

PROBABILITY CLASS - X



...HOW LIKELY SOMETHING IS...



pppst.com

Probability is
how likely
something is to
happen.

Experiment:

An operation which can produce some well-defined outcomes is called an experiment. Such as rolling a dice, tossing a coin

Terms related to Probability

Equally Likely Events:

When there is no reason to expect the happening of one event in preference to the other, then the events are known equally likely events.

For example; when an unbiased coin is tossed the chances of getting a head or a tail are the same.

Event:

Out of the total results obtained from a certain experiment, the set of those results which are in favor of a definite result is called the event and it is denoted as E.

Experimental Probability vs. Theoretical Probability

Experimental Probability is found by repeating an experiment and observing the outcomes.

$$P(\text{event}) = \frac{\text{number of times event occurs}}{\text{total number of trials}}$$

Example:

A coin is tossed 10 times:
A head is recorded 7 times
and a tail 3 times.

$$P(\text{head}) = \frac{7}{10}$$

$$P(\text{tail}) = \frac{3}{10}$$

Theoretical Probability is what is expected to happen based on mathematics

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$$

Example:

A coin is tossed.

$$P(\text{head}) = \frac{1}{2}$$

$$P(\text{tail}) = \frac{1}{2}$$

Probability always lies between 0 and 1 ,

if probability of an event is zero it is called impossible event and if it is one then the event is called sure event.

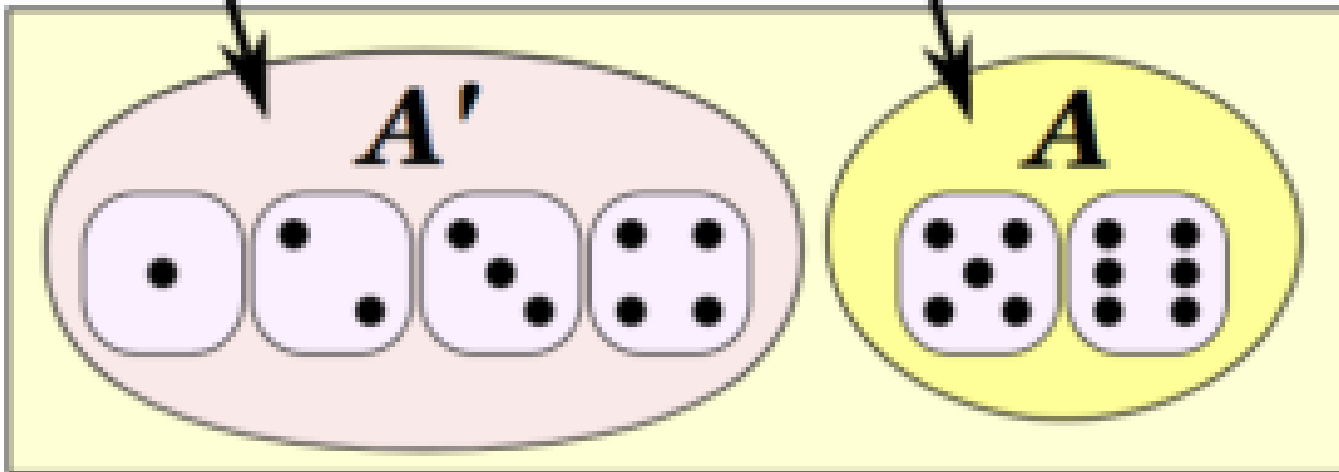


COMPLEMENT OF AN EVENT

In probability, the complement of an event A is the event not A ; this complementary event is often denoted A' or $\bar{A}$.

*Complement of
Event A*

Event A



$$P(A') = 1 - P(A)$$

Complementary Events

The Sum of the Probabilities of an **Event** and its **Complement** add to '1'.

Example: For a dice

$$P(>4) = \frac{2}{6} = \frac{1}{3}$$



$$P(\text{Complement } >4) = P(\leq 4) = \frac{4}{6} = \frac{2}{3}$$

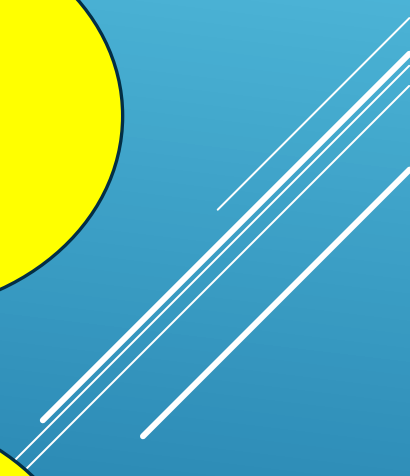
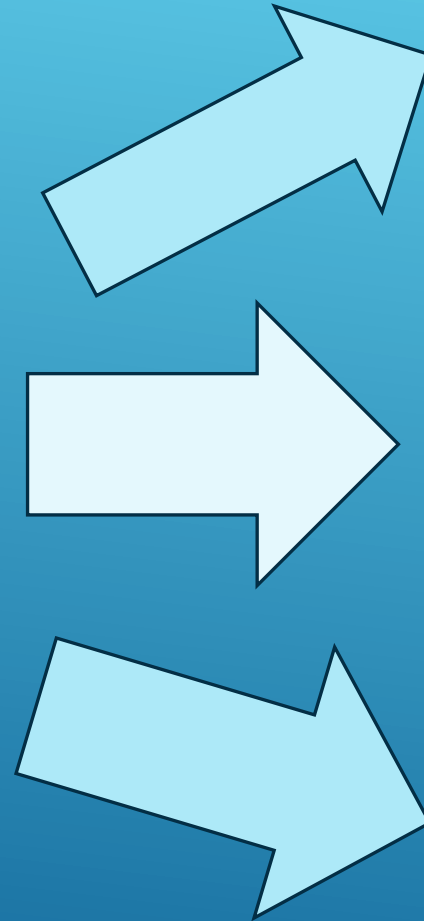
$$P(>4) + P(\text{Complement } >4) = \frac{1}{3} + \frac{2}{3} = 1$$

Probability
cannot be

Negative

**More
than
one**

**More
than
100%**



FORMULA FOR FINDING PROBABILITY OF AN EVENT A

$$P(A) = \frac{\text{Number of favorable outcomes to A}}{\text{Total number of outcomes}}$$

The sample space is the list of all possible outcomes.

Flipping a Coin



SAMPLE SPACE

{Head, Tail}
Uniform

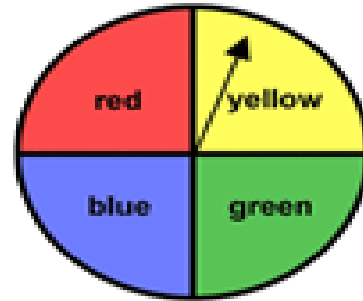
Rolling a Six Sided Dice



SAMPLE SPACE

{1, 2, 3, 4, 5, 6}
Uniform

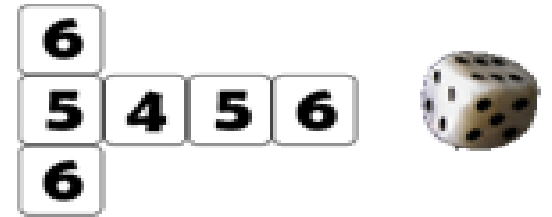
Spinning a 4 color spinner



SAMPLE SPACE

{Red, Yellow, Green, Blue}
Uniform

Rolling a Weighted Dice



SAMPLE SPACE

{4, 5, 6}
Not Uniform

Picking a flavor of ice cream



SAMPLE SPACE

{Chocolate, Vanilla, Strawberry}
Uniform

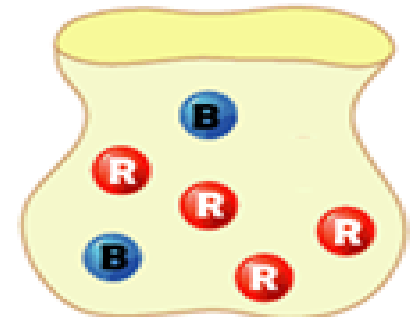
Determining the gender of baby



SAMPLE SPACE

{Boy, Girl}
Uniform

Picking from a bag of marbles



SAMPLE SPACE

{Blue, Red}
Not Uniform



SAMPLE SPACE

Tossing of a coin

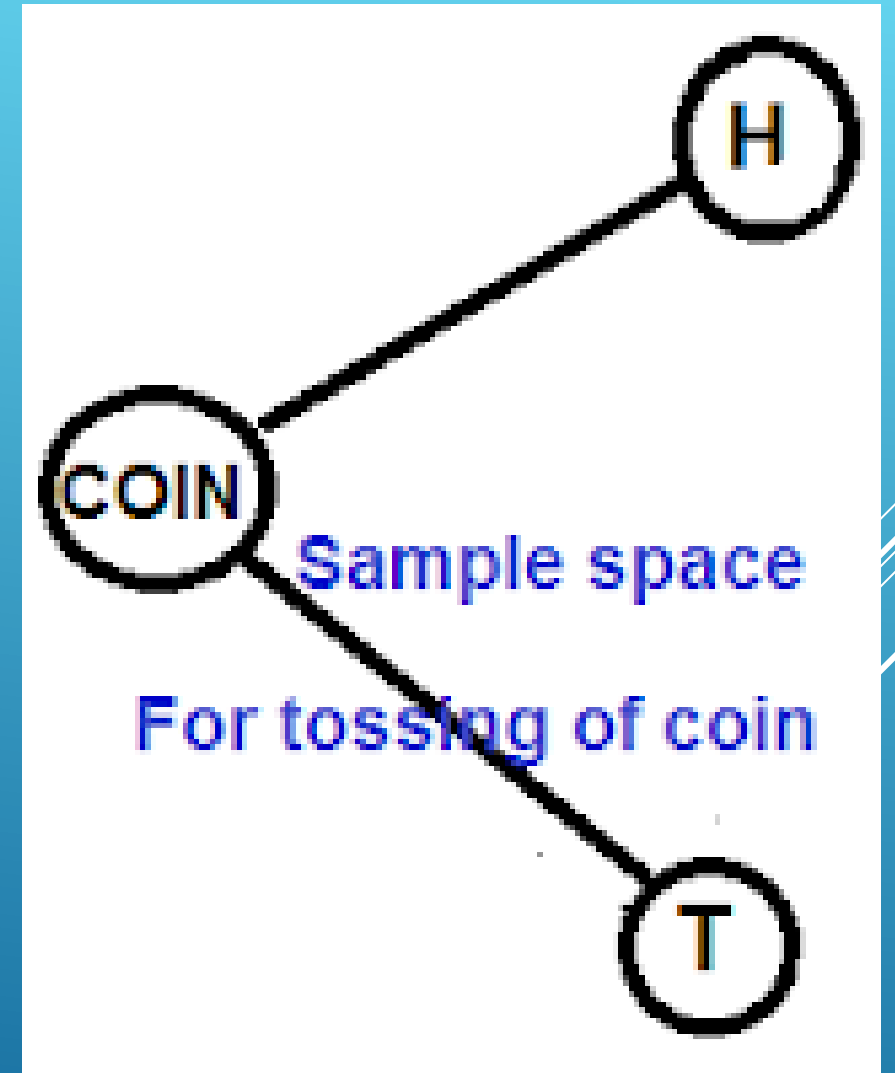
To find the sample space for tossing of one coin



Out of two outcome one is H and second is T.

So Put H and T in sample space 'S'

$$S = \{H, T\}$$



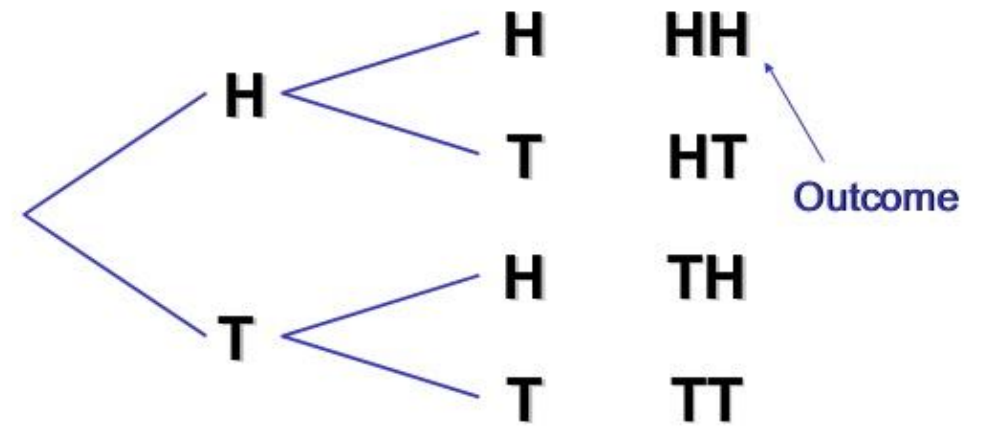
TO FIND THE SAMPLE SPACE FOR TOSSING OF TWO COINS

There will be $2 \times 2 = 4$ possible outcomes as shown in the following table. Thus the sample space is $S = \{HH, HT, TH, TT\}$.

Coin 2 \ Coin 1	H	T
H	HH	HT
T	TH	TT

Tree Diagram

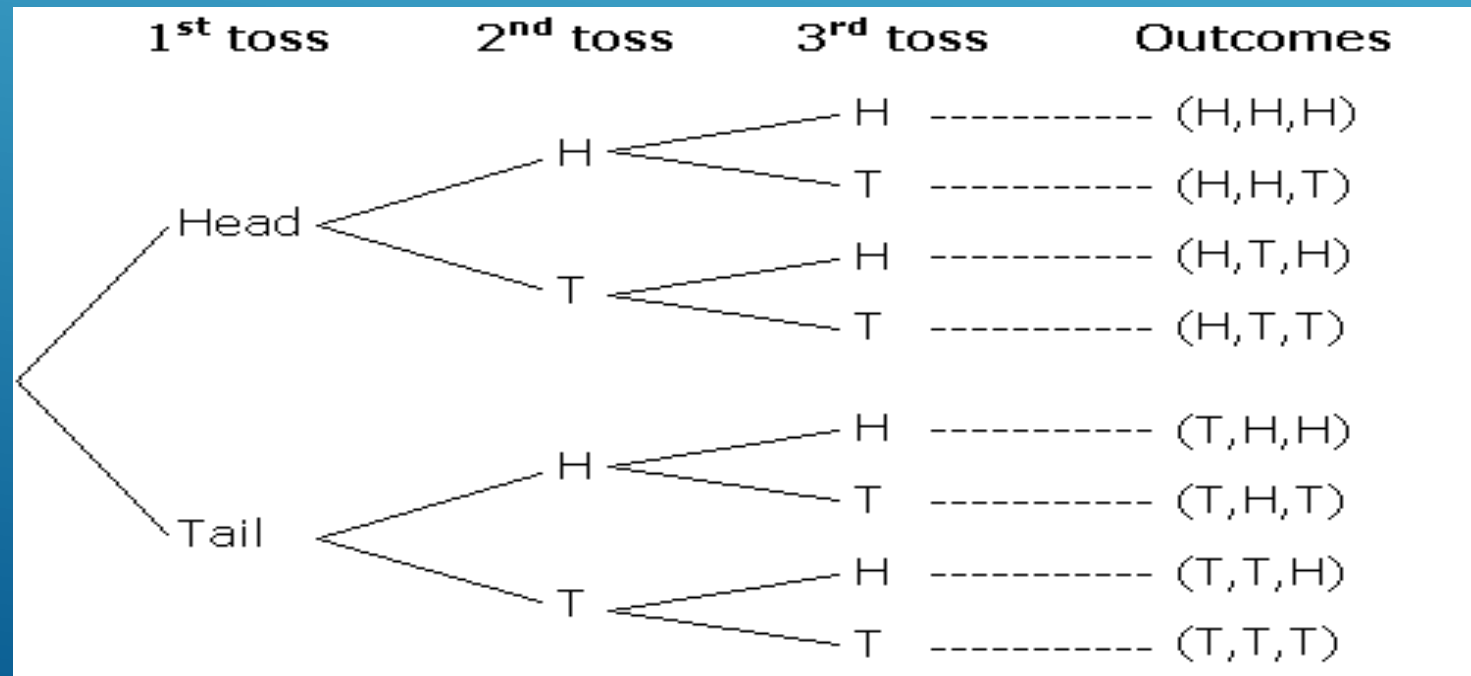
Experiment: Toss 2 Coins. Note Faces.



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

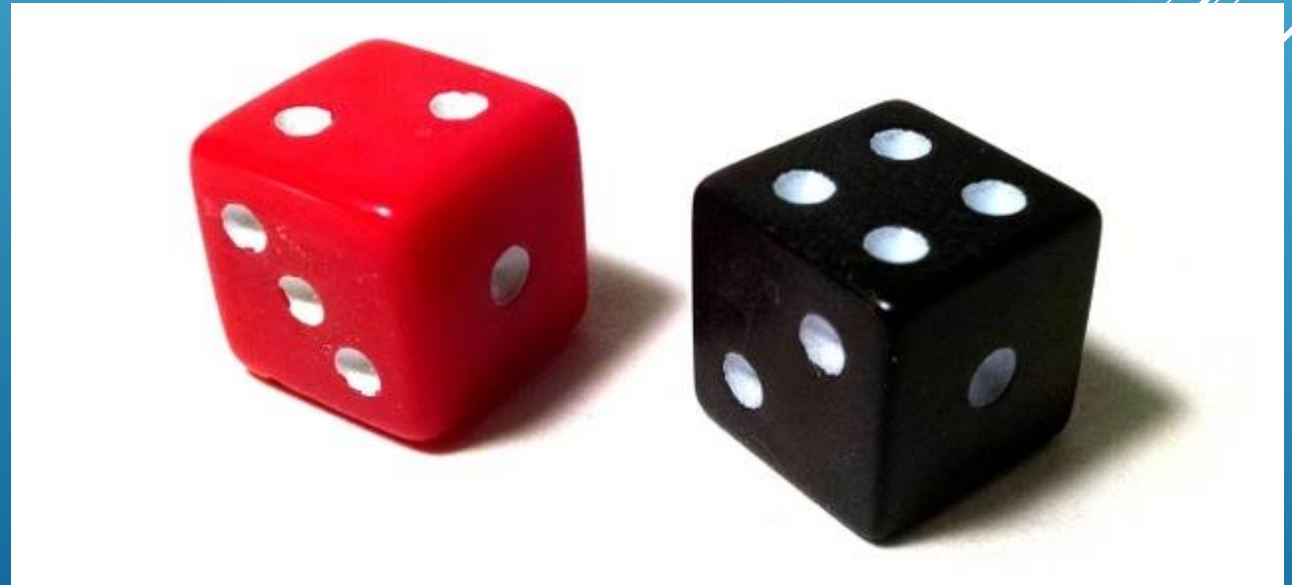
Sample Space

Suppose a coin is tossed three times or three distinct coins are tossed simultaneously. There will be $2 \times 2 \times 2 = 8$ possible outcomes. Thus the sample space of this experiment will be $S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$



SAMPLE SPACE

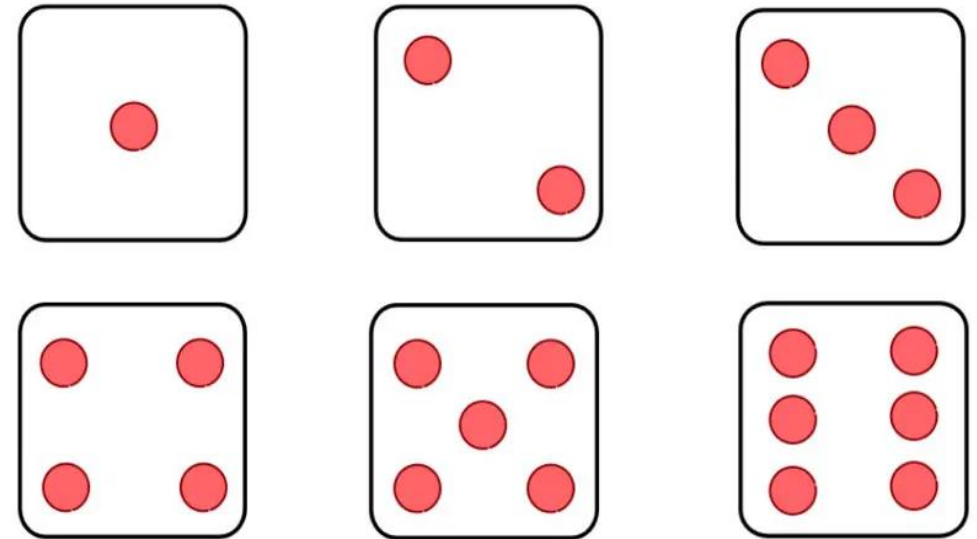
Rolling of a dice



SAMPLE SPACE OF ONE DICE

- A dice has 6 sides which are all equally likely to be rolled.
- Each side has a different number written on it.
- We can roll a: 1, 2, 3, 4, 5 or a 6.
- We say that the sample space for a dice is: 1, 2, 3, 4, 5, 6.

Sample Space for Rolling a Die:



6 outcomes

Sample space for two dice (outcomes):

When two dice are thrown simultaneously, thus number of event can be $6^2 = 36$ because each die has 1 to 6 number on its faces.

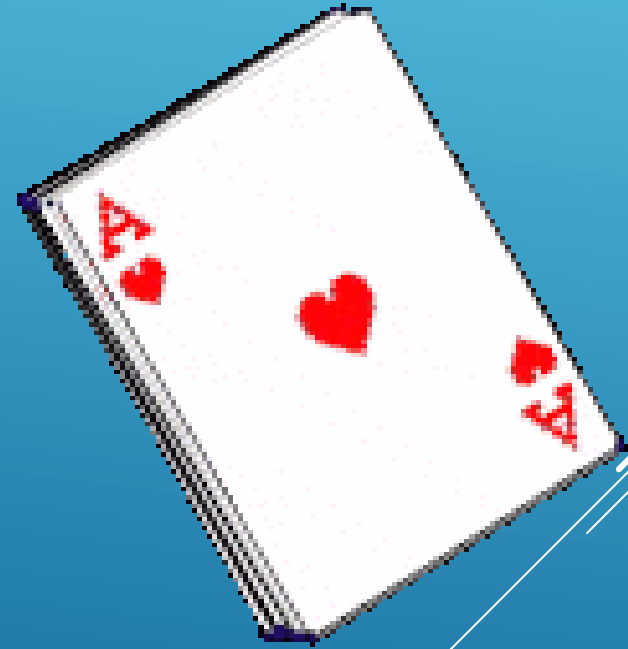
The outcomes (1, 1), (2, 2), (3, 3), (4, 4), (5, 5) and (6, 6) are called doublets.

(ii) The pair (1, 2) and (2, 1) are different outcomes.

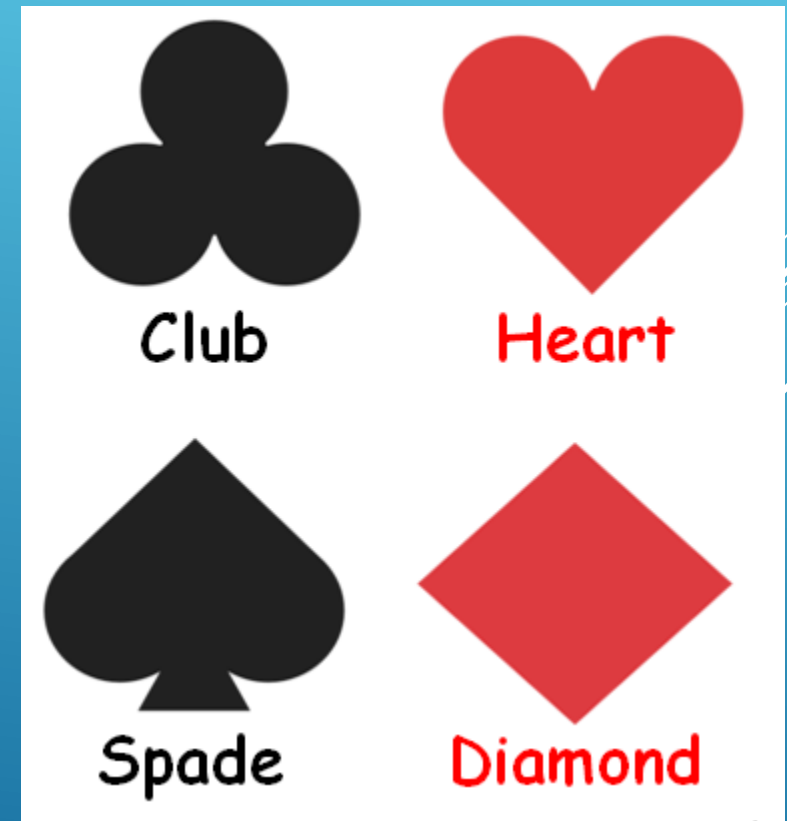
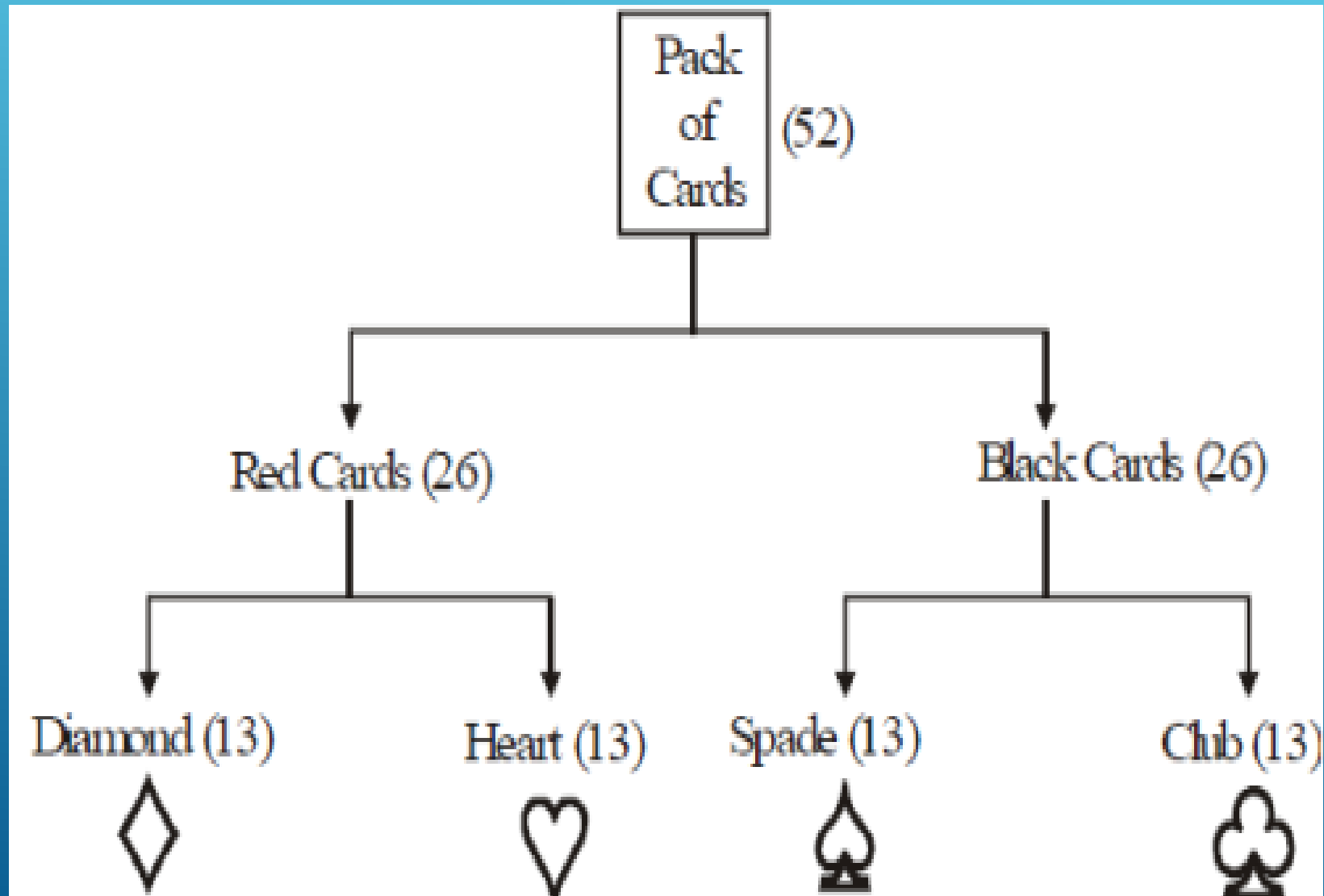
		Second Throw					
		1	2	3	4	5	6
First Throw	1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
	2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
	3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
	4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
	5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
	6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

SAMPLE SPACE

Playing Cards



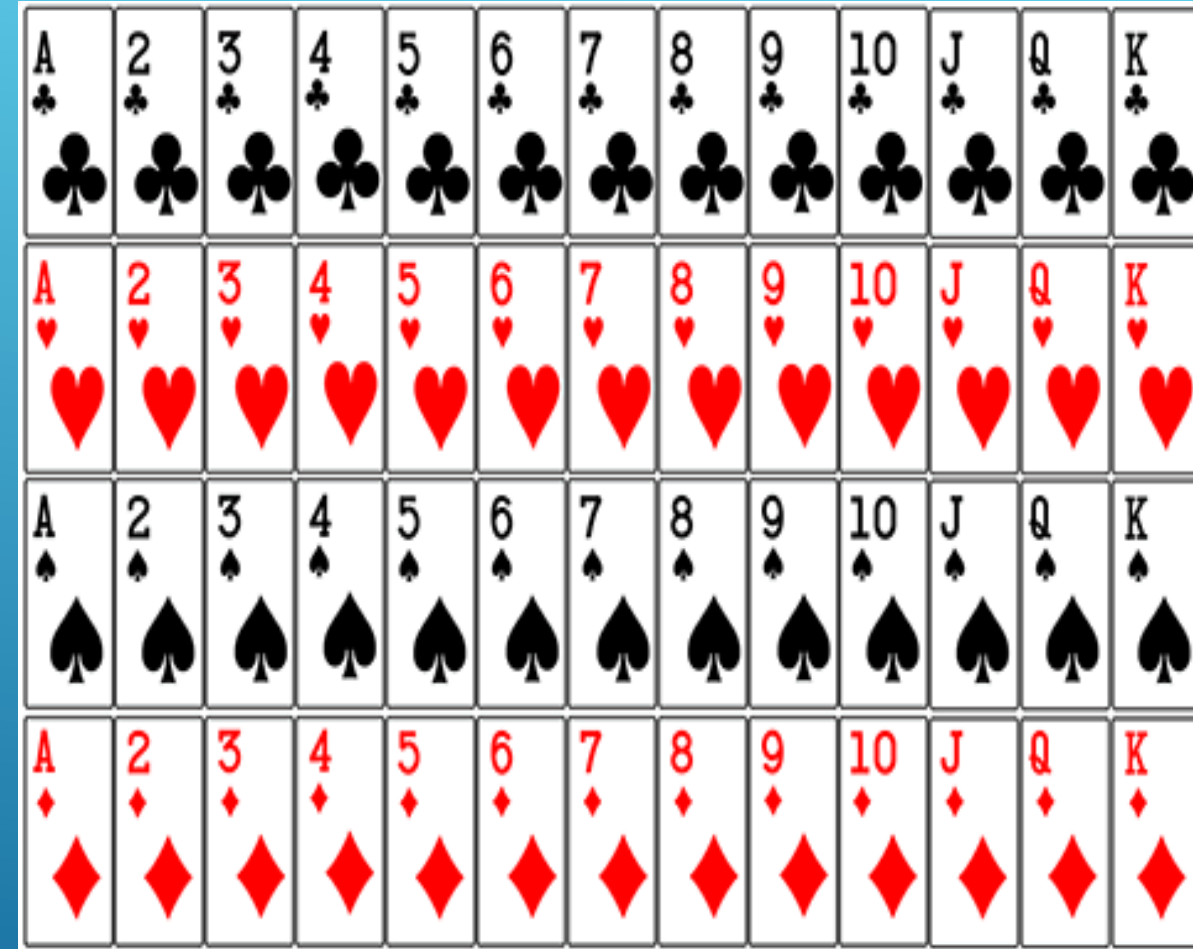
A PACK OF 52 PLAYING CARDS



A pack of 52 playing cards

1. Club – 13 cards
2. Heart – 13 cards
3. Spade – 13 cards
4. Diamond – 13 cards
5. No. of black cards – 26
6. No. of red cards – 26
7. No. of Ace cards (named as "A") – 4
8. No. of Jack cards (named as "J") – 4
9. No. of Queen cards (named as "Q") – 4
10. No. of King cards (named as "K") – 4
11. No. of face cards (named as "J", "Q" and "K") – 12

(In each type, there three face cards. So there are 12 cards in total of all the four types)



RECAP

(1) A bag contains 3 red and 2 blue marbles. A marble is drawn at random. The probability of drawing a black ball is :

- (a) $\frac{3}{5}$ (b) $\frac{2}{5}$ (c) $\frac{0}{5}$ (d) $\frac{1}{5}$

(2) The probability that it will rain tomorrow is 0.85. What is the probability that it will not rain tomorrow

- (a) 0.25 (b) 0.15 (c) $\frac{3}{20}$ (d) none of these

(3) What is the probability that a number selected from the numbers (1, 2, 3,.....,15) is a multiple of 4?

- (a) $\frac{1}{5}$ (b) $\frac{4}{15}$ (c) $\frac{2}{15}$ (d) $\frac{1}{3}$

4) The probability that a prime number selected at random from the numbers (1,2,3,35) is :

- (a) $12/35$ (b) $11/35$ (c) $13/35$ (d) none of these**

5) The sum of the probability of an event and its complement is :

- (a) 2 (b) 1 (c) 0 (d) none of these**

.

6) Which of the following cannot be a probability of an event

- (a) 0.15 (b) $2/7$ (c) $7/5$ (d) none of these.**

THANK YOU

