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Q The chance of one event happening is sq^r of Chance of 2nd Event, but Odds against 1st are cubes of odds against 2nd. Find the chance of each.

Let 2 Events A & B
$P(A) = a, P(B) = b$

① $a = b^2$

② odd against $= \frac{P(\bar{A})}{P(A)} = \frac{1-a}{a}$

$$\left(\frac{1-a}{a}\right) = \left(\frac{1-b}{b}\right)^3$$

$$\frac{1-b^2}{b^2} = \frac{(1-b)^3}{b^3 b}$$

$$b - b^3 = 1 - 3b + 3b^2 - b^3$$

$$3b^2 - 4b + 1 = 0$$

$$3b^2 - 3b - b + 1 = 0$$

$$3b(b-1) - 1(b-1) = 0$$

$$b = 1 \ (\times), \quad b = 1/3 \ (\checkmark)$$

Q In a given Race. The 2 odds in favour of 4 horses A, B, C, D are 1:3, 1:4, 1:5 & 1:6 Find the chance of one of them wins the Race is? (Assuming that Dead heat is impossible)

(A) Q odds in Fav $\Rightarrow \frac{m}{n-m} = \frac{1}{3}$

$3m = n - m \Rightarrow n = 4m$

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

$$\frac{1}{4} + \frac{1}{5} + \frac{1}{6} + \frac{1}{7} = \frac{319}{420}$$

Ans

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Q3 If atleast one child in a family with 3 children is a boy then the Prob. that 2 of the children are Boys?

S.S = { $B_1B_2B_3$, $B_1B_2G_3$, $B_1G_2B_3$, $G_1B_2B_3$, $G_1B_2G_3$, $G_1G_2B_3$, $B_1G_2G_3$, ~~$G_1G_2G_3$~~ }

$P(A) = \frac{3}{7}$

Q4 Couple has 2 children Find the Prob. that Both are Boys if it is known that older child is Boy

S.S. = { B_1B_2, B_1G_2, G_1B_2, G_1G_2 }

For this Qs. S.S. in Fav. { B_1B_2, B_1G_2 }

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

Q5 2 Natural No. are selected from 1–20 Natural No Find Prob. that selected No.s

A) having Sum = Even.

$\frac{{}^{10}C_2 + {}^{10}C_2}{{}^{20}C_2}$

B) having Sum = odd

$\frac{{}^{10}C_1 \times {}^{10}C_1}{{}^{20}C_2}$

(C) When multiplication is Even.

Donot select → 1 E 10.

$$\frac{{}^{10}C_2 + {}^{10}C_1 \times {}^{10}C_1}{{}^{20}C_2}$$

(D) Product = odd

$$\frac{{}^{10}C_1 \rightarrow \text{Donood.}}{{}^{20}C_2}$$

Q6 12 Males & 2 Females are Sitting on a Circular table. Find Prob. that Both Females are Sitting together?

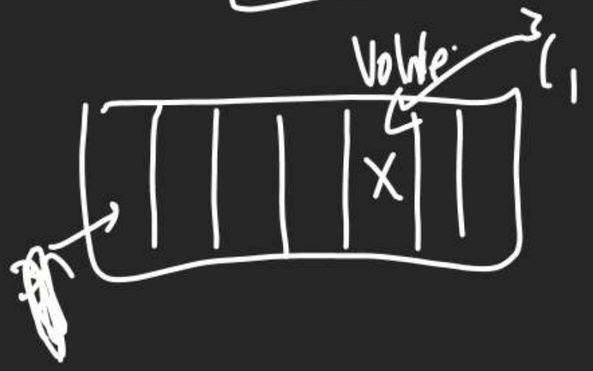
$$P(A) = \frac{\lfloor 13-1 \times \lfloor 2}{\lfloor 14-1}$$

$$= \frac{\lfloor 12 \times \lfloor 2}{\lfloor 13}$$

Q7 If a 7 Letter word is Formed from 4C & 3V (all diff.) Find Prob. that word Starting with a Vowel.

$n(S) = \lfloor 7$

$$P(A) = \frac{{}^{3}C_1 \times \lfloor 6}{\lfloor 7}$$



Q A 7 Letter word is Formed from 4C & 3V. Find Prob. that Word has its 5 Box from Starting is a Vowel.

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Q 4 Apples 3 oranges are placed in a Line Find Prob that 2 extreme places are filled by Oranges

$$P(A) = \frac{{}^{3}C_2 \times \lfloor 2 \times \lfloor 5}{\lfloor 7}$$

Q 10 Find Prob. of selecting 2 No. out of 1st 6 Nat. No. of No. are Coprime?

1,2,3,4,5,6 — Nat. No having HCF = 1

(1,2)(2,3)(3,4)(4,5)(5,6)(2,5) (1,3)(1,4)(1,5)(1,6)

$n(S) = {}^{6}C_2 = \frac{6 \times 5}{1 \times 2} = 15$ (3,5)

$$P(A) = \frac{11}{15}$$

81×81

$9^2 \times 9^2$

$6^4 = 6^2 \times 6^2$

36×36

49×49

64×64

$$P(A) = \frac{4}{10}$$

Q 11 What is the Prob. that 4th Power of an Integer Chosen Randomly ends with a digit 6.

$(\ldots\ldots 0)^4 = \ldots 0$

$(\ldots 1)^4 = \ldots 1$

$(\ldots 2)^4 = \ldots 6$

$(\ldots 3)^4 = \ldots 1$

$(\ldots 4)^4 = \ldots 6$

$(\ldots 5)^4 = \ldots 5$

$(\ldots 6)^4 = \ldots 6$

$(\ldots 7)^4 = \ldots 1$

$(\ldots 8)^4 = \ldots 6$

$(\ldots 9)^4 = \ldots 1$

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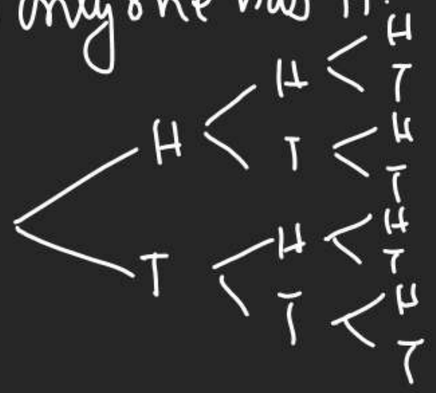
Q11 A Coin is tossed 3 times
or 3 Coins are tossed Simultaneously
Find Prob. that
A) all 3 has H H H
B) all 3 do not has H H H
C) only one has H.



SS = { HHH, HHT, HTH, HTT
THH, THT, TTH, TTT }

1) $P(A) = \frac{1}{8}$

2) $P(\bar{A}) = 1 - \frac{1}{8} = \frac{7}{8}$.

3) $P(A) = \frac{3}{8}$ { HTT, THT, TTH }

(4) Any 2 has H = HHT, HTH, THH
3/8 TTT

(5) At least one has H = 1 − P(No Head) = $1 - \frac{1}{8} = \frac{7}{8}$.

(6) At least 2 has H = $\frac{4}{8}$

(7) Alternate H & T coming = $\frac{2}{8}$
HTH, THT

Q12 Prob. of getting 7 Head out of n Coins. is equal to Prob. of getting 8 Head out n Coins.
Find Prob of 3 Head out of n Coins.

$P(7H) = P(8H)$

$\frac{{}^nC_7}{2^n} = \frac{{}^nC_8}{2^n}$

$\Rightarrow {}^nC_7 = {}^nC_8 \Rightarrow n = 7 + 8 = 15$
(15, 15)

$P(3H) = \frac{{}^{15}C_3}{2^{15}}$

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Q Find Prob of Head coming 13 odd times in a throw of 100 coins.

$$P(A) = \frac{{}^{100}C_1 + {}^{100}C_3 + {}^{100}C_5 + {}^{100}C_7 + \cdots + {}^{100}C_{99}}{2^{100}}$$

$P(X) = \begin{cases} \frac{X-1}{36} \\ \frac{13-X}{36} \end{cases}$

$= \frac{2^{100-1}}{2^{100}} = \frac{2^{99}}{2^{100}} = \frac{1}{2}$

Q Find Prob. on a throw of a dice

14 (A) When an Even No. comes

$\{2,4,6\} \rightarrow P(A) = \frac{3}{6} = \frac{1}{2}$

(B) When multiple of 3 comes

$\{3,6\} \rightarrow P(A) = \frac{2}{6} = \frac{1}{3}$

(C) When Even & Multiple of 3 comes

$\{2,4,6\}$ and $\{3,6\} = \{6\} \rightarrow P(A) = \frac{1}{6}$

(D) Even No OR Multiple of 3 comes.

$\{2,4,6\} \cup \{3,6\} = \{2,3,4,6\}$

$P(A) = \frac{4}{6} = \frac{2}{3}$.

Q 2 dices are thrown find Prob.

15 (1) Sum of No. = 10

$P(A) = \frac{13-10}{36} = \frac{3}{36}$

(2) Sum of Both in at least 10 → Sum 10, 11, 12 होना चाहिए

$P(A) = \frac{(13-10)+(13-11)+(13-12)}{36} = \frac{3+2+1}{36} = \frac{1}{6}$

(3) Sum of Both = Even No $\{2,4,6,8,10,12\}$

$\frac{(2-1)+(4-1)+(6-1)+(13-8)+(13-10)+(13-12)}{36} = \frac{1+3+5+5+3+1}{36}$

(4) Sum of Both is Prime No. $\{2,3,5,7,11\}$

$\frac{(2-1)+(3-1)+(5-1)+(7-1)+(13-11)}{36} = \frac{1+2+4+6+2}{36}$

(5) Sum is Multiple of 3. $\{3,6,9,12\}$

(6) One dice has Multiple of 2 & other has Multiple of 3.

$(2,3)(2,6)(4,3)(4,6)(6,3)$ $(6,6)$

या $(3,2)(6,2),(9,3)(6,4)(3,6)$

$P(A) = \frac{11}{36}$

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Q A coin is tossed 4 times.

16 Prob(No of Head > No of tails)

HHHH → H = 4, T = 0

HHHT
HTHH
HHTH
THHH
} → H = 3, T = 1

HTHT → H = 2, T = 2 ✗

$P(A) = \frac{5}{2^4} = \frac{5}{16}$

(M2) HHHH → 1

3H 1T → $\frac{4}{1\,3} = 4$

$P(A) = \frac{1+4}{16}$

$P(2H \& 2T)$

$\frac{4}{1^2\,1^2} = \frac{24}{4} = 6.$

$P(A) = \frac{6}{2^4} = \frac{6}{16}.$

HTHT
HTTH
THHT
THTH
HHTT
TTHH