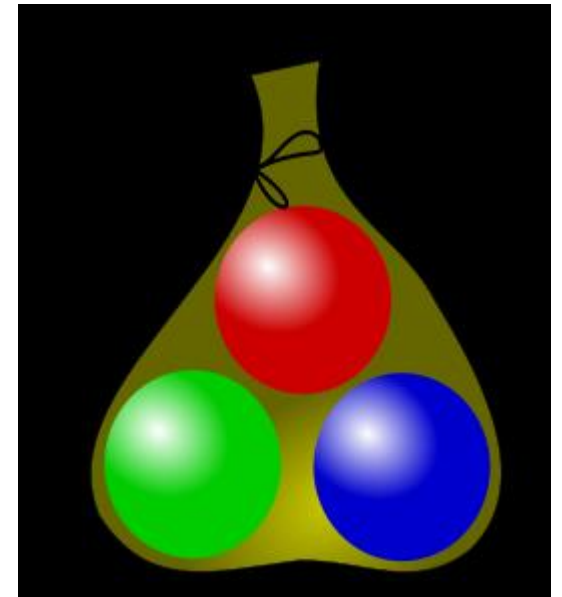
One side of the coin is heads and one is tails. The probability is 1 out of 2 for each side, or 0.5.



P(red)

$$P(\text{red}) = 0.\overline{33}$$

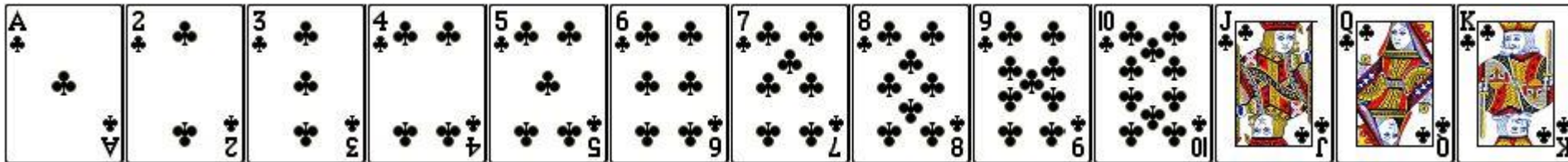
There is one red marble, one green, and one blue. The probability is 1 out of 3 for each marble, or $0.\overline{33}$.



P(face card)

$P(\text{face card}) = \text{about } 0.23$

Each suit has 13 cards. Three of them are face cards—the jack, queen and king. The probability is 3 out of 13 for drawing a face card, which is about 0.23.



Complementary Events

The complement of an event is the set of all the outcomes that are NOT the event. Together they add up to all the possible outcomes.

Because either the event will occur or the NOT event will occur, if you add up their probabilities, you will always get ONE.

(Complement with an E comes from complete.)

$$P(\text{red}) + P(\text{not red})$$

$$P(\text{red}) = 0.\overline{33}$$

$$P(\text{not red}) = 0.\overline{66}.$$

There are 2 not red marble out of 3, which is $0.\overline{66}$.

$$0.\overline{33} + 0.\overline{66} = 1.0$$

