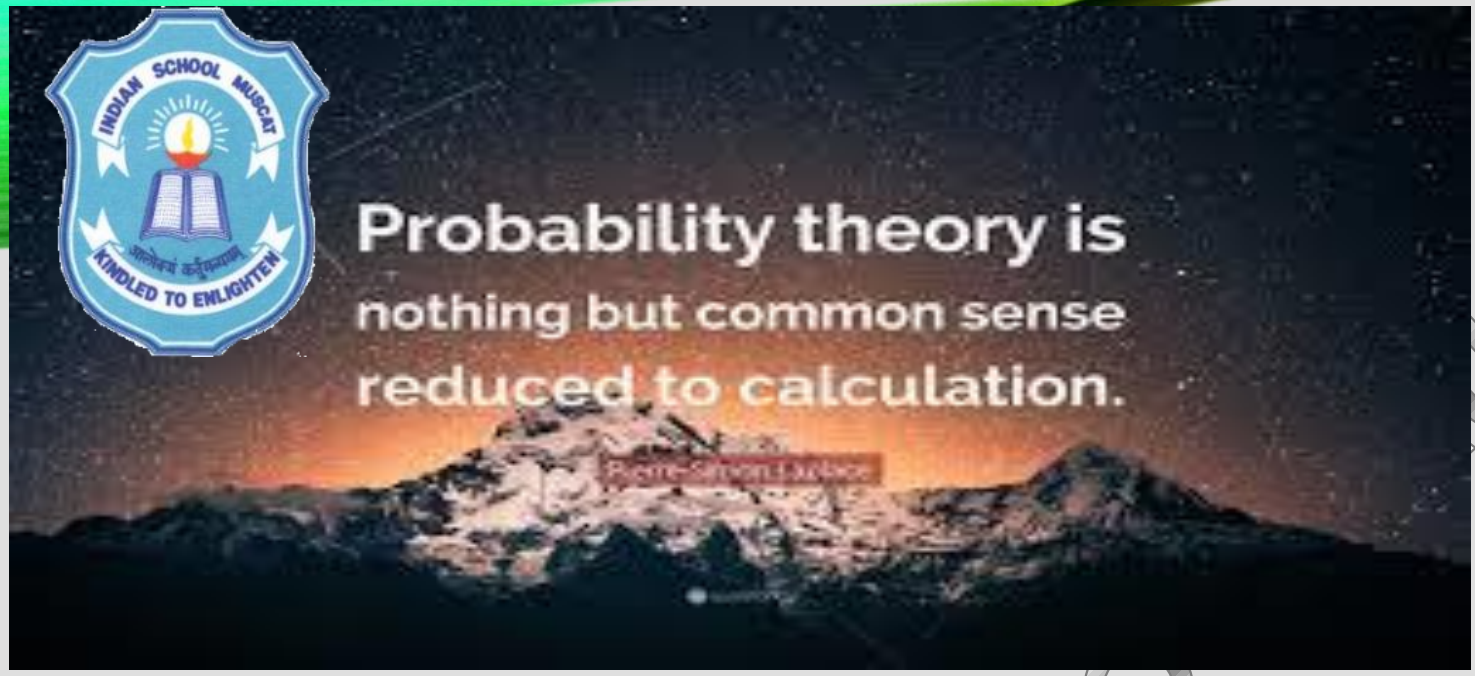


PROBABILITY

Module 11

Class 11

ASSIGNMENTS

While shuffling a pack of 52 cards.2 cards are accidently dropped. Find the probability that missing cards are of different colours.

$$\frac{26c_1 \text{ x } 26c_1}{52c_2} = \frac{26 \text{ x } 26 \text{ x } 2}{52 \text{ x } 51} = \frac{26}{51}$$

A five digit number is formed at random by using the digits 1,2,3,4,5,6 and 7. Find the chance the number formed has none of its digits repeated.

$$\frac{7 \text{ x } 6 \text{ x } 5 \text{ x } 4 \text{ x } 3}{7 \text{ x } 7 \text{ x } 7 \text{ x } 7 \text{ x } 7} = \frac{360}{2401}$$

MODULE - 8

ASSIGNMENTS

Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that

(a) Both Anil and Ashima will not qualify the examination.

(b) Atleast one of them will not qualify the examination and

(c) Only one of them will qualify the examination.

A ---- Anil; B ---- Ashima

$P(A) = 0.05 \quad P(B) = 0.10 \quad P(A \cap B) = 0.02$

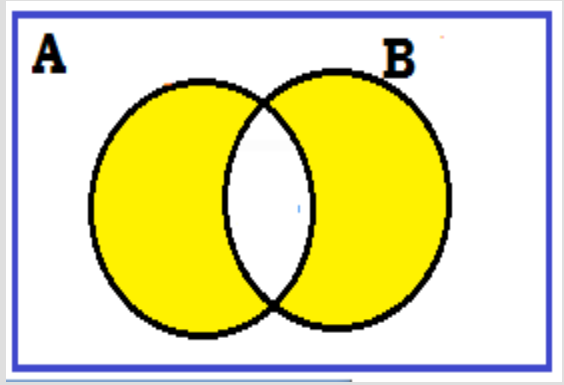
(a) $P(A' \cap B') = P(A \cup B)' = 1 - 0.13 = 0.87$

(b) $P(A' \cup B') = P(A \cap B)' = 1 - 0.02 = 0.98$

(c) $P[(A-B) \cup (B-A)] = P(A \cup B) - P(A \cap B)$

$= 0.13 - 0.02$

$= 0.11$



MODULE - 9

ASSIGNMENTS

The probability that at least one of the events A and B occurs is 0.6. If A and B occur simultaneously with probability 0.2, then $P(\bar{A}) + P(\bar{B})$ is

(A) 0.4 (B) 0.8 (C) 1.2 (D) 1.6

$P(A \cup B) = 0.6, \quad P(A \cap B) = 0.2$

$P(\bar{A}) + P(\bar{B}) = ?$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A) + P(B) = 0.8$

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

$= 2 - 0.8$

$= 1.2$

MODULE - 9

A committee of two persons is selected from two men and two women. What is the probability that the committee will have (a) no man? (b) one man? (c) two men?

ASSIGNMENTS

a) $\frac{{}^2C_2}{{}^4C_2} = \frac{1}{6}$; b) $\frac{{}^2C_1 \times {}^2C_1}{{}^4C_2} = \frac{2}{3}$; c) $\frac{{}^2C_2}{{}^4C_2} = \frac{1}{6}$

Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all Kings (ii) 3 Kings (iii) atleast 3 Kings.

(i) $\frac{{}^4C_4 \times {}^{48}C_3}{{}^{52}C_7} = \frac{1}{7735}$

(ii) $\frac{{}^4C_3 \times {}^{48}C_4}{{}^{52}C_7} = \frac{9}{1547}$

(iii) $\frac{{}^4C_4 \times {}^{48}C_3}{{}^{52}C_7} + \frac{{}^4C_3 \times {}^{48}C_4}{{}^{52}C_7} = \frac{46}{7735}$

EXTRA SUM

TRY

Two numbers are selected randomly from the set S={1,2,3,4,5,6} without replacement one-by-one. The probability that minimum of the two numbers is less than 4 is_____

Solution: Possible combinations where minimum of the two numbers is less than 4 are

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

	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)

Favourable cases = $2! \times 12 = 24$

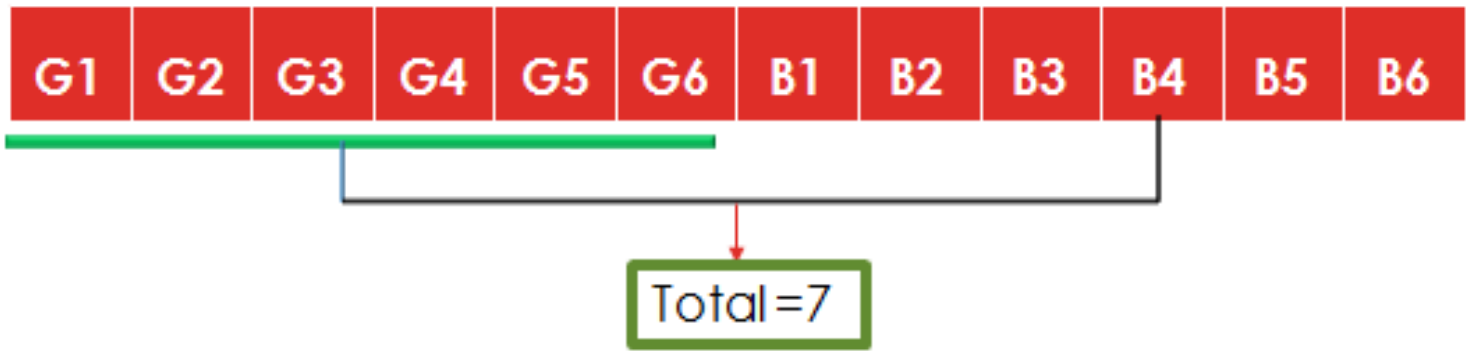
$$\text{Probability} = \frac{24}{30} = \frac{4}{5}$$

EXTRA SUM

2) Six boys and six girls sit in a row at random. Find the probability that (i) the six girls sit together. (ii) the boys and girls sit alternately.

The total number of arrangements of six boys and six girls = 12!

(i) the six girls sit together.

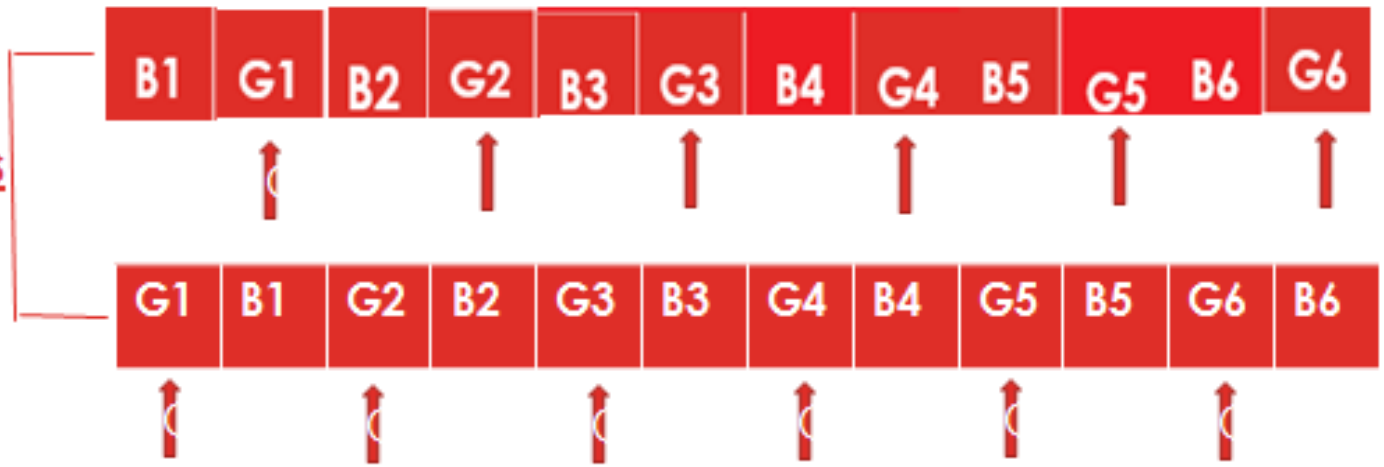


$$\therefore \text{Required probability} = \frac{7! \times 6!}{(12)!} = \frac{1}{132}$$

(ii) the boys and girls sit alternately.

$$\therefore \text{Required probability} = \frac{(6! \times 6!) + (6! \times 6!)}{(12)!}$$

2 cases



$$= \frac{2 \times 6! \times 6!}{(12)!}$$

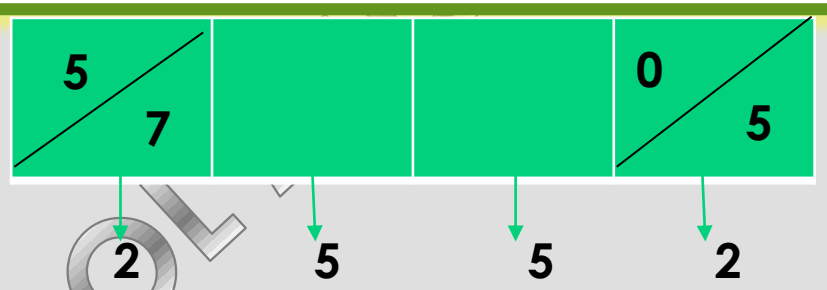
$$= \frac{1}{462}$$

Mis. Ex

9) If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5, and 7, what is the probability of forming a number divisible by 5 when, (i) the digits are repeated (ii) the repetition of digits is not allowed

Solution:

(i) the digits are repeated



No. of favourable cases = 2 x 5 x 5 x 2 – 1

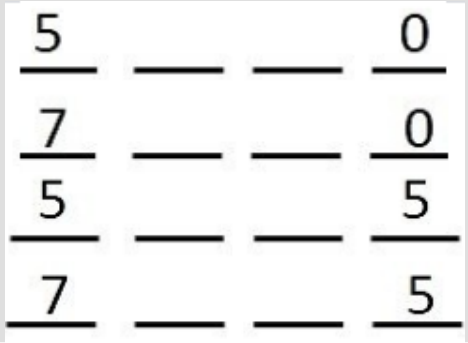
= 99

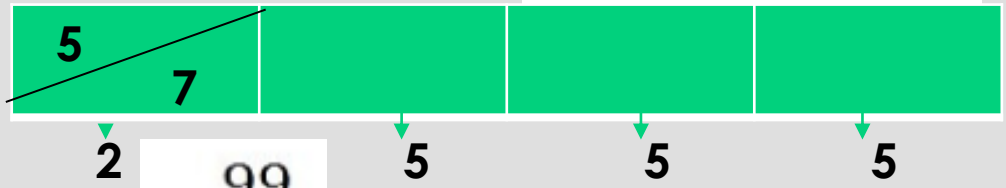
Total no. of cases = 2 x 5 x 5 x 5 – 1

= 249

P(no. divisible by 5 when, the digits are repeated) $= \frac{99}{249}$

$= \frac{33}{83}$





Subtracting 1,since 5000 should not be included

(ii) the repetition of digits is not allowed

(a) 5 _ _ 5 ***Not possible*** *as repetition is not allowed*

(b) Total number of cases $= 1 \times 3 \times 2 \times 1$
$= 6$

(c) Total number of cases $= 1 \times 3 \times 2 \times 1$
$= 6$

(d) Total number of cases $= 1 \times 3 \times 2 \times 1$
$= 6$

(a) 5 _ _ 5

(b) 5 _ _ 0

(c) 7 _ _ 5

(d) 7 _ _ 0

$\therefore$ Total number of 4-digit numbers greater than 5000 $= 2 \times 4 \times 3 \times 2 = 48$

Required probability $= \frac{18}{48} = \frac{3}{8}$

REVISION

TRY

Question 1

Suppose 3 bulbs are selected at random from a lot. Each bulb is tested and classified as defective (D) or non – defective(N). Write the sample space of this experiment.

S= {NNN,NND, NDN,NDD,
DNN,DND, DDN,DDD }

Question 2

A box contains 1 red and 3 identical white balls. Two balls are drawn at random in succession without replacement. Write the sample space for this experiment.

S = {RW, WR, WW}

REVISION

TRY

Question 3

A die is rolled. Let E be the event "die shows 4" and F be the event "die shows even number". Are E and F mutually exclusive?

$E \cap F = \{4\} \cap \{2, 4, 6\}$

$= \{4\}$ $\quad E \cap F \neq \phi$

Hence E and F are **not** mutually exclusive events

Question 4

Three coins are tossed. Write two events which are mutually exclusive.

$A = \{HHH\}$ $\quad B = \{TTT\}$

$A \cap B = \phi$ A and B are mutually exclusive events

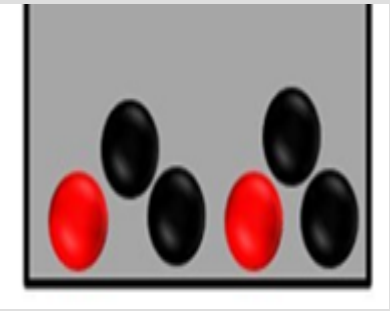
Question 5

REVISION

TRY

5) An urn contains 6 balls of which two are red and four are black. Two balls are drawn at random. Find the probability that they are of different colours.

$$P(\text{they are of different colors}) = \frac{{}^{2}C_{1} \times {}^{4}C_{1}}{{}^{6}C_{2}} = \frac{8}{15}$$



Question 6

If E and F are events such that $P(E) = \frac{1}{4}$, $P(F) = \frac{1}{2}$ and $P(E \text{ and } F) = \frac{1}{8}$, find

(i) P(E or F), (ii) P(not E and not F).

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$

$$= \frac{1}{4} + \frac{1}{2} - \frac{1}{8} = \frac{5}{8}$$

(ii) $P(\text{not E and not F}) = P(\bar{E} \cap \bar{F})$

$$= \frac{3}{8}$$

Thank You and Happy Learning