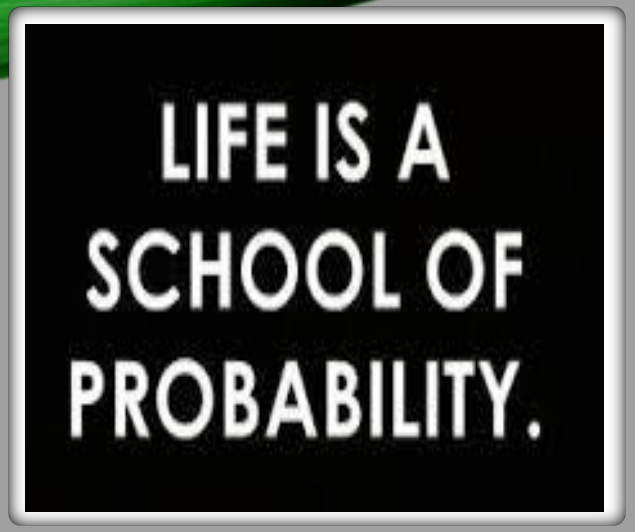
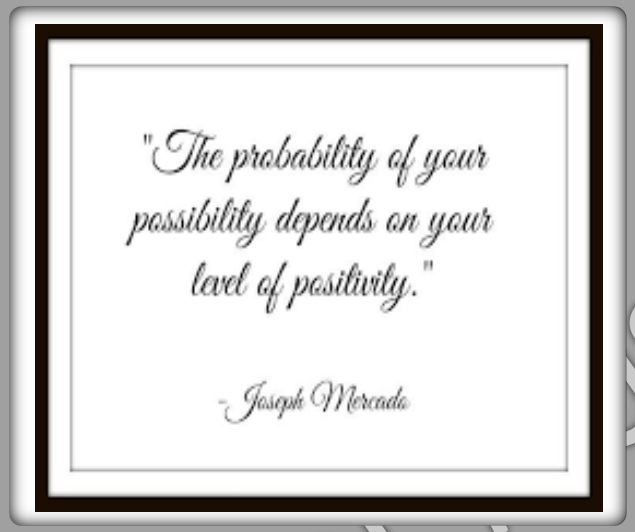
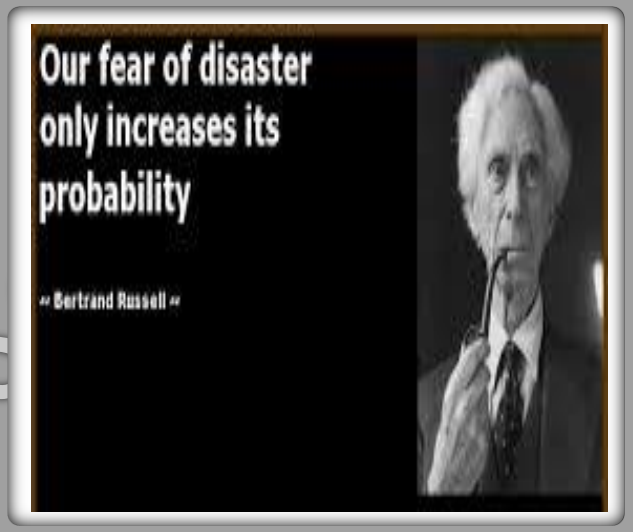






PROBABILITY

CLASS 11
MODULE 10

MCQ

TRY

Question1) If M and N are any two events, the probability that at least one of them occurs is

(A) $P(M) + P(N) - 2P(M \cap N)$

(B) $P(M) + P(N) - P(M \cap N)$

(C) $P(M) + P(N) + P(M \cap N)$

(D) $P(M) + P(N) + 2P(M \cap N)$

Ans: (B)

MCQ

TRY

Question 2) If A and B are mutually exclusive events, then

(A) $P(A) \le P(\overline{B})$ (B) $P(A) \ge P(\overline{B})$ (C) $P(A) < P(\overline{B})$ (D) none of these

Sol. For mutually exclusive events, $P(A \cap B) = 0$

$$\therefore \; P(A \cup B) = P(A) + P(B)$$

$$\Rightarrow \; P(A) + P(B) \le 1$$

$$\Rightarrow \; P(A) + 1 - P(\overline{B}) \le 1 \qquad [P(B) = 1 - P(\overline{B})]$$

$$\Rightarrow \; P(A) - P(\overline{B}) \le 0$$

$$\Rightarrow \; P(A) \le P(\overline{B})$$

Ans: (A)

MCQ

TRY

Question 3) Three digit numbers are formed using the digits 0, 2, 4, 6, 8. A number is chosen at random out of these numbers. What is the probability that this number has the same digits?

(A) $\frac{1}{16}$ (B) $\frac{16}{25}$ (C) $\frac{1}{645}$ (D) $\frac{1}{25}$

Solution: Since a 3-digit number cannot start with digit 0, the hundredth place can have any of the 4 digits. Now, the tens and units place can have all the 5 digits.

Ans: (D)

Therefore, the total possible 3-digit numbers are $4 \times 5 \times 5$, i.e., 100.

Required probability $= \frac{4}{100} = \frac{1}{25}$

EXTRA SUMS

1) A book contains 100 pages . A page is chosen at random. What is the chance that the sum of the digits on the page is equal to 9?

No of digits from 1 - 100 whose sum is 9 = 9, 18, 27, 36, 45, 54 ,63, 72, 81, 90,

No. of favourable cases = 10

P(sum of the digits on the page is equal to 9) = $\frac{10}{100}$ = $\mathbf{\frac{1}{10}}$

EXTRA SUMS

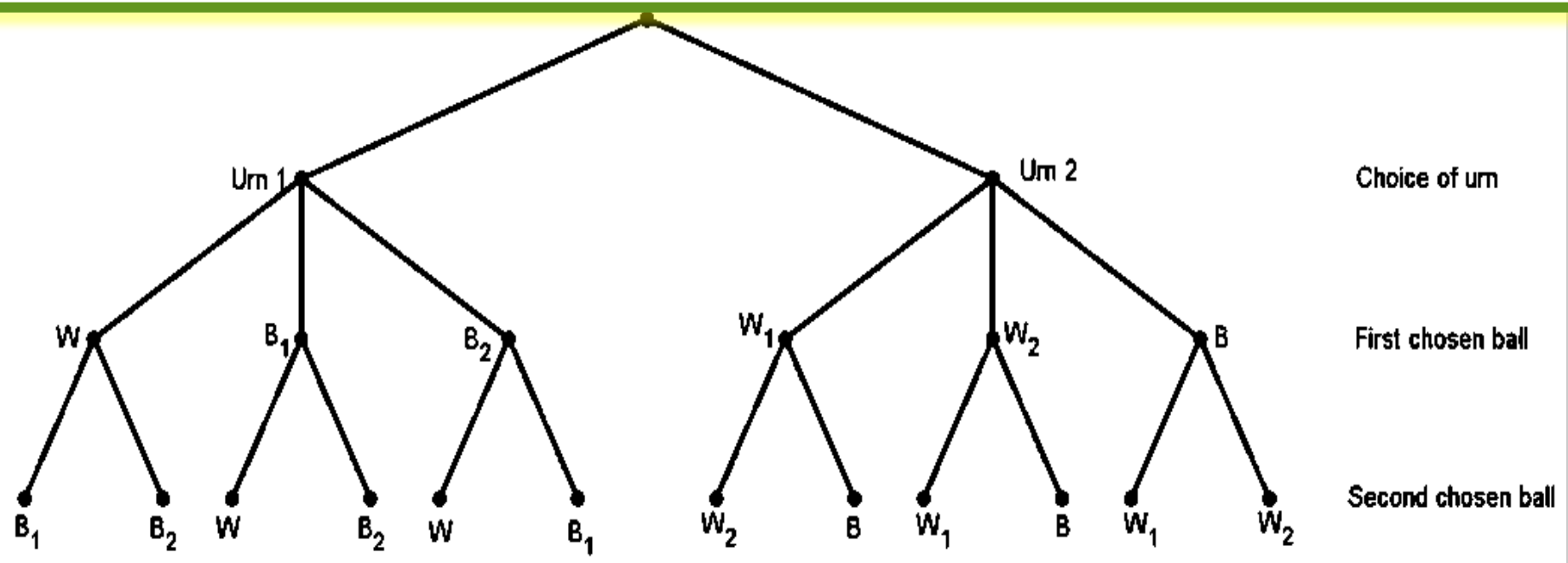
2) One urn contains two black balls (labeled B_1 and B_2) and one white ball. A second urn contains one black ball and two white balls (labeled W_1 and W_2) .Suppose the following experiment is performed. One of the two urns is chosen at random .Next a ball is randomly chosen from the urn. Then a second ball is chosen at random from the same urn without replacing the first ball.

(a) Write the sample space showing all possible outcomes

(b) What is the probability that two black balls are chosen

(c) What is the probability that two balls of opposite colour are chosen.

Solution:

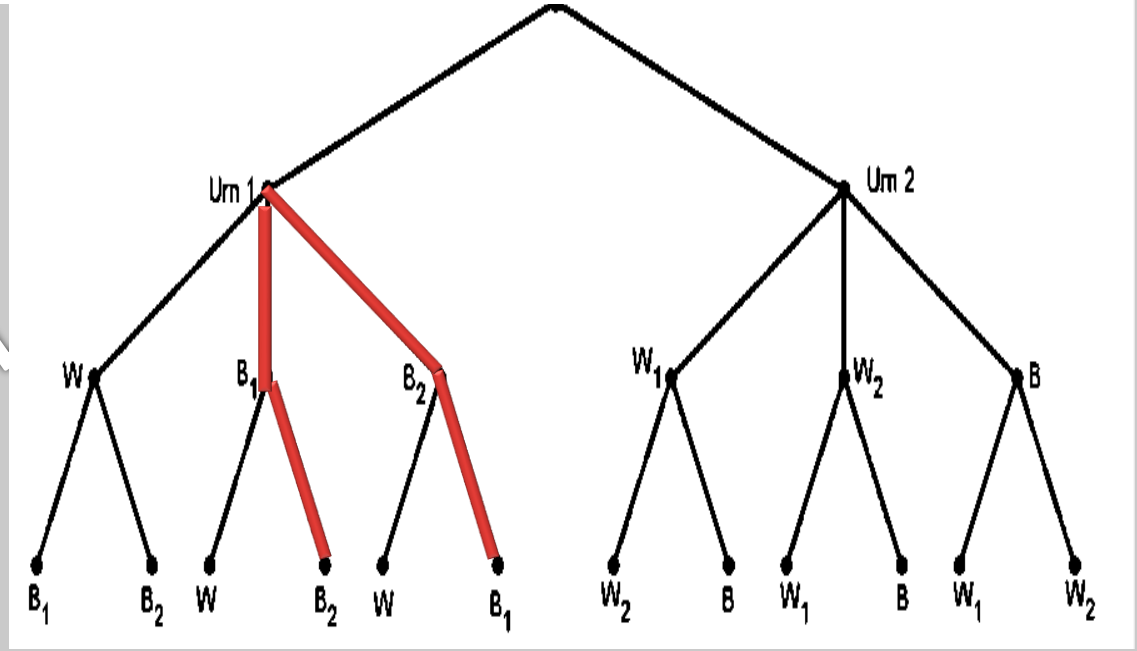


Solution:

a)

Sample space = $\{ WB_1, WB_2, B_1W, B_1B_2, B_2W, B_2B_1, W_1W_2, W_1B, W_2W_1, W_2B, BW_1, BW_2\}$

b) $P(\text{Two black balls}) = \frac{2}{12} = \frac{1}{6}$



c) $\{ WB_1, WB_2, B_1W, B_2W, W_1B, W_2B, BW_1, BW_2\}$

$P(\text{Two balls of opposite color}) = \frac{8}{12} = \frac{2}{3}$

3) If A,B and C are three mutually exclusive and exhaustive events of an experiment such that 3 P(A) = 2P(B) = P(C),then find P(A).

Solution:

Let 3 P(A) = 2P(B) = P(C) = p

$$P(A) = \frac{p}{3} \qquad P(B) = \frac{p}{2}$$

since A, B, C are mutually exclusive and exhaustive events $P(A) + P(B) + P(C) = 1$

$$\Rightarrow \quad \frac{p}{3} + \frac{p}{2} + p = 1$$

$$\Rightarrow \quad p = \frac{6}{11}$$

Hence, $P(A) = \frac{2}{11}$

8) From the employees of a company, 5 persons are selected to represent them in the managing committee of the company. Particulars of five persons are as follows:

S. No.	Name	Sex	Age in years
1.	Harish	M	30
2.	Rohan	M	33
3.	Sheetal	F	46
4.	Alis	F	28
5.	Salim	M	41

Mis. Ex

A person is selected at random from this group to act as a spokesperson. What is the probability that the spokesperson will be either male or over 35 years?

Solution:

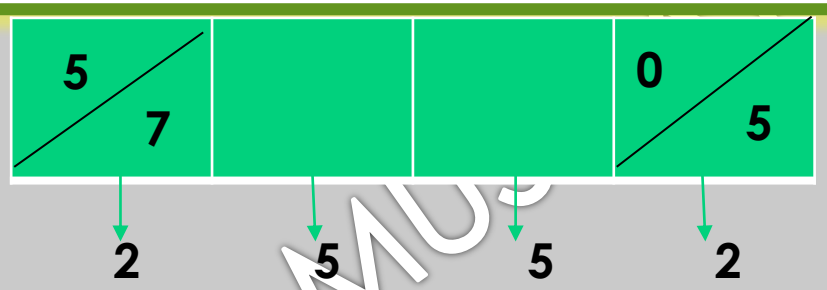
$$P(\text{spokesperson will be either male or over 35 years}) = \frac{3}{5}+\frac{2}{5}-\frac{1}{5} := \frac{4}{5}$$

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

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:

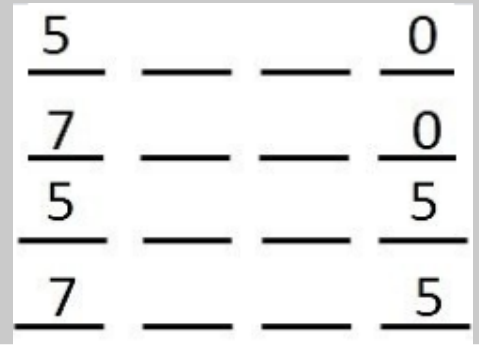


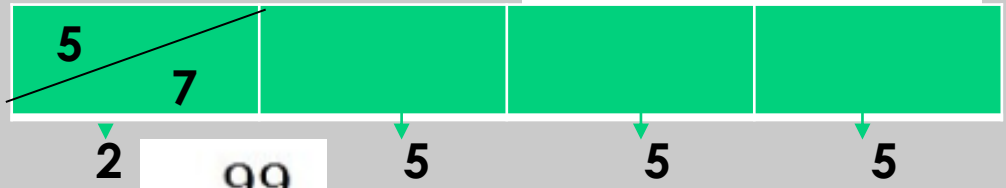
(i) the digits are repeated

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

Thank You and Happy Learning