- (h) Exhaustive Events : Events A, B, C....L are said to be Exhaustive Event if no event outside this set can result as an outcome of an experiment. For example, if A and B are two events defined on a sample space S, then A and B are exhaustive  $\Rightarrow$  A  $\cup$  B = S  $\Rightarrow$  P (A  $\cup$  B) = 1.
- 3. CLASSICAL DEFINITION OF PROBABILITY
  - If n represents the total number of equally likely, mutually exclusive and exhaustive outcomes of an experiment and m of them are favourable to the happening of the event A, then the probability of happening of the event A is given by

P(A) = m/n.

Note:

(i)  $0 \leq P(A) \leq 1$ 

(ii)  $P(A) + P(\overline{A}) = 1$ , Where  $\overline{A} = Not A$ .

(iii) If x cases are favourable to A and y cases are favourable to  $\overline{A}$  then P(A) =  $\frac{x}{(x+y)}$  and

 $P(\overline{A}) = \frac{y}{(x+y)}$ . We say that Odds In Favour Of A are x : y and odds against A are y : x.

## 4. VENN DI AGRAMS

A diagram used to illustrate relationships between sets. Commonly, a rectangle represents the universal set and a circle within it represents a given set (all members of the given set are represented by points within the circle). A subset is represented by a circle within a circle and union and intersection are indicated by overlapping circles. Let S is the sample space of an experiment and A, B, C are three events corresponding to it









5. ADDITION THEOREM

 $A \cup B = A + B = A$  or B denotes occurrence of at least A or B.

For 2 events A & B :

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

Note :

(a) P(A∪B)

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

(This is known as generalized addition theorem)

P(A + B)

$$P(A) + P(B \cap A)$$

P(A or B)

$$P(B) + P(A \cap \overline{B})$$

P (occurrence of atleast one A or B)

$$P(A \cap \overline{B}) + P(A \cap B) + P(B \cap \overline{A})$$
$$1 - P(\overline{A} \cap \overline{B})$$
$$1 - P(\overline{A} \cup \overline{B})$$

## FOUNDATION (MATHEMATICS)

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13. What is the probability of throwing a number 18. greater than 2 with a fair dice ?

(A) 
$$\frac{2}{3}$$
 (B)  $\frac{2}{5}$  (C) 1 (D)  $\frac{3}{5}$ 

- 14. Three cards numberd 2, 4 and 8 are put into a box. If a card is drawn at random what is the probability that the card drawn is(i) a prime number ?
  - (A) 1 (B)  $\frac{1}{3}$  (C)  $\frac{4}{5}$  (D)  $\frac{5}{7}$

(ii) an even number?

(A) 1 (B)  $\frac{2}{3}$  (C)  $\frac{1}{2}$  (D)  $\frac{3}{5}$ 

(iii) an odd number?

- (A) 1 (B) 0 (C)  $\frac{1}{3}$  (D)  $\frac{2}{3}$
- 15. Two fair coins are tossed. Find the probability of obtaining(i) 2 Heads20.
  - (A) 1 (B)  $\frac{2}{3}$  (C)  $\frac{1}{2}$  (D)  $\frac{1}{4}$

(ii) 1 Head and 1 Tail

(A) 
$$\frac{1}{2}$$
 (B) 1 (C)  $\frac{1}{2}$  (D)  $\frac{2}{3}$ 

(iii) 2 Tails

- (A) 1 (B)  $\frac{1}{4}$  (C)  $\frac{2}{3}$  (D)  $\frac{1}{2}$
- 16. In rolling two dices, find the probability that(i) there is at least one '6'

(A) 
$$\frac{11}{36}$$
 (B)  $\frac{22}{36}$  (C)  $\frac{15}{36}$  (D)  $\frac{29}{36}$ 

(ii) the sum is 5

- (A)  $\frac{1}{4}$  (B)  $\frac{1}{9}$  (C)  $\frac{1}{2}$  (D)  $\frac{1}{6}$
- 17. From a bag containing 4 white and 5 blck balls a man draws 3 at random. What are the odds against these being all black ?

(A) 
$$\frac{5}{37}$$
 (B)  $\frac{37}{5}$  (C)  $\frac{11}{13}$  (D)  $\frac{13}{37}$ 

Amit throws three dice in a special game of Ludo. If it is known that he needs 15 or higher in this throw to win then find the chance of his winning the game.

(A) 
$$\frac{5}{54}$$
 (B)  $\frac{17}{216}$  (C)  $\frac{13}{216}$  (D)  $\frac{15}{216}$ 

19. Find out the probability of forming 187 or 215 with the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 when only numbers of three digits are formed and when

(i) repetitions are not allowed

(A) 
$$\frac{12}{504}$$
 (B)  $\frac{18}{504}$  (C)  $\frac{2}{504}$  (D)  $\frac{24}{504}$ 

(ii) repetitions are allowed

(A) 
$$\frac{2}{729}$$
 (B)  $\frac{6}{729}$  (C)  $\frac{11}{729}$  (D)  $\frac{4}{729}$ 

In a horse race there were 18 horses numbered 1–18. The probability that horse 1 would win is 1/6, that 2 would win is 1/10 and that 3 would win is 1/8. Assuming that a tie is impossible, find the chance that one of the three will win.

(A) 
$$\frac{47}{120}$$
 (B)  $\frac{119}{120}$  (C)  $\frac{11}{129}$  (D)  $\frac{1}{5}$ 

21. Two balls are to be drawn from a bag containing8 grey and 3 blue balls. Find the chance that they will both be blue.

(A) 
$$\frac{1}{5}$$
 (B)  $\frac{3}{55}$  (C)  $\frac{11}{15}$  (D)  $\frac{14}{45}$ 

22. Two fair dice are thrown. What is the probability of(i) throwing a double ?

(A)  $\frac{1}{6}$  (B) 1 (C)  $\frac{2}{3}$  (D)  $\frac{1}{2}$ 

(ii) the sum is greater than 10

(A) 
$$\frac{2}{3}$$
 (B)  $\frac{2}{5}$  (C)  $\frac{1}{6}$  (D)  $\frac{1}{12}$ 

(iii) the sum is less than 10?

(A)  $\frac{5}{6}$  (B)  $\frac{2}{5}$  (C)  $\frac{3}{5}$  (D)  $\frac{2}{3}$ 

## FOUNDATION (MATHEMATICS)

- A bag contains 3 red, 6 white and 7 black 33. 38. balls. Two balls are drawn at random. What is the probability that both are black ? (A)  $\frac{1}{8}$  (B)  $\frac{7}{40}$  (C)  $\frac{12}{40}$  (D)  $\frac{13}{40}$ 34. A bag contains 6 red, 4 white and 8 blue balls. If three balls are drawn at random, find the probability that (i) all the three balls are of thesame colour. 39. (A)  $\frac{17}{240}$  (B)  $\frac{5}{51}$  (C)  $\frac{31}{204}$  (D) None (ii) all the three balls are blue. (A)  $\frac{8}{51}$  (B)  $\frac{50}{51}$  (C)  $\frac{7}{102}$  (D)  $\frac{13}{51}$ 40. 35. If P(A) = 1/3, P(B) = 1/2,  $P(a \cap B) = 1/4$  then find  $P(A' \cup B')$ (A)  $\frac{1}{3}$  (B)  $\frac{2}{5}$  (C)  $\frac{2}{3}$  (D)  $\frac{3}{4}$ (C) 0.1 36. A and B are two candidates seeking admission 41. to the IIMs. The probability that A is selected is 0.5 and the probability that both A and B are selected is at most 0.3. Is it possible that the probability of B getting selected is 0.9. (A) No (B) Yes (C) Either (a) or (b) (D) Can't say 37. The probability that a student will pass in
  - Mathematics is 3/5 and the probability that he will pass in English is 1/3. If the probability that he will pass in both Mathematics and English is 1/8, What is the probability that he will pass in at least one subject ?

(A) 
$$\frac{97}{120}$$
 (B)  $\frac{87}{120}$  (C)  $\frac{53}{120}$  (D)  $\frac{120}{297}$ 

The odds in favour of standing first of three students Amit, Vikas and Vivek appearing at an examination are 1 : 2 : 3 : 5 and 1 : 7 respectively. What is the probability the either of them will stand first (assume that a tie for the first place is not possible).

(A) 
$$\frac{168}{178}$$
 (B)  $\frac{168}{178}$  (C)  $\frac{5}{168}$  (D)  $\frac{125}{168}$ 

A, B, C are three mutually exclusive and exhaustive events associated with a random experiment. Find P(A) if it is igven that P(B) = 3/2 P(A) and P(C) = 1/2 P(B).

(A) 
$$\frac{4}{13}$$
 (B)  $\frac{2}{3}$  (C)  $\frac{12}{13}$  (D)  $\frac{1}{13}$ 

- A and B are two mutually exclusive events of an experiment. If P(A') = 0.65, P(A ∪ B) = 0.65 and P(B) = p, find the value of p.
  (A) 0.25 (B) 0.3
  (C) 0.1 (D) 0.2
- A bag contains 4 white and 2 black balls. Another contains 3 white and 5 black balls. If one balls is drawn from each bag, find the probability that

(i) both are white

(A) 
$$\frac{1}{3}$$
 (B)  $\frac{2}{3}$  (C)  $\frac{1}{4}$  (D)  $\frac{3}{4}$ 

(ii) both are black.

(A) 
$$\frac{3}{24}$$
 (B)  $\frac{1}{24}$  (C)  $\frac{3}{12}$  (D)  $\frac{5}{24}$ 

(ii) one is white and one is black.

(A) 
$$\frac{13}{24}$$
 (B)  $\frac{15}{24}$ 

(C) 
$$\frac{11}{21}$$
 (D)  $\frac{1}{2}$