Probability, Permutation and Combination
Solution

1. Answer: (A)

Required probability = $\frac{^4C_2}{^{12}C_2} = \frac{4 \times 3}{12 \times 11} = \frac{1}{11}$

2. Answer: (B)

Ways to select 4 balls out of 16 = $^{16}C_4$

Ways to select one red balls = $^5C_1$

Ways to select two black balls = $^6C_2$

Ways to select one blue balls = $^5C_1$

∴ Required probability

$= \frac{^5C_1 \times {}^6C_2 \times {}^5C_1}{^{16}C_4} = \frac{75}{364}$

3. Answer: (B)

Required probability = $\frac{^9C_2}{^{20}C_2} = \frac{9 \times 8}{20 \times 19} = \frac{18}{95}$

4. Answer: (C)

Total no. of possible outcomes = 36

Possibility of getting sum of 6 = 5 i.e. $[(1,5), (2,4), (3,3), (4,2), (5,1)]$

So, required possibility = $\frac{5}{36}$

5. Answer: (A)

Quantity I:

Probability of not more than one person telling a lie = Probability of all telling the truth + probability of two person telling the truth

= P (A) . P (B) . P(C) + P (A) . P(B) . $\overline{P(C)}$ + P (A). $\overline{P(B)}$. P (C) + $\overline{P(A)}$. P (B). P (C)

$= 0.6 \times 0.4 \times 0.5 + 0.6 \times 0.4 \times 0.5 + 0.6 \times 0.6 \times 0.5 + 0.4 \times 0.4 \times 0.5$

= 0.12 + 0.12 + 0.18 + 0.08 = 0.5

Quantity II:

Probability of at least two persons lying with B being one of them

= Probability of all lying + Probability of two persons lying B being one of them

$= \overline{P(A)}.\overline{P(B)}.\overline{P(C)}. + P(A).\overline{P(B)}.\overline{P(C)}. + \overline{P(A)}.\overline{P(B)}.P(C)$

$= 0.4 \times 0.6 \times 0.5 + 0.6 \times 0.6 \times 0.5 + 0.4 \times 0.6 \times 0.5$

= 0.12 + 0.18 + 0.12 = 0.42

Quantity I > Quantity II

6. Answer: (B)

Probability that no one can solve the given question

$= \frac{2}{3} \times \frac{3}{5} \times \frac{1}{2} = \frac{1}{5}$

Probability that the question will be solved = 1 − probability that no one can solve the question

$= 1 - \frac{1}{5} = \frac{4}{5}$

7. Answer: (B)

There are 4 possible cases

= (3 red) (1 red 2 green) (2 red 1 green) (3 green)

Required probability

$= \frac{^5C_3 + {}^5C_1 \times {}^4C_2 + {}^5C_2 + {}^4C_1 + {}^4C_3}{^{15}C_3} = \frac{12}{65}$

8. Answer: (D)

Green balls = $2 \times \frac{4+5}{2} = 9$

Required probability = $\frac{^4C_2}{^{18}C_2} = \frac{12}{306} = \frac{2}{51}$

9. Answer: (A)

$P = \frac{^3C_1 \times {}^5C_1}{^{12}C_2} = \frac{5}{22}$

10. Answer: (A)

Required probability

$= \frac{13}{27} \times \frac{12}{26} + \frac{14}{27} \times \frac{13}{26} = \frac{13}{27}$

11. Answer: (B)

Sum can be odd in two cases:

1. first card is odd numbered & second one in even.

2. first card is even numbered & second one is odd.

Required probability = $\frac{13}{25} \times \frac{12}{24} + \frac{12}{25} \times \frac{13}{24}$

$= \frac{13}{25}$

12. Answer: (A)

Conditions for odd sum

1. First card is odd numbered and second one is even numbered ⇒ $\frac{16}{31} \times \frac{15}{30} = \frac{8}{31}$

2. First card is even numbered and second is odd numbered $\Rightarrow \frac{15}{31} \times \frac{16}{30} = \frac{8}{31}$ Hence required probability $= \frac{8}{31} + \frac{8}{31} = \frac{16}{31}$

13. Answer: (D)

Odd sum is there when one card drawn is odd and another even.

∴ Required probability

$= \left(\frac{13}{27} \times \frac{14}{26}\right) + \left(\frac{14}{27} \times \frac{13}{26}\right) = \frac{14}{27}$

14. Answer: (E)

Probability of choosing basket $\rightarrow \frac{1}{3}$

Probability of choosing two orange $\rightarrow \frac{{}^{3}C_{2}}{{}^{6}C_{2}}$

Required probability $= \frac{1}{3} \times \frac{{}^{3}C_{2}}{{}^{6}C_{2}} = \frac{1}{15}$

15. Answer: (C)

Total letter in IMPORTANCE → 10

Total letter in PORTABILITY → 11

Letters which is common in both words

⇒ IPORTA

So we choose a letter rather than these six letters $\Rightarrow \frac{4}{10} = \frac{2}{5}$

16. Answer: (E)

Total number of mobiles = 12

Required cases = one honor 7x and one One plus five or two One plus five

Required probability $= \frac{{}^{7}C_{1} \times {}^{5}C_{1}}{{}^{12}C_{2}} + \frac{{}^{5}C_{2}}{{}^{12}C_{2}}$

$= \frac{7 \times 5}{66} + \frac{10}{66}$

$= \frac{45}{66}$

$= \frac{15}{22}$

17. Answer: (C)

Total balls = x + 10

Probability of choosing 2 blue balls

$= {}_{x}C_{2} \div {}^{x+10}C_{2} = 0.125$

ATQ,

$\frac{x \times (x-1)}{(10+x) \times (9+x)} = \frac{125}{1000} = \frac{1}{8}$

$8(x^2 - x) = (10 + x)(9 + x)$

$8x^2 - 8x = 90 + 9x + 10x + x^2$

$7x^2 - 27x - 90 = 0$

$7x^2 - 42x + 15x - 90 = 0$

$7x(x - 6) + 15(x - 6) = 0$

$(7x + 15)(x - 6) = 0$

18. Answer: (C)

ATQ,

$\frac{X}{X+16} = \frac{1}{3}$

3X = X + 16

X = 8

∴ sum of red & blue balls = 8 + 6 = 14

19. Answer: (B)

Total numbers of ways → 7!

Favorable numbers of ways → 5! × 3!

Probability $\rightarrow \frac{5! \times 3!}{7!} = \frac{1}{7}$

20. Answer: (D)

∴ Required probability $= \frac{7}{36} \times \frac{6}{35}$

$= \frac{1}{30}$