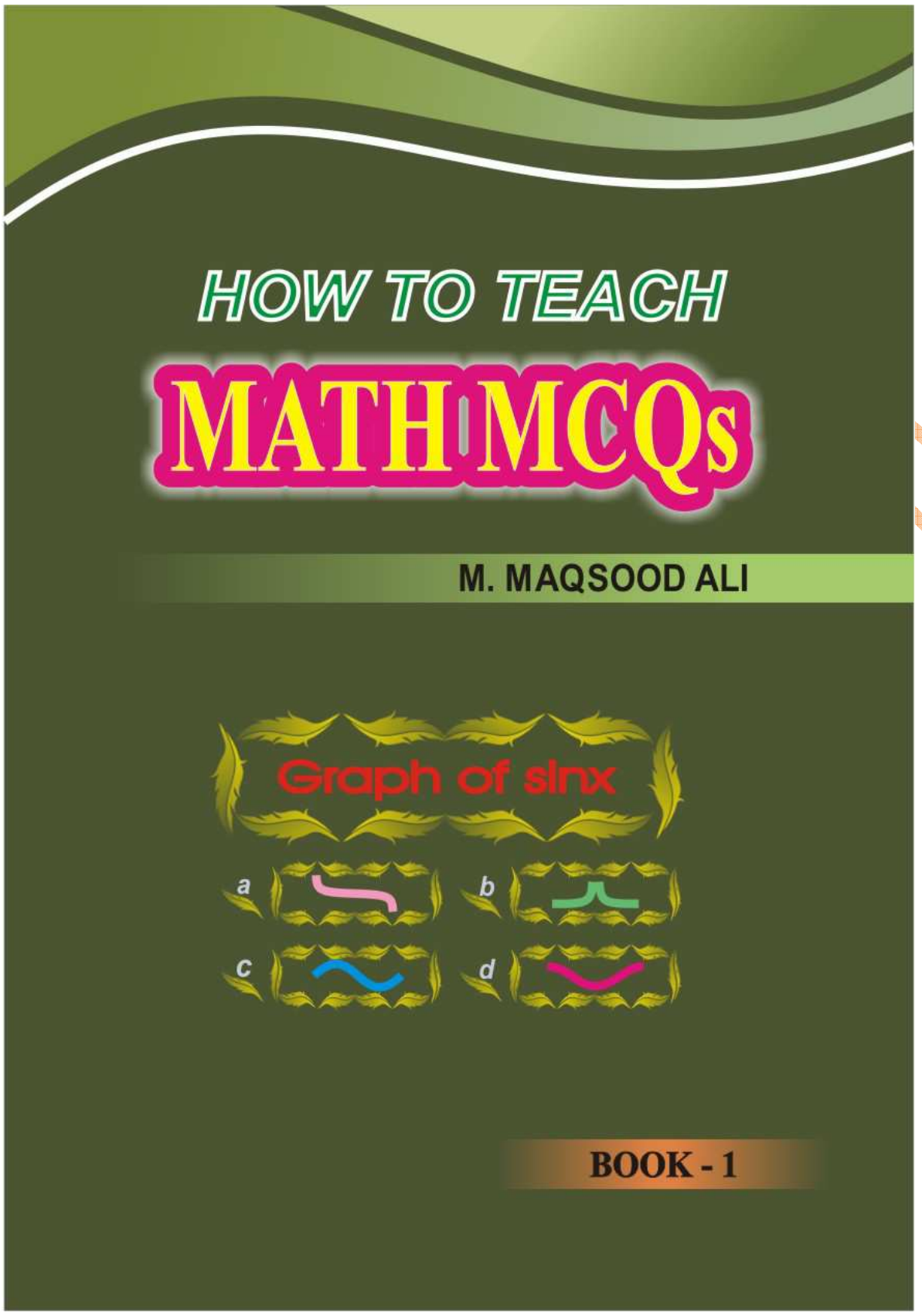

HOW TO TEACH
MATH MCQs
M. MAQSOOD ALI
Graph of sinx
a
b
c
d
BOOK - 1

Chapter 9

PROBABILITY

If S is a finite sample space of equally likely outcomes and A is an event in S, the probability of A , denoted by $P\ (A)$, is

$$P\ (A) = \frac{n\ (A)}{n\ (S)}$$

TOTAL NUMBER OF OUT COMES

1 : Fair coin:

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

$$\Rightarrow \quad n(S) = 2$$

2 : Ordinary Die:

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

$$\Rightarrow \quad n(S) = 6$$

3 : Deck of cards:

Total cards $= n(S) = 52$

Total cards are divided into two colors.

Number of black cards $= 26$

Number of red cards $= 26$

Black cards are divided into two suits .

(a) clubs ♣ (b) spades ♠

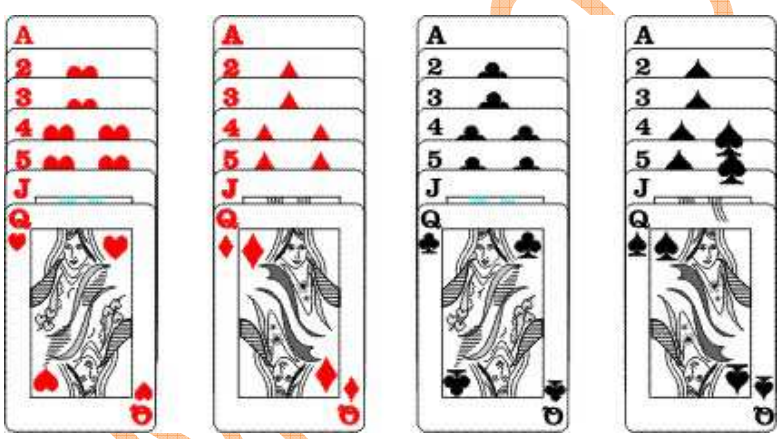
Red cards are divided into two suits.

(a) diamond ♦ (b) heart ♥

Each suits contains 13 cards.

The out comes of each suits are

2 , 3 , 4 , 5 , 6 , 7 , 8 , 9 , 10 , J (jack) , Q (queen) , K (king) , A (ace).



SECTION A

Required outcome is exactly one, so do not use combination (${}^nC_r$).

Because ${}^nC_1 = n$

COIN IS TOSSED ONCE
OR
ONE CION

MCQ-1 :

A fair coin is tossed once. What is the probability of obtaining head?

(a) 1 (b) $1/2$ (c) 0 (d) 2

Solution:

$$A = \{H\} \Rightarrow n(A) = 1$$
$$S = \{H, T\} \Rightarrow n(S) = 2$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(H) = \frac{1}{2}$$

COIN IS TOSSED TWICE
OR
TWO COINS ARE TOSSED

Total outcomes:

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

Total Number of outcomes:

$$n(S) = 2^2 = 4$$

MCQ-2 :

A coin is tossed twice. What is the probability of one head and one tail?

(a) $^1/_2$ (b) $^1/_4$ (c) 0 (d) $^3/_4$

Solution:

$$A = \{HT, TH\} \Rightarrow n(A) = 2$$

$$n(S) = 2^2 = 4$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{2}{4} = \frac{1}{2}$$

The answer is (a).

A COIN IS TOSSED THRICE

Total Number of outcomes:

$$n(S) = 2^3 = 8$$

A COIN IS TOSSED FOUR TIMES

Total Number of outcomes:

$$n(S) = 2^4 = 16$$

A COIN IS TOSSED n TIMES

Total Number of outcomes:

$$n(S) = 2^n$$

EXERCISE-1

(1) A coin is tossed thrice. What is the probability of three heads?

(a) -8 (b) $\frac{3}{2}$ (c) $\frac{1}{8}$ (d) $\frac{2}{3}$

(2) A coin is tossed twice. What is the probability of exactly one head?

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{4}$ (d) 0.2

(3) A coin is tossed six times. What is the probability of getting all head?

(a) $\frac{1}{64}$ (b) 3 (c) $\frac{3}{2}$ (d) $\frac{1}{6}$

A DIE IS ROLLED ONCE

Total outcomes:

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

Total Number of outcomes:

$$n(S) = 6$$

MCQ- 3:

A die is rolled once. What is the probability of getting number 5?

(a) $^5/_6$ (b) $^1/_3$ (c) 1 (d) $^1/_6$

Solution:

$$A = \{5\} \quad \Rightarrow \quad n(A) = 1$$
$$n(S) = 6$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{1}{6}$$

A DIE IS ROLLED TWICE (OR) TWO DICE ARE ROLLED

Possibility diagram:

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

$$n(S) = 6^2 = 36$$

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PLAYING CARDS

Total number of outcomes:

$$n(S) = 52$$

MCQ-5 :

A card is drawn at random from a deck of 52 cards. What is the probability that the card is a king?

(a) $^4/_{13}$ (b) $^1/_{26}$ (c) $^1/_{13}$ (d) $^1/_{52}$

Solution:

Total king $= 4 \quad \Rightarrow \quad n(A) = 4$

$$n(S) = 52$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{4}{52}$$

$$= \frac{1}{13}$$

The answer is (c).

EXERCISE-3

(1) A card is drawn at random from a deck of 52 well shuffled cards. What is the probability that the card is a black queen?

(a) $\frac{2}{13}$ (b) $\frac{1}{13}$ (c) $\frac{1}{52}$ (d) $\frac{1}{26}$

(2) A card is drawn at random from a deck of 52 well shuffled cards. What is the probability that the card is a diamond.

(a) $\frac{1}{4}$ (b) $\frac{1}{13}$ (c) $\frac{2}{13}$ (d) $\frac{1}{52}$

(3) A card is drawn at random from a deck of 52 well shuffled cards. What is the probability that the drawing card is a king or jack?

(a) $\frac{1}{8}$ (b) $\frac{1}{26}$ (c) $\frac{2}{13}$ (d) $\frac{1}{13}$

(4) A card is drawn at random from a deck of 52 well shuffled cards. What is the probability that the drawing card is an ace, a king or a queen?

(a) $\frac{1}{52}$ (b) $\frac{3}{26}$ (c) $\frac{1}{12}$ (d) $\frac{3}{13}$

(5) A card is drawn at random from a deck of 52 cards. What is the probability the card is a queen or a red card?

(a) $\frac{1}{13}$ (b) $\frac{15}{26}$ (c) $\frac{7}{13}$ (d) $\frac{1}{2}$

(6) A card is drawn at random from a deck of 52 well shuffled cards. What is the probability the drawing card is a club or a jack?

(a) $\frac{2}{13}$ (b) $\frac{1}{13}$ (c) $\frac{17}{52}$ (d) $\frac{4}{13}$

BALLS OF DIFFERENT COLORS

MCQ-6 :

A bag has 5 green, 2 white and 3 black balls. If one ball is drawn at random. What is the probability that it is green ball?

(a) 1/5 (b) $^1/_2$ (c) 1/10 (d) 5/8

Solution:

Total balls $= 5 + 2 + 3 = 10 \Rightarrow n(S) = 10$

Green balls $= 5 \Rightarrow n(A) = 5$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{5}{10}$$

$$= \frac{1}{2}$$

The answer is (b).

EXERCISE-4

(1) A bag has 6 red and 3 green balls. A ball is drawn at random. What is the probability that the ball is green?

(a) $\frac{3}{2}$ (b) $\frac{2}{9}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$

(2) A box contains 3 white, 2 black and 5 red balls. A ball is drawn at random. What is the probability that the ball is white or black?

(a) $\frac{1}{10}$ (b) $\frac{3}{10}$ (c) $\frac{1}{5}$ (d) $\frac{1}{2}$

$$P(A \cup B) = P(A) + P(B) \quad , \quad where \ A \cap B = \emptyset$$

Note:

U : Use for (in words) “or”

MCQ- 7:

A die is rolled. What is the probability that the number comes up is an even number or 5?

(a) $^2/_3$ (b) $^1/_2$ (c) $^3/_4$ (d) $^1/_3$

Solution:

Even numbers = 2, 4, 6

$$P(E) = 3/6 = {}^1/_2$$

$$P(5) = {}^1/_6$$

$$P(A) = P(E) + P(5)$$

$$P(A) = {}^1/_2 + {}^1/_6$$

$$= {}^2/_3$$

The answer is (a).

Shortcut:

Out comes:
Even numbers = 2, 4, 6
or 5

$$A = \{2, 4, 6, 5\}$$

$$n(A) = 4$$

$$P(A) = \frac{P(A)}{P(S)}$$

$$P(A) = \frac{4}{6}$$

$$= 2/3$$

The answer is (a).

MCQ- 8:

A card is drawn from a deck of 52 cards. What is the probability that the card is a king or a queen?

(a) $^4/_{13}$ (b) $^1/_{26}$ (c) $^2/_{13}$ (d) $^1/_{13}$

Solution:

$$P(K) = \frac{4}{52} = \frac{1}{13}$$

$$P(Q) = \frac{4}{52} = \frac{1}{13}$$

$$P(KUQ) = P(K) + P(Q)$$

$$= \frac{1}{13} + \frac{1}{13}$$

$$= \frac{2}{13}$$

The answer is (c).

Shortcut:

$$A = \{K, Q\} \Rightarrow n(A) = 8$$

$$n(S) = 52$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{8}{52}$$

$$= \frac{2}{13}$$

The answer is (c).

EXERCISE-5

(1) A die is rolled. What is the probability that the number comes up is an odd number or 4?

(a) $^2/_3$ (b) $^1/_2$ (c) $^3/_4$ (d) $^1/_3$

(2) A card is drawn from a deck of 52 cards. What is the probability that the card is a ace or a jack?

(a) $^4/_{13}$ (b) $^1/_{26}$ (c) $^2/_{13}$ (d) $^1/_{13}$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B), \quad where \quad A \cap B \neq \emptyset$$

$A \cap B \neq \emptyset$: Set A and set B are not disjoint.

MCQ-9 :

A die is rolled. What is the probability that the number comes up is an even or a prime number?

(a) $\frac{5}{6}$ (b) $\frac{2}{3}$ (c) 1 (d) $\frac{1}{2}$

Solution:

$E = \{2,4,6\} \Rightarrow P(E) = \frac{3}{6} = \frac{1}{2}$

$P = \{2,3,5\} \Rightarrow P(P) = \frac{3}{6} = \frac{1}{2}$

$E \cap P = \{2\} \Rightarrow P(E \cap P) = \frac{1}{6}$

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

$$P(E \cup P) = \frac{1}{2} + \frac{1}{2} - \frac{1}{6}$$

$$= \frac{5}{6}$$

The answer is (a).

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TWO OBJECTS ONE BY ONE

Case-1: Replaced

MCQ-11 :

A bag has 5 green, 2 white and 3 black balls. If one ball is drawn at random and replaced. Another ball is drawn, what is the probability that both the balls are green?

(a) $\frac{1}{4}$ (b) $\frac{3}{5}$ (c) $\frac{5}{12}$ (d) $\frac{2}{9}$

Solution:

Green balls $=$ 5
White balls $=$ 2
Black balls $=$ 3

Total balls $=$ $5 + 2 + 3 = 10$

P(both balls are green)=P(ball is green).P(ball is green after replacement)

$$P(G \cap G) = P(G).P(G)$$

$$P(G \cap G) = \frac{5}{10} \cdot \frac{5}{10}$$

$$= \frac{1}{4}$$

The answer is (a).

Case-2: Not replaced

MCQ-12 :

A bag has 5 green, 2 white and 3 black balls. If one ball is drawn at random and not replaced. Another ball is drawn, what is the probability that both the balls are green?

(a) $\frac{1}{4}$ (b) $\frac{3}{5}$ (c) $\frac{5}{12}$ (d) $\frac{2}{9}$

Solution:

EXERCISE-7

(1) A card is drawn at random from a deck of well shuffled cards, and is not replaced. Another card is drawn, what is the probability that both cards are kings?

(a) $\frac{1}{13\times17}$ (b) $\frac{3}{13\times17}$ (c) $\frac{2}{52^2}$ (d) $\frac{7}{51\times52}$

(2) A card is drawn at random from a deck of 52 well shuffled cards and is replaced. Another card is drawn at random. What is the probability that both the cards are queens.

(a) $\frac{1}{8}$ (b) $\frac{1}{169}$ (c) $\frac{2}{13}$ (d) $\frac{3}{26}$

(3) A bag has 5 green, 2 white and 3 black balls. If two balls are drawn at random, one at a time and replaced. What is the probability that both the balls are balck?

(a) $\frac{3}{10}$ (b) $\frac{3}{5}$ (c) $\frac{9}{100}$ (d) $\frac{2}{3}$

(4) A bag contains 6 red and 4 black balls. Two balls are drawn at random one by one without replacement. What is the probability that first ball is black and second green.

(a) $\frac{4}{15}$ (b) $\frac{5}{90}$ (c) $\frac{3}{10}$ (d) $\frac{16}{15}$

(5) Two members are chosen one by one, without replacement , out of 5 men and 4 women. What is the probability that first is man and second is women?

(a) $\frac{7}{9}$ (b) $\frac{5}{18}$ (c) $\frac{8}{9}$ (d) $\frac{19}{8}$

SECTION B

PROBABILITY USING COMBINATION

(TWO OBJECTS SIMULTANEOUSELY)

Number of required outcomes two or more than two.

In this case use COMBINATION.

MCQ- 13:

Two cards are drawn at random from a deck of 52 cards. What is the probability that the cards are Jack or ace?

(a) $\frac{{}^{8}C_{2}}{{}^{52}C_{2}}$ (b) $\frac{{}^{4}C_{2}.{}^{4}C_{2}}{{}^{52}C_{2}}$ (c) $\frac{2\ {}^{4}C_{2}}{{}^{52}C_{2}}$ (d) $\frac{{}^{4}C_{1}.{}^{4}C_{1}}{{}^{52}C_{2}}$

Solution:

No. of cards Jack and ace = 8

No. of drawing cards = 2

Total cards = 52

NOTE: The cards may be both Jack, both ace or one Jack and one ace.

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{{}^{8}C_{2}}{{}^{52}C_{2}}$$

The answer is (a).

MCQ- 14:

Two cards are drawn at random from a deck of 52 cards. What is the probability that the cards are one Jack and one ace?

(a) $\frac{^8C_2}{^{52}C_2}$ (b) $\frac{2\ ^4C_2}{^{52}C_2}$ (c) $\frac{2\ ^4C_1}{^{52}C_2}$ (d) $\frac{^4C_1.^4C_1}{^{52}C_2}$

Solution:

No. of jack $= 4$

No of ace $= 4$

NOTE: One card is jack and one is ace, neither both are jack nor both ace.

$$P(A) = \frac{n(A)}{n(s)}$$

$$P(A) = \frac{^4C_1.^4C_1}{^{52}C_2}$$

The answer is (d).

MCQ-15 :

A bag has 6 red, 10 green and 12 blue balls. Six balls are drawn at random. What is the probability of 2 red and 4 blue balls?

(a) $\frac{^{18}C_6}{^6C_2\ ^{12}C_4}$ (b) $\frac{^6C_2+^{12}C_4}{^{28}C_6}$ (c) $\frac{^8C_6}{^{28}C_6}$ (d) $\frac{^6C_2.^{12}C_4.}{^{28}C_6}$

Solution:

Total red balls $= 6$, Required red balls $= 2$

Total blue balls $= 12$, Required blue balls $= 4$

Total balls $= 6 + 10 + 12 = 28$

$$P(A) = \frac{n(A)}{n(s)}$$

$$P(A) = \frac{^6C_2.^{12}C_4}{^{28}C_6}$$

The answer is (d).

EXERCISE-8

(1) Two cards are drawn simultaneously at random from a deck 52 well shuffled cards. What is the probability that the drawing cards are king or queen?

(a) $\frac{{}^{8}C_2}{{}^{52}C_2}$ (b) $\frac{{}^{4}C_2\,{}^{4}C_2.}{{}^{52}C_2}$ (c) $\frac{2\,{}^{4}C_2.}{{}^{52}C_2}$ (d) $\frac{{}^{4}C_1\,{}^{4}C_1.}{{}^{52}C_2}$

(2) Two cards are drawn simultaneously from a deck of 52 well shuffled cards. What is the probability that the drawing cards are both king or both queen?

(a) $\frac{{}^{8}C_2}{{}^{52}C_2}$ (b) $\frac{{}^{4}C_2\,{}^{4}C_2.}{{}^{52}C_2}$ (c) $\frac{2\,{}^{4}C_2.}{{}^{52}C_2}$ (d) $\frac{{}^{4}C_1\,{}^{4}C_1.}{{}^{52}C_2}$

(3) Two cards are drawn at random from a deck of 52 well shuffled cards. What is the probability of one king and one queen?

(a) $\frac{{}^{8}C_2}{{}^{52}C_2}$ (b) $\frac{{}^{4}C_2\,{}^{4}C_2.}{{}^{52}C_2}$ (c) $\frac{2\,{}^{4}C_2.}{{}^{52}C_2}$ (d) $\frac{{}^{4}C_1\,{}^{4}C_1.}{{}^{52}C_2}$

(4) Three students are selected at random from 6 boys and 3 girls. What is the probability of selecting two boys and one girl?

(a) $\frac{2\,{}^{6}C_2\,{}^{3}C_1.}{{}^{9}C_2}$ (b) $\frac{{}^{6}C_3}{{}^{9}C_3}$ (c) $\frac{{}^{6}C_2\,{}^{3}C_1.}{{}^{9}C_2}$ (d) $\frac{{}^{6}C_{2+}\,{}^{3}C_1.}{{}^{9}C_2}$

(5) A bag has 5 red, 8 green and 9 blue balls. Five balls are drawn at random. What is the probability of 2 blue and 3 green balls?

(a) $\frac{{}^{8}C_2\,{}^{9}C_3}{{}^{22}C_5}$ (b) $\frac{{}^{8}C_3+{}^{9}C_2}{{}^{22}C_5}$ (c) $\frac{{}^{8}C_3.{}^{9}C_2}{{}^{22}C_3.{}^{22}C_2}$ (d) $\frac{{}^{8}C_3.{}^{9}C_2}{{}^{22}C_5}$

SECTION C

Some probabilities are given. To find the other probabilities with the help of given probabilities.

$$P(A \cap B) = P(A).P(B) \quad \text{and} \quad P(A') = 1 - P(A)$$

$\cap$: in words "and"

A' : not in A

MCQ- 16:

The probability that Ali passes the test is 0.8. What is the probability he will fail in test?

(a) 1 (b) 0.4 (c) 0.2 (d) 0.8

Solution:

P(Ali passes the test) $= P(A) = 0.8$

P (Ali will not pass the test) $= P(A') = ?$

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

$$P(A') = 1 - 0.8$$

$$= 0.2$$

The answer is (c).

MCQ-17 :

The probability that Ali will solve a problem is 2/7 and Sarim will solve it 1/6. What is the probability that both will solve it?

(a) $\frac{1}{42}$ (b) $\frac{1}{21}$ (c) $\frac{19}{42}$ (d) 1

Solution:

P(Ali will solve the problem) $= P(A) = \frac{2}{7}$

P(Sarim will solve the problem) $= P(S) = \frac{1}{6}$

P(both solve the problem) $= P(A \cap S)$

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EXERCISE-9

(1) The probability that Ali passes each test is 0.6. What is the probability, he will fail in first two test?

(a) $\frac{4}{5}$ (b) 0 (c) 0.16 (d) 0.8

(2) The probability that Atif goes to school each day is 0.7. What is the probability that he will go to school on Monday and not Tuesday?

(a) 0.3 (b) 0.4 (c) 1 (d) 0.21

(3) The probability that team A wins a cricket test match is 2/5 and not win is 1/2 . What is the probability that match will be drawn?

(a) 0.5 (b) 1.5 (c) $\frac{1}{5}$ (d) 0.1

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