

PROBABILITY



A THEORETICAL APPROACH

Experimental probability	Theoretical probability
5 appears 140 times. $P(\text{roll a } 5) = \frac{140}{1000}$	5 appears. $P(\text{roll a } 5) = \frac{1}{6}$
	
Roll a die 1000 times.	Roll a die once

In theoretical approach of probability, instead of performing experiments, we use our knowledge about a situation, some logical reasoning, and/or known formula to calculate the probability of an event happening.

Probability of an Event A:

P(A) =

$$\frac{\text{Number of outcomes favourable to event A}}{\text{Number of all possible outcomes of the experiment}}$$

➤ Quick Revision of some basic concepts of Probability:

- ❖ The two approaches of probability are Practical and Theoretical
- ❖ An operation which can produce some well-defined outcomes is called an experiment.
- ❖ An element having only one outcome of the experiment is called an elementary event.
- ❖ The sum of the probabilities of all the elementary events of an experiment is 1.
- ❖ The range of the probability of an event is 0 to 1.

To find the complement of an Event say 'A'.

The complement of an event A is also called as not A and is written as A' or $\bar{A}$.

Hence we have 

$$P(\bar{A}) = 1 - P(A)$$

$$P(A) = 1 - P(\bar{A}).$$

For example, if A is an event of getting a number 6 in a single throw of a die then what is the probability of the even not A? To find P(not A) i.e. $P(\bar{A})$ we write

$$\begin{aligned} P(\bar{A}) &= 1 - P(A) \\ &= 1 - P(\text{getting a no. 6}) \\ &= 1 - 1/6 = \mathbf{5/6}. \end{aligned}$$

SAMPLE SPACE:-

THE LIST OF ALL POSSIBLE
OUTCOMES OF AN
EXPERIMENT

To write the sample space for the given experiment, we make a list of all the possible outcomes of the experiment.

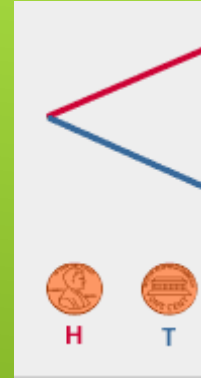
For example

A fair coin is tossed once.

Sample Space =
{ Head, Tail} or
simply {H, T}

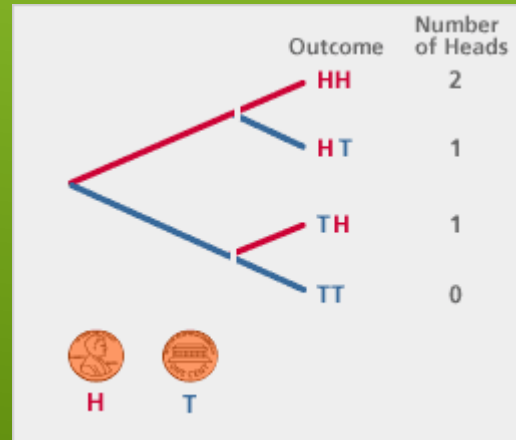
SOME COMMON SAMPLE SPACES

Tossing
a Coin



$\{H, T\}$

Tossing
a pair of
Coins

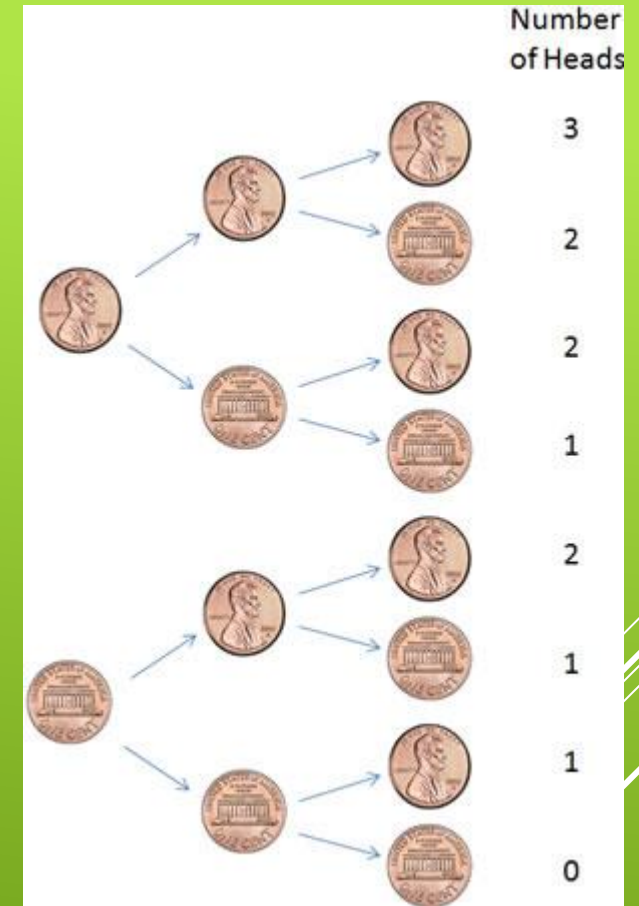


$\{HH, HT, TH, TT\}$

Tossing
three
coins
together



{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT}



Rolling a
die



$\{1, 2, 3, 4, 5, 6\}$

Rolling a
pair of
dice



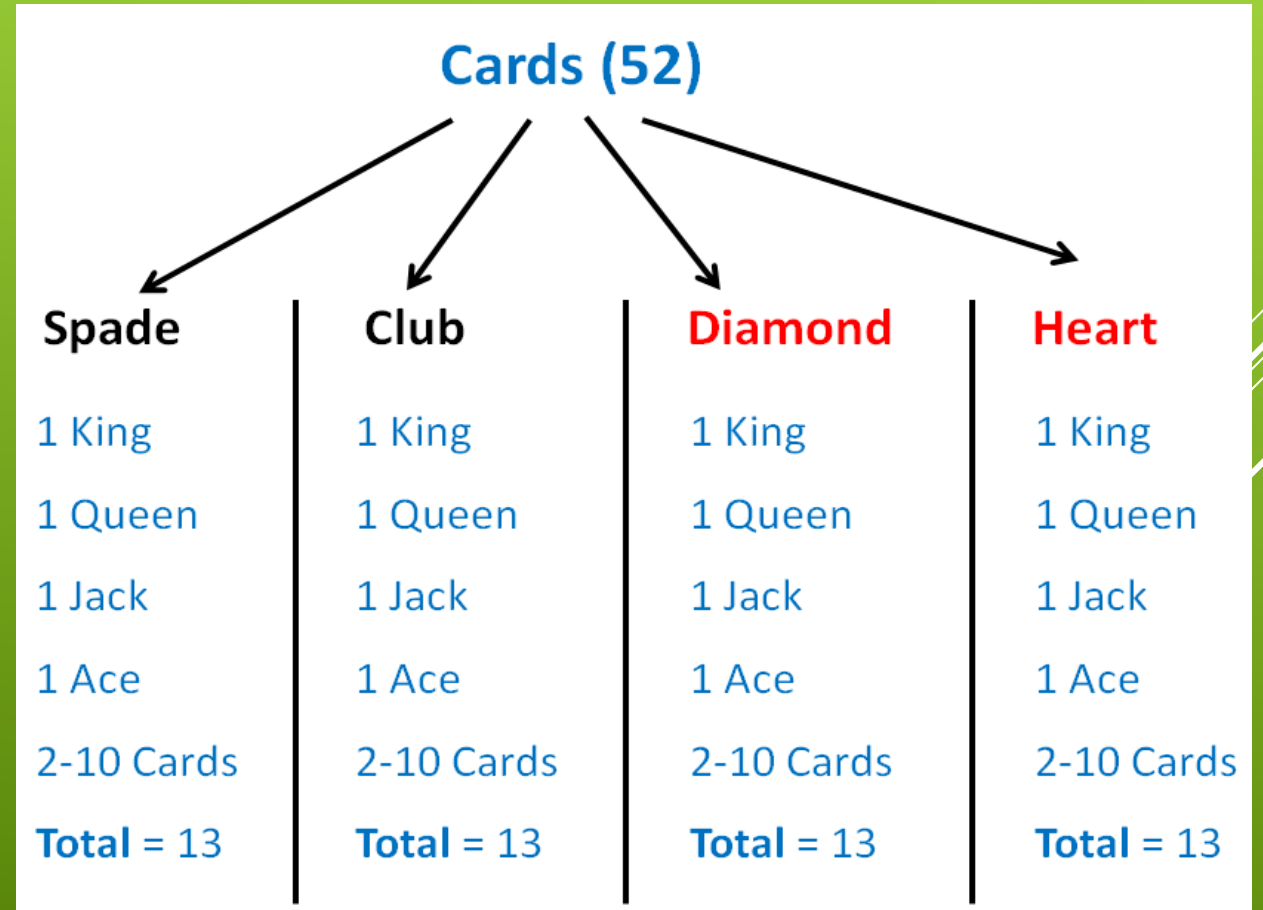
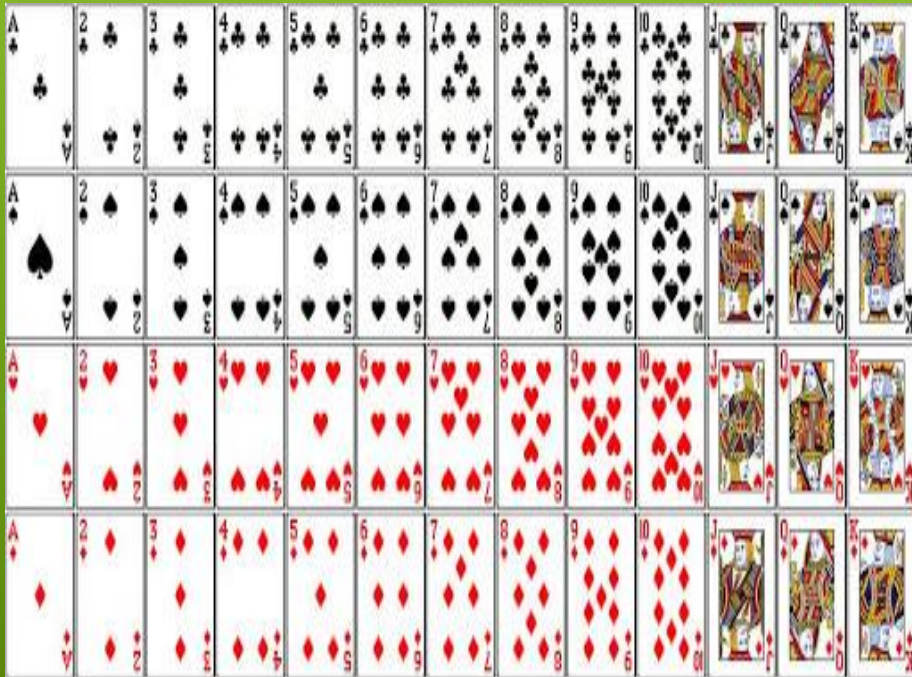
	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

Try These Now - (COINS & DICE)

- 

Playing Cards

A pack of paying cards consists of 52 cards which are as follows:

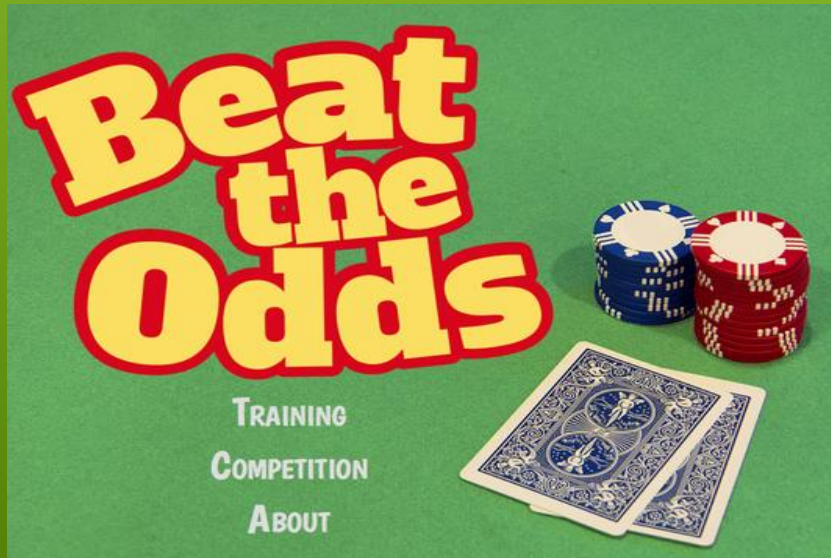


Try These Now - (PLAYING CARDS & NUMBER CARDS)

- A jar contains 54 marbles each of which blue, green or white. The probability of selecting a blue marble at random from the jar is $\frac{1}{3}$ and the probability of selecting a green marble at random is $\frac{4}{9}$. How many white marbles does the jar contain?
- Cards marked with numbers 13, 14, 15....., 60 are placed in a box and mixed thoroughly. One card is drawn at random from the box. Find the probability that the number on the card is:
(a) a prime number (b) a perfect square (c) divisible by 3 or 5
- A card is drawn at random from a pack of 52 playing cards. Find the probability that the card drawn is neither an ace nor a king.
- A card is drawn at random from a pack of 52 playing cards. Find the probability that the card drawn is:
(a) a king or jack (b) a non-ace (c) a red card

SOME BASIC APPLICATIONS OF -PROBABILITY

Probability and Games

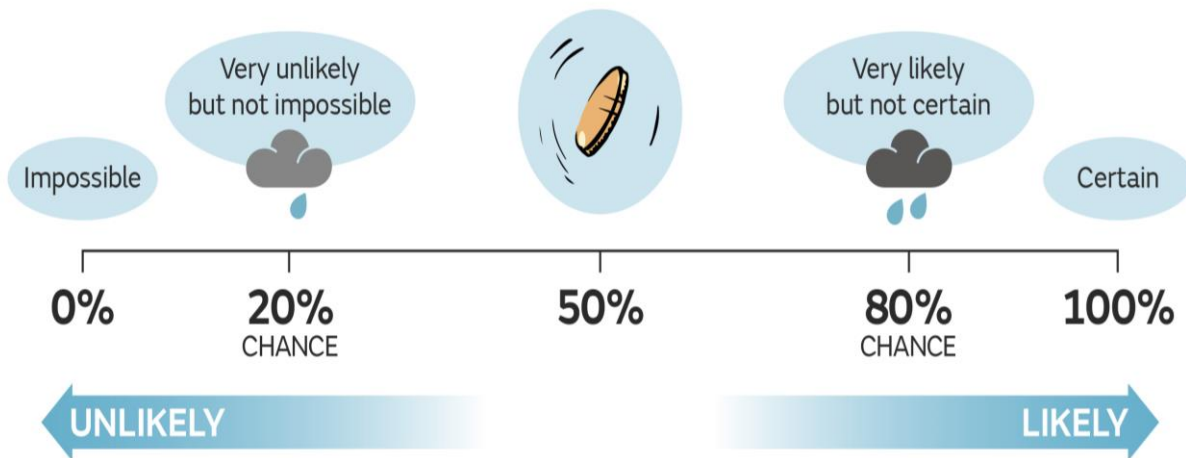


- ❖ You use probability when we play board, card or video games that involve luck or chance. You must weigh the odds of getting the cards you need in poker or the secret weapons you need in a video game. The likelihood of getting those cards or tokens will determine how much risk you're willing to take. Probability helps you assess what's at stake and determine how you want to play the game.

Probability and Weather

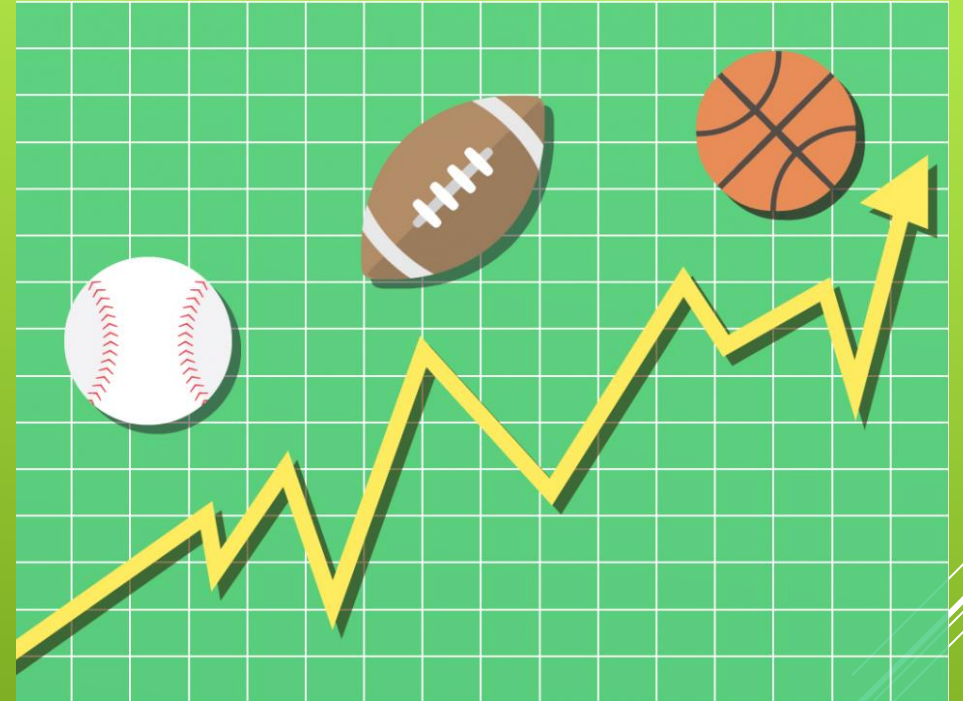
- ❖ Nearly every day you use probability to plan around the weather. Meteorologists can't predict exactly what the weather will be, so they use tools and instruments to determine the likelihood that it will rain, snow or hail. For example, if there's a 60-percent chance of rain, then the weather conditions are such that 60 out of 100 days with similar conditions, it has rained. You may decide to wear closed-toed shoes rather than sandals or take an umbrella to work.

THE SCALE OF PROBABILITY



Probability and Sports

- ❖ Athletes and coaches use probability to determine the best sports strategies for games and competitions. For example a baseball coach evaluates a player's batting average when placing him in the lineup.



The probability that we
may fail in the struggle
ought not to deter us from
the support of a cause we
believe to be just.



Abraham Lincoln

16th U.S. President

(1809-1865)

QuoteHD.com

Thank
You