PROBABILITY

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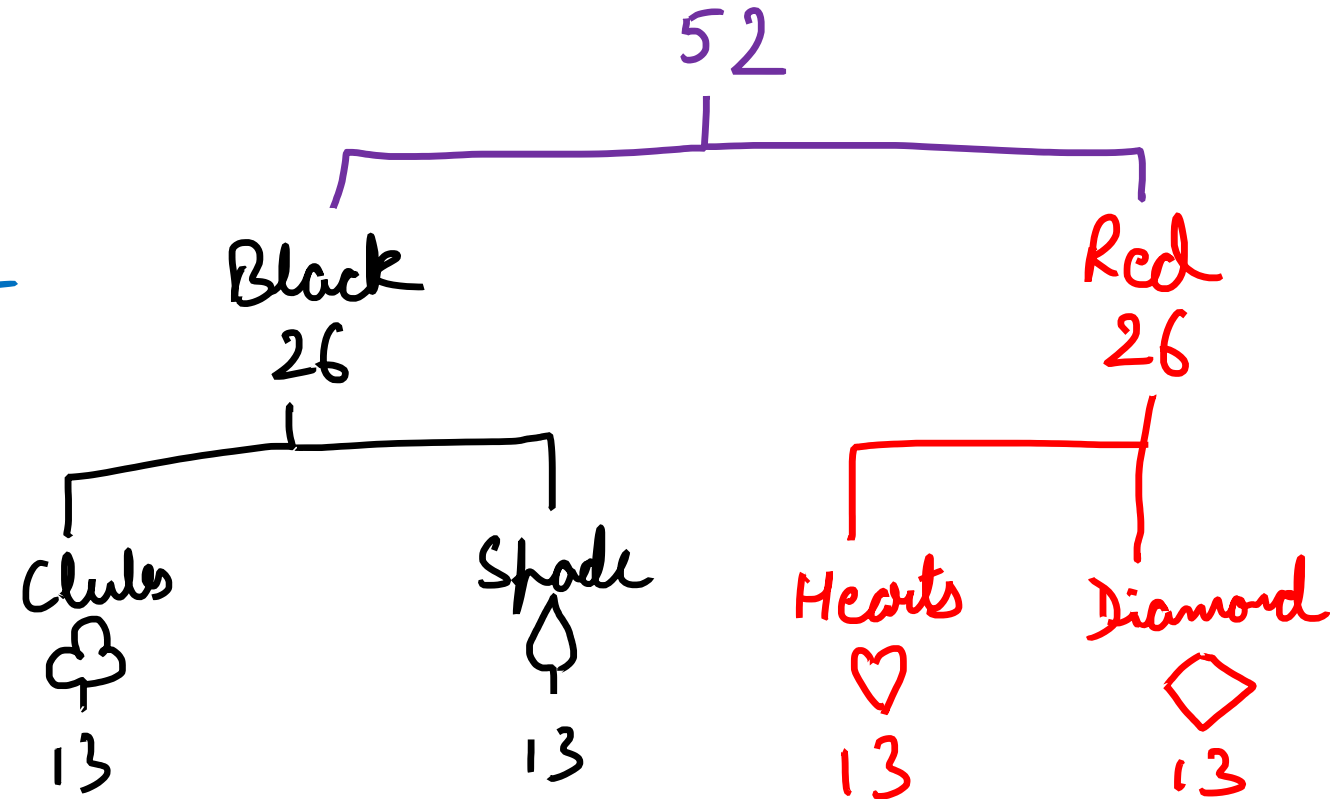
CONCEPT

$$P = \frac{Favourable}{Total}$$

1. A card is drawn from a well-shuffled pack of cards. What is the probability of getting a spade?

Ans: _____

$F = 13$

$P = \dfrac{S}{T} = \dfrac{13}{52} = \dfrac{1}{4}$

$P = \dfrac{^{13}C_1}{^{52}C_1} = \dfrac{13}{52} = \dfrac{1}{4}$

52

Black 26

Red 26

Clubs ♣ 13

Spade ♠ 13

Hearts ♡ 13

Diamond ◇ 13

2. A card is drawn from a well-shuffled pack of cards. What is the probability of getting a spade or a diamond?

Ans: _____

$$P = P(S) \text{ or } P(D) = \frac{13}{52} + \frac{13}{52} = \frac{26}{52} = \frac{1}{2}$$

$$P = \frac{{}^{13}C_1 + {}^{13}C_1}{{}^{52}C_1} = \frac{13 + 13}{52} = \frac{26}{52} = \frac{1}{2}$$

3. Two cards are drawn from a well-shuffled pack of cards. What is the probability that the first is a spade and the second is a diamond?

Ans: _____

$$P = P(S, D) = \frac{13}{52} \times \frac{13}{51} = \frac{1}{4} \times \frac{13}{51} = \frac{13}{204}$$

$$P = \frac{^{13}C_1 \times ^{13}C_1}{^{52}P_2} = \frac{13 \times 13}{52 \times 51} = \frac{13}{204}$$

4. Two cards are drawn from a well-shuffled pack of cards. What is the probability of getting a spade and a diamond?

Ans: _____

$$P = P(S, D) \text{ or } P(D, S)$$

$$= \frac{13}{52} \times \frac{13}{51} + \frac{13}{52} \times \frac{13}{51} = 2 \times \frac{1}{\cancel{4}_2} \times \frac{13}{51} = \frac{13}{102}$$

$$P = \frac{^{13}C_1 \times ^{13}C_1}{^{52}C_2} = \frac{13 \times 13}{\frac{2}{52 \times 51}{2}} = \frac{13}{102}$$

5. Two bottles are randomly selected from a stack of 10 bottles in which 5 are blue, 3 are green, and 2 are yellow. What is the probability that the 1st bottle selected is blue and the 2nd is green?

Ans: _____

$$P = P(B, G) = \frac{5}{10} \times \frac{3}{9} = \frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$$

$$P = \frac{^5C_1 \times ^3C_1}{^{10}P_2} = \frac{5 \times 3}{10 \times 9} = \frac{1}{6}$$

6. Three bottles are randomly selected from a stack of 12 bottles in which 3 are black, 4 are white, and 5 are red. What is the probability that all 3 bottles selected are of different colour?

Ans: _____

$$P = \frac{{}^3C_1 \times {}^4C_1 \times {}^5C_1}{{}^{12}C_3} = \frac{3 \times 4 \times 5}{\frac{12 \times 11 \times 10}{3 \times 2}} = \frac{3}{11}$$

7. Two dice are rolled. What is the probability that the sum of the results is 5?

Ans: _____

$$T = \underline{6} \times \underline{6} = 6^2 = 36$$

$$F =$$

D_1	D_2
1	4
2	3
3	2
4	1
5	X
6	X

4

$$P = \frac{4}{36} = \frac{1}{9}$$

8. Two dice are rolled. What is the probability that the sum of the results is less than or equal to 5?

Ans: _____

$T = \underline{6} \times \underline{6} = 36$

$F =$

D_1	D_2
1	1,2,3,4
2	1,2,3
3	1,2
4	1
5	X
6	X

10

$P = \dfrac{10}{36} = \dfrac{5}{18}$

9. A fair coin is tossed 6 times. What is the probability that heads turns up exactly 2 times?

Ans: _____

$T = \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} \times \underline{2} = 2^6 = 64$

$F =$

H H T T T T

T T T T H H

T T H H T T

H T T T T H

⋮

$\dfrac{6!}{2! \times 4!} = \dfrac{\overset{3}{\cancel{6}} \times 5}{\cancel{2}} = 15$

10. A bag contains three differently coloured bottles, which include 3 black, 4 white, and 5 red. If 3 bottles are picked randomly from the bag, what is the probability that:

i. All the three are black?   Ans: _____

ii. None of them are white?   Ans: _____

iii. All of them are not white? Ans: _____

i) $P = \dfrac{3}{12} \times \dfrac{2}{11} \times \dfrac{1}{10} = \dfrac{1}{220}$

$P = \dfrac{^3C_3}{^{12}C_3} = \dfrac{1}{\dfrac{12 \times 11 \times 10}{3 \times 2}} = \dfrac{1}{220}$

ii) $P = \dfrac{^8C_3}{^{12}C_3} = \dfrac{\dfrac{8!}{3! \times 5!}}{\dfrac{12!}{3! \times 9!}} = \dfrac{\dfrac{8 \times 7 \times 6}{12 \times 11 \times 10}}{} = \dfrac{14}{55}$

iii) $P(\text{All white}) = \dfrac{^4C_3}{^{12}C_3} = \dfrac{4}{\dfrac{12 \times 11 \times 10}{3 \times 2}} = \dfrac{1}{55}$

$P(\text{All Not white}) = 1 - \dfrac{1}{55} = \dfrac{54}{55}$

11. A committee of 10 people needs to be seated on 10 chairs in a straight line. What is the probability that 3 particular people always sit together?

Ans: _____

$T = 10!$

$F = 1, 2, 3, 4, 5, 6, 7, \boxed{8, 9, 10}$

$= 8! \times 3!$

$P = \dfrac{8! \times 3!}{10!} = \dfrac{3 \times 2}{10 \times 9} = \dfrac{1}{15}$

12. The probability of getting heads in both trials when a balanced coin is tossed twice will be?

A. 1/4   B. 1/2   C. 1   D. 3/4

$$\frac{C_1}{\begin{matrix} H \\ H \\ T \end{matrix}} \quad \frac{C_2}{\begin{matrix} H \\ T \\ H \\ T \end{matrix}}$$

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

13. A card is drawn from a well-shuffled pack of cards. The probability of getting a queen of club or king of the heart is?

A. 1/52   B. 1/26   C. 1/13   D. None of these

$$P = \frac{1 + 1}{52} = \frac{2}{52} = \frac{1}{26}$$

14. If the probability that <u>A will live 15</u> years is <u>7/8</u> and that B will live 15 years is 9/10, then what is the probability that both will live 15 years?

A. 1/20   B. 63/80   C. 1/5   D. None of these

$$P = P(A^{\checkmark}, B^{\checkmark})$$

$$= \frac{7}{8} \times \frac{9}{10} = \frac{63}{80}$$

Both dying

$$P = P(A^{x}, B^{x}) = \frac{1}{8} \times \frac{1}{10} = \boxed{\frac{1}{80}}$$

One dies

$$P = P(A^{\checkmark}, B^{x}) \text{ or } P(A^{x}, B^{\checkmark})$$

$$= \frac{7}{8} \times \frac{1}{10} + \frac{1}{8} \times \frac{9}{10}$$

$$= \frac{7}{80} + \frac{9}{80} \boxed{= \frac{16}{80}}$$

15. The probability of drawing a red card from a deck of playing cards is

A. 2/18　　　　　　B. 1/13　　　　　　　　C. 1/4　　　✓ D. 1/2

$$P(R) = \frac{26}{52} = \frac{1}{2}$$

16. Two dice are rolled. What is the probability that the sum of the numbers appeared on them is 8 or 11?

A. 1/6   B. 1/18   C. 1/9   ✓ D. 7/36

$T = \underline{6} \times \underline{6} = 36$

$F =$

D_1	D_2
1	X
2	6
3	5
4	4
5	3, 6
6	2, 5

7

$P = \dfrac{7}{36}$

17. A bag contains 8 red and 5 white balls. 2 balls are drawn at random. What is the probability that both are white?

A. 5/16　　　　　B. 2/13　　　　　C. 3/26　　　　　✓ D. 5/39

$$P = \frac{5}{13} \times \frac{4}{12} = \frac{5}{39}$$

18. Three unbiased coins are tossed. What is the probability of getting at most 2 heads?

A. 1/4   B. 3/8   ✓ C. 7/8   D. 1/2

$2 \times 2 \times 2 = 8$

H	H	H
H	H	T
H	T	H
H	T	T
T	H	H
T	H	T
T	T	H
T	T	T

$$\frac{7}{8}$$

19. A brother and sister appear for an interview against two vacant posts in an office. The probability of the brother's selection is 1/5th and that of the sister's selections is 1/3rd. What is the probability that only one of them is selected?

A. 1/5   B. 2/5 ✓   C. 1/3   D. 2/3

$$P = P(B^{\checkmark}, S^{x}) \text{ or } P(B^{x}, S^{\checkmark})$$

$$= \frac{1}{5} \times \frac{2}{3} + \frac{4}{5} \times \frac{1}{3}$$

$$= \frac{2}{15} + \frac{4}{15} = \frac{6}{15} = \frac{2}{5}$$

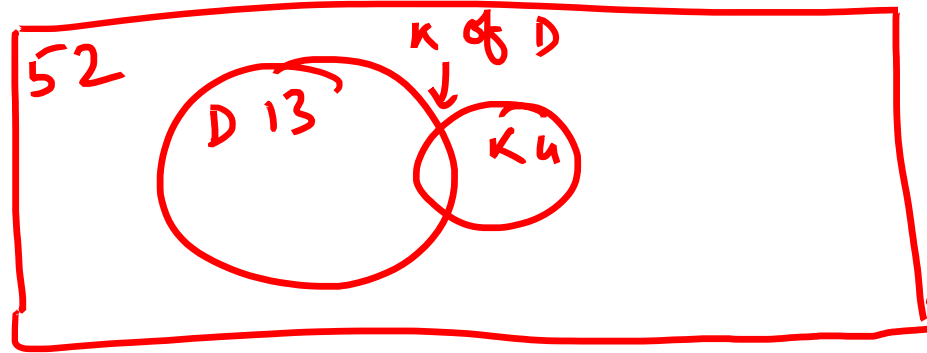**20. The probability that a card drawn from a pack of 52 cards will be a diamond or a king is?**

A. 1/13   B. 4/13 ✓   C. 1/52   D. 2/13

52

K of D

D 13   K 4

$$F = 13 + 4 - 1 = 16$$

$$P = \frac{16}{52} = \frac{4}{13}$$

ANSWER KEY – PROBABILITY

QUESTION	ANSWER	QUESTION	ANSWER
1	1/4	11	1/15
2	1/2	12	A
3	13/204	13	B
4	13/102	14	B
5	1/6	15	D
6	3/11	16	D
7	1/9	17	D
8	5/18	18	C
9	15/64	19	B
10	1/220, 14/55, 54/55	20	B