PROBABILITY

- KOUSTAV

in www.linkedin.com/in/KoustavNandi
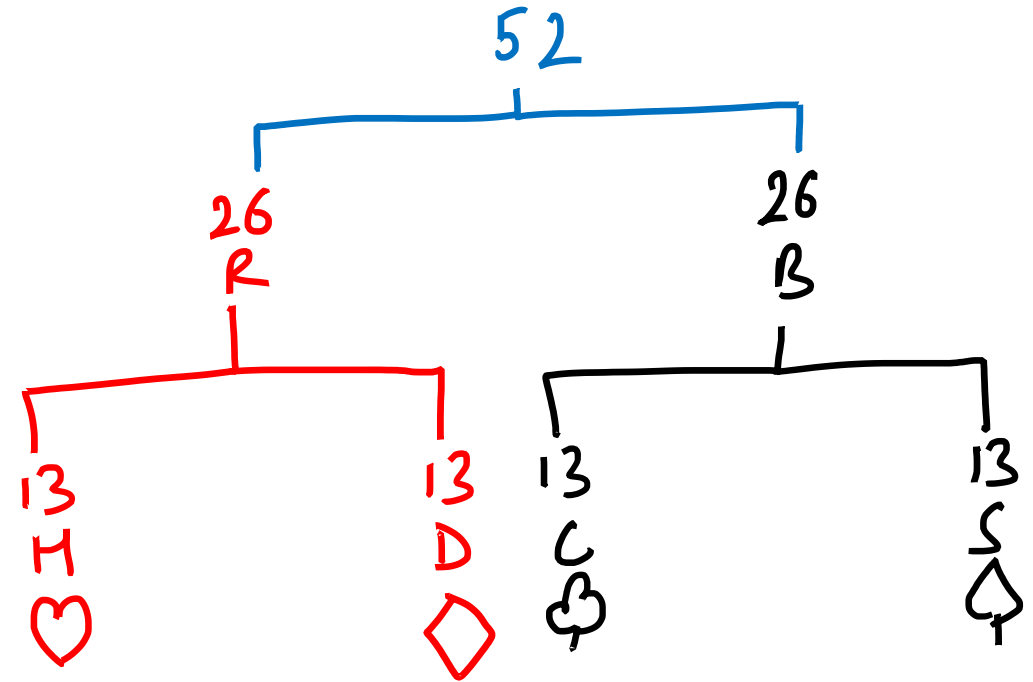
▶ www.youtube.com/TheAptitudeGuy

CONCEPT

$$P = \frac{\text{FAVOURABLE}}{\text{TOTAL}}$$

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

Ans: _____

$$P = \frac{13}{52} = \frac{1}{4}$$

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

52

26
R

26
B

13
H
♥

13
D
♢

13
C
♣

13
S
♠

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

Ans: _____

$$P = P(S \text{ or } D) = \frac{13}{52} + \frac{13}{52} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

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

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: _____

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

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

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

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: _____

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

$F =$

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

4

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

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

Ans: _____

$T = 6 \times 6 = 36$

$F =$

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: _____

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

$F = \quad H \quad H \quad T \quad T \quad \quad T \quad T$

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

HTTTTH

TTTTHH

$P = \dfrac{15}{64}$

$\vdots$

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

ii) $P = \dfrac{^8C_3}{^{12}C_3} = \dfrac{\dfrac{8 \times 7 \times 6}{3 \times 2}}{\dfrac{12 \times 11 \times 10}{3 \times 2}} = \dfrac{14}{55}$

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

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

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: _____

$T = 10!$

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

$8! \times 3!$

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

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

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

13. There are four hotels in a town. If 3 men check into the hotels in a day then what is the probability that each checks into a different hotel?

A) 6/7   B) 1/8   ✓ C) 3/8   D) 5/9

$$T = \underline{4} \times \underline{4} \times \underline{4} = 4^3 = 64$$

$$F = \underline{4} \times \underline{3} \times \underline{2} = 24$$

$$P = \frac{24^3}{64_8} = \frac{3}{8}$$

14. If the probability that A will live 15 years is 7/8 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

$$P = P(A^{\checkmark}, B^{\checkmark}) = \frac{7}{8} \times \frac{9}{10} = \boxed{\frac{63}{80}}$$

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

$$= \frac{7}{8} \times \frac{1}{10} + \frac{1}{8} \times \frac{9}{10} = \frac{7}{80} + \frac{9}{80} = \boxed{\frac{16}{80}} = \frac{1}{5}$$

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

15. In a drawer there are (4) white socks, 3 blue socks and 5 grey socks. Two socks are picked randomly. What is the probability that both the socks are of same colour?

A) 4/11   B) 1   C) 2/33   ✓D) 19/66

$$P = P(WW) \text{ or } P(BB) \text{ or } P(GG)$$

$$= \frac{4}{12} \times \frac{3}{11} + \frac{3}{12} \times \frac{2}{11} + \frac{5}{12} \times \frac{4}{11}$$

$$= \frac{12 + 6 + 20}{12 \times 11} = \frac{\overset{19}{\cancel{38}}}{\underset{6}{\cancel{12} \times 11}} = \frac{19}{66}$$

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

$T = 6 \times 6 = 36$

$F =$

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 speaks truth in 55% cases and B speaks truth in 75% cases. Find the percentage of cases they are likely to contradict each other in stating the fact?

A) 36.4%   B) 56.8%   C) 63.2%   D) 47.5%

$A_T = \dfrac{55}{100}$ $A_L = \dfrac{45}{100}$ $= \dfrac{11}{80} + \dfrac{27}{80}$

$B_T = \dfrac{75}{100}$ $B_L = \dfrac{25}{100}$ $= \dfrac{38}{80} \times 100 = 47.5\%$

$P(A_T, B_L)$ or $P(A_L, B_T)$

$= \dfrac{55}{100} \times \dfrac{25}{100} + \dfrac{45}{100} \times \dfrac{75}{100}$

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

$T = 2 \times 2 \times 2 = 8$

H H H

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

$P = \dfrac{7}{8}$

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

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

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

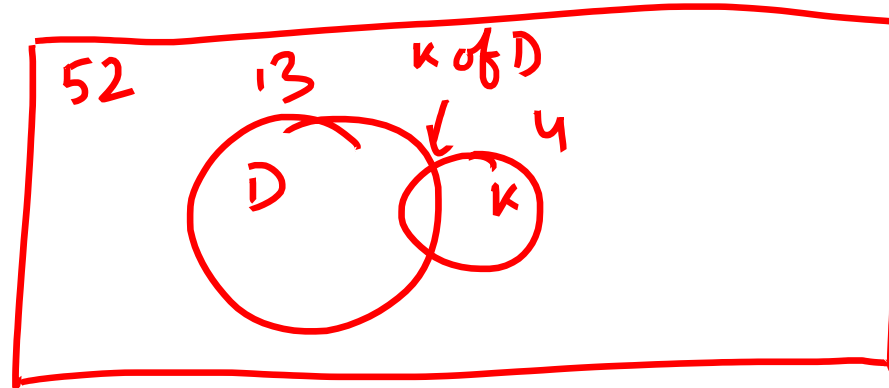$$= \frac{2}{15} + \frac{4}{15} = \frac{6}{15} = \frac{2}{5}$$

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   13   K of D

D   K   4

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

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

21. David has two boxes containing shapes.

In box A there are 4 stars and 2 hearts.

In box B there are 2 stars and 1 heart.

David takes, at random, a shape from box A and puts it into box B.

He then takes a shape from box B.

What is the probability that this shape is a star?

A. 1/12

B. 4/9

C. 2/3 ✓

D. 3/4

E. 4/3

$$\frac{A}{\begin{vmatrix} 4S \\ 2H \end{vmatrix}} \xrightarrow[H]{S} \frac{B}{\begin{vmatrix} 2S \\ 1H \end{vmatrix}}$$

Case 1 ⓢ   Case 2 Ⓗ

$$\frac{4}{6} \times \frac{3}{4} + \frac{2}{6} \times \frac{2}{4}$$

$$\frac{3}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$$

22. I have two identical unfair dice, where the probability that the dice get a 6 is twice as high as the probability of any other outcome, which are all equally likely. What is the probability that when I roll both dice the total will be 12?

A. 1/9

B. 4/9

C. 4/49

D. 2/7

$P(1) \quad P(2) \quad P(3) \quad P(4) \quad P(5) \quad P(6)$

$x \qquad x \qquad x \qquad x \qquad x \qquad 2x$

$\text{Total} = 7x \qquad\qquad P(6) = \dfrac{2x}{7x} = \dfrac{2}{7}$

$P(6) \times P(6)$

$= \dfrac{2}{7} \times \dfrac{2}{7} = \dfrac{4}{49}$

ANSWER KEY – PROBABILITY

QUESTION	ANSWER	QUESTION	ANSWER
1	1/4	11	1/15
2	1/2	12	A
3	13/204	13	C
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