# PERMUTATIONS AND COMBINATIONS

① Permutation means arrangement where order of objects is important

whereas

Combination is the selection where order is not important

abc, acb, bac, bca, cab, Cba — These are 6 different permutations/arrangements but only one combination/selection.

② In How many ways 2 students out of 3 students A, B, C can be

selected ?

AB
AC
BC

3 different selections.

arranged ?

AB BA
AC CA
BC CB

6 different arrangements

③ In How many ways can 2 students A, B form a line for a photograph?

AB
BA
2 different photographs are possible

2 × 1
= 2 diff photographs

2 Students can stand in a line for a photograph is 2! = 2 Factorial = 2
diff ways
2! = 2 × 1 = 2 way ways

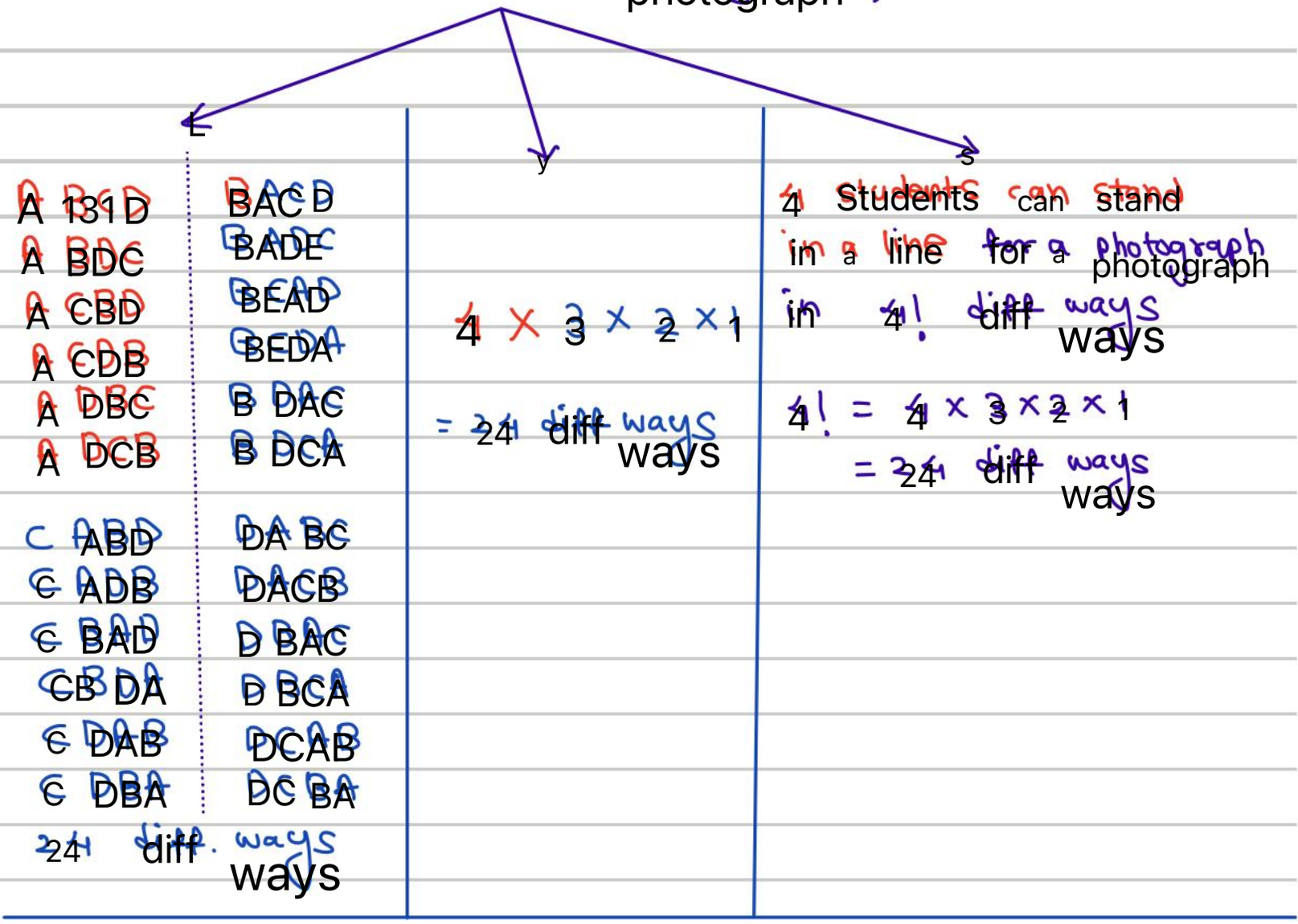
④ In How many ways can 3 students A, B, C form a line for photograph?

ABC
ACB
BAC
BCA
CAB
CBA
Photograph can be taken in 6 diff ways autograph

3 × 2 × 1
= 6 diff photographs

3 students can stand in a line for a photograph in 3! diff ways
3! = 3 × 2 × 1
= 6 ways
31 ways

⑤ In How many ways 4 students A, B, C, D can form a line for photograph?




⑥ In How many ways 5 students can stand in a line for a photograph?

⟹ 5 students can stand in a line for photograph in 5! = 120 diff ways

$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

⑦ In How many ways 6 students can stand in a line for a photograph?

⟹ 6 students can stand in a line for photograph in 6! diff ways

$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1$

$= 6 \times 5! = 720$

(8)

$0! = 1$

$1! = 1$

$2! = 2 \times 1 = 2$

$3! = 3 \times 2 \times 1 = 6$

$4! = 4 \times 3 \times 2 \times 1 = 24$

$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$

$6! = 6 \times 5! = 720$

$7! = 7 \times 6 \times 5 \times 4! = 5040$

$8! = 40,320$

$91 = 3,62,880$

$101 = 36,28,800$

(9)

(i) $\frac{18!}{17!} = \frac{18 \times 17!}{17!} = 18$

(ii) $\frac{x!}{(x-1)!} = \frac{x(x-1)!}{(x-1)!} = x$ se

(iii) $\frac{8 \times 9!}{9 \times 8!} = \frac{8 \times 9!}{9 \times 8!} = 8$ 9

(iv) $\frac{(x+1)!}{(x-1)!} = \frac{(x+1)\,x\,(x-1)!}{(x-1)!} = x(x+1)$ assets

(xi) $\frac{(x+3)!}{(x+1)!}$ qty

$= \frac{(x+3)!}{(x+6)(x+5)(x+4)(x+3)!}$ Fifty

$= \frac{1}{(x+6)(x+5)(x+4)}$ Gets Gets sets

(v) $\frac{(x-3)!}{(x-4)!} = \frac{(x-3)(x-4)!}{(x-4)!} = (x-3)$

(vi) $\frac{(x-8)!}{(x-6)!} = \frac{(x-8)!}{(x-6)(x-7)(x-8)!} = \frac{1}{(x-6)(x-7)}$

(vii) $\frac{18! \times 5}{17! \times 8} = \frac{18 \times 17! \times 5}{17! \times 8} = \frac{90}{8} = \frac{45}{4}$

(viii) $\frac{18!\ 28!}{20!\ 26!} = \frac{18! \times 28 \times 27 \times 26!}{20 \times 19 \times 18! \times 26!} = \frac{756}{380} = \frac{189}{95}$

(ix) $\frac{(x+1)!\ (x-3)!}{(x-4)!\ (x+3)!} = \frac{(x+1)!\ (x-3)(x-4)!}{(x-4)!\ (x+3)(x+2)(x+1)!} = \frac{(x-3)}{(x+3)(x+2)}$

(x) $\frac{(x-8)!\ x}{(x-1)!\ (x-10)!} = \frac{(x-8)(x-9)(x-10)!\ x}{(x-1)!\ (x-10)!} = \frac{x(x-8)(x-9)}{(x-1)!}$

100

In How many a photograph of 2 students can be taken out of 5 students A, B, C, D, E ?

| | |
|---|---|
| AB | BA |
| AC | CA |
| AD | DA |
| AE | EA |
| BC | CB |
| BD | DB |
| BE | EB |
| CD | DC |
| CE | EC |
| DE | ED |

These are 20 diff photographs

$5 \times 4$

$= 20$ ways

Photograph can be taken in 20 diff ways

'r' objects out of 'n' objects can be arranged in $^nP_r$ diff ways where $^nP_r = \frac{n!}{(n-r)!}$

2 students out of 5 student can be arranged in $^5P_2$ ways

$^5P_2 = \frac{5!}{(5-2)!}$

$= \frac{5!}{3!}$

$= \frac{5 \times 4 \times 3!}{3!} = 20$ ways

(11) $^nP_r = \frac{n!}{(n-r)!}$ where $n \geq r \geq 0$

n must be a positive integer

r is also an integer (non-negative)

(12) In How many 3 students can stand in a line for photograph out of 5 students P, Q, R, S, T & E

| | | | | |
|---|---|---|---|---|
| QR | POS | POT | PRS | PRT |
| RIO | PSO | PTO | PSR | PTR |
| QPR | GPS | OPTSPR | | RPT |
| ORP | OSP | OTP | SRP | RTP |
| 2PO | SPO | TPO | RPS | TPR |
| RQP | SQP | TQP | RSP | TRP |
| PST | QRS | QRT | QST | RST |
| PTS | OSR | QTR | OTS | RTS |
| SPT | ROIS | ROT | SOT | SRT |
| STP | RSO | RTO | STO | STR |
| TPS | SORTOR | | TQS | TRS |
| TSP | SRO | TRA | TSO | TSR |

x

5 × 4 × 3 = y

= 60 diff photographs

photographs

3 students out of 5 can be arranged in 5P3 diff ways

arranged

ways

$5P_3 = \frac{5!}{(5-3)!} = \frac{5!}{2!}$

$= \frac{5 \times 4 \times 3 \times 2!}{2!}$

= 60 ways

∴ Photograph can be taken in 60 diff ways

photograph can be taken in 60 diff ways

SB ftp.es

(13) 18P18ps $= \frac{18!}{(18-4)!} = \frac{18 \times 17 \times 16 \times 15 \times 14!}{14!} = (18 \times 17 \times 16 \times 15)$

= 73,440

20P20ps $= \frac{20!}{(20-5)!} = \frac{20 \times 19 \times 18 \times 17 \times 16 \times 15!}{15!}$ IX

$= 20 \times 19 \times 18 \times 17 \times 16$

= 1860480

100P100ps $= \frac{100!}{(100-3)!} = \frac{100 \times 99 \times 98 \times 97!}{97!}$ 9711

$= 100 \times 99 \times 98$

= 970200

$200P_{200}$ pa $= \frac{200!}{(200-2)!} = \frac{200 \times 199 \times 198!}{198!}$

$= 200 \times 199$

= 39800

(14)

$${}^{n}P_r = n \times (n-1) \times (n-2) \times (n-3) \cdots\cdots \text{ } r \text{ terms}$$

Npr

$${}^{n}P_r = \frac{n!}{(n-r)!} \qquad {}^{n}P_0 = \frac{n!}{n!} = 1$$

Into It

hip

| | |
|---|---|
| hp1 | $= n$ |
| hpa | $= n(n-1)$ |
| hp3 | $= n(n-1)(n-2)$ |
| hp4 | $= n(n-1)(n-2)(n-3)$ |
| hps | $= n(n-1)(n-2)(n-3)(n-4)$ |
| mph | $= n!$ |

spot

| | |
|---|---|
| ${}^{5}P_0$ | $= 1$ |
| Sp1 | ${}^{5}P_1 = 5$ |
| 52 | ${}^{5}P_2 = 20$ |
| Sp3 | ${}^{5}P_3 = 60$ |
| Spg | ${}^{5}P_4 = 120$ |
| Sps | ${}^{5}P_5 = 120$ |

Main formula

$${}^{n}P_r = \frac{n!}{(n-r)!} \quad \text{where } n \geq r \geq 0$$

270

'r' objects out of 'n' can be arranged in ${}^{n}P_r$ diff ways

objects ways arranged

| | |
|---|---|
| 36ps | ${}^{36}P_5 = 1402410240$ |
| SOP4 | ${}^{50}P_4 = 5527200$ |
| 80 pg | ${}^{80}P_6 = 216360144000$ |
| 71 p3 | ${}^{71}P_3 = 342930$ |

| | |
|---|---|
| 8Pa | ${}^{8}P_0 = 1$ |
| 128 | ${}^{12}P_1 = 12$ |
| 1383 | ${}^{13}P_3 = 1716$ |
| 8ps | ${}^{8}P_8 = 40320 = 8!$ |
| | ${}^{7}P_7 = 7! = 5040$ |
| | ${}^{13}P_4 = 17160$ |

(15) In how many a line of 4 students can be formed from 20 students ?

$\Longrightarrow$


$^{20}P_1 \times {}^{19}P_1 \times {}^{18}P_1 \times {}^{17}P_1$

$= 20 \times 19 \times 18 \times 17$

$= 1,16,280$ ways

$= {}^{20}P_4$

$= 20ps$

$= 1,16,280$ ways

(16)

| | |
|---|---|
| $^{10}P_1 = 10$ | $19ps = 1395360$ |
| $SP_3 = 336$ | $^{18}P_a = 1$ |
| $12ps = 11,880$ | $^{18}8,8 = 18!$ |
| $2082 = 380$ | $^{20}op_6 = 27907200$ |
| $^{11}po = 1$ | $Mp_4 = MCM\ ^{1}(M-2)(m-3)$ |
| $^{10}op_{10} = 10! = 3628800$ | $Kp_3 = k(k-1)(k-2)$ |

(17) $\dfrac{19Pa \times 20ps}{Zip \times {}^{2}op} = \dfrac{19 \times 18 \times 3210414 \times 48}{Hix \times Volx \times ls}$

$= \left(\dfrac{513}{35}\right)$

(18) $\dfrac{^{21}P_4}{^{3}P_2} = \dfrac{21 \times 20 \times 191 \times 181}{2.01 \times 191 \times 18 \times 17} = \left(\dfrac{21}{17}\right)$

180

Iffy

(19) $\frac{xP_3 \times K^{-1}p_3}{(x+1)D_{p_4} \times be^{-1}p_2} = \frac{x(x-1)(x-2)(x-3)}{(x+1)x(x-1)(x-2)}$

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$= \frac{(x-3)}{(x+1)}$

(20) $\frac{kB \times (k+1)Ceti\ pg}{(k-1)p_4 \times (k+2)1\ p_3}$

$= \frac{k(k-1)(k-2)(k+1)k(k-1)(k-2)}{(k-1)(k-2)(k-3)(k-4)(k+2)(k+1)k}$

$= \frac{k(k-1)(k-2)}{(k-37)(k-47)(1kt^2)}$

(21) $Sp_a = 60$ then $x = ?$

$\Rightarrow Sp_x = 60 = 5 \times 4 \times 3$

$Sp_x = Sp_y = SP_z$

$\boxed{x = 3}$

(22) $\left(\frac{^8P_3 \times 7Pa \times 4! \times 10Pa}{10ps \times {}^8P_3 \times 6 \times 3!}\right)$

$= \left(\frac{8 \times 7 \times 6 \times 7 \times 6 \times 5 \times 4 \times 24 \times 16 \times 91}{18 \times 948 \times 4 \times 4 \times 8 \times 71.61 \times 6 \times 63}\right)$

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

(23) How many 4 digit numbers can be formed by using 8, 3, 2, 6 is repetition of digits is not allowed ?

$\Rightarrow$

$^4P_1 \times {}^3P_1 \times {}^2P_1 \times {}^1P_1$

$= 24$ diff numbers can be formed

| | | | |
|---|---|---|---|
| 8326 | 6238 | 3826 | 2836 |
| 8362 | 6283 | 3862 | 2863 |
| 8236 | 6328 | 3286 | 2386 |
| 8263 | 6382 | 3268 | 2368 |
| 8632 | 6823 | 3682 | 2683 |
| 8623 | 6832 | 3628 | 2638 |

(24) How many words can be formed by using letters of word CAP

$\Rightarrow$ $3P_3 = 3! = 6$ diff words can be formed

CAP, CPA, APC, ACP, PAC, PCA

(25) How many diff. words can be formed by using letters of word MIKE

$\Rightarrow$ $4! = 24$ diff words can be formed.

| | | | |
|---|---|---|---|
| MIKE | IMKE | KMIE | EMIK |
| MIEK | IMEK | KMEI | EMKI |
| MKIE | IKME | KIME | EIMK |
| MKEI | IKEM | KIEM | EIKM |
| MEIK | IEMK | KEIM | EKMI |
| MEKI | IEKM | KEMI | EKIM |

(26) How many diff words can be formed by using letters of word 'VINOD'

How many diff words can be formed by using letters of word VINOD

$\Rightarrow 5! = 120$ diff words

(27) How many diff words can be formed by using letters of word 'MOM'

How many diff words can be formed by using letters of word Mom

$\Rightarrow$ MOM, MMO, OMM

No. of diff words $= \frac{3!}{2!} = \frac{6}{2} = 3$ diff words

34

(28) How many diff words can be formed by using letters of word 'NOON'

How many diff words can be formed by using letters of word Noon

$\Rightarrow \frac{4!}{2!\,2!} = \frac{24}{2 \times 2} = 6$ diff words

392

NOON, NONO, NNOO, OONN, ONON, ONNO

(29) How many diff words can be formed by using letters of word 'CALCULATIONS'

How many diff words can be formed by using letters of word CALCULATIONS

$\Rightarrow \frac{12!}{2!2!2!}$

C - 2
A - 2
L - 2

$= 5,98,75,200$ diff words

5,98,75,200

(30) How many diff words can be formed by using letters of word 'BANANA'

How many diff words can be formed by using letters of word BANANA

$\Rightarrow = \frac{6!}{3!\,2!} = \frac{720}{6 \times 2} = 60$ diff words

A - 3
N - 2

60 diff words

(31)

| Word | How many diff words can be formed by using letters of this word ? |
|---|---|
| EXAMINATIONS | $\frac{12!}{2!2!2!}$ = 5,98 5,200 words |
| KOLKATA | $\frac{7!}{2!2!}$ = 1260 words |
| AMERICANS | $\frac{9!}{2!}$ = 1,81940 words |
| AFGHANISTAN | $\frac{11!}{3!2!}$ = 33,26,900 words |
| MISSISSIPPI | $\frac{11!}{4!4!2!}$ = 39,650 words |
| STATISTICS | $\frac{10!}{3!2!2!}$ = 50,400 words |
| COMPUTER | $8!$ = 40,320 words |
| JAYARAMAN | $\frac{9!}{4!}$ = 15,120 words |
| MANAGEMENT | $\frac{10!}{2!2!2!2!}$ = 3,26,800 words |
| PERCEPTIANS | $\frac{11!}{2!2!}$ = 99,79,200 words |

(32) How many diff words can be formed by using letters of word 'KARO' If all vowels should be kept together ?

⟹ (A O) K R

= 3! × Internal arrangements

= 3! × 2!

= 12 diff words

| | |
|---|---|
| AO KR | OAK R |
| AO RK | OA RK |
| K AO R | KOA R |
| R AO K | ROA K |
| RK AO | R KOA |
| K R AO | K ROA |

(33) 330 How many diff words can be formed by using letters of word 'COMPUTER' If all vowels should be kept together ?

⟹ (OU E) C, M, P, T, R

= 6! × Internal arrangements

= 6! × 3!

= 4320 diff words

(34) How many diff words can be formed by using letters of word 'MAMA JI' If all vowels should be kept together ?

⟹ (AAI) M MJ

= $\frac{4!}{2!}$ × Internal arrangements = $\frac{4!}{2!} \times \frac{3!}{2!}$ = 36 words

If SIX

(35) How many diff words can be formed by using letters of word 'MATHEMATICS' If all vowels should be kept together?

⟹ A E AI M TH M T C S

$= \frac{8!}{2!2!} \times$ Internal arrangements

$= \frac{40320}{4} \times \frac{4!}{2!} = 1,20,960$ words

(36)

| word | How many words can be formed by using letters of this word if all vowels should be kept together? |
|---|---|
| MICROPHONE<br>I OOE MC RP HN | $7! \times \frac{4!}{2!} = 60,480$ words |
| AAU RIP XUE MX<br>AAU U E R J P X MX | $\frac{7!}{2!} \times \frac{5!}{2!2!} = 75,600$ words |
| INDICATIONS<br>I IA IO NDCTNS | $\frac{7!}{2!} \times \frac{5!}{3!} = 50,400$ words |
| ANTARTICA<br>A AIA N TR TC | $\frac{6!}{2!} \times \frac{4!}{3!} = 1440$ words |

CHARTERED ACCOUNTANT

AEEAOU A

CHR TRD CCN TNT

$\frac{13!}{3!\,2!\,2!\,2!\,1!} \times \frac{7!}{3!\,2!}$

= 18162 144000 words

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FREQUENCY

EVEO FR p Ney

$7! \times \frac{3!}{2!}$

= 15,120 words

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BANANAS

AAA B NNS

$\frac{5!}{2!} \times \frac{3!}{3!}$ = 60 words

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PROFESSIONALS

OEIOA PRESSNLS

$\frac{9!}{3!} \times \frac{5!}{2!}$ = 3628800 words

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INDIVIDUALS

III IVA NDVDLS

$\frac{7!}{3!} \times \frac{5!}{3!1!}$ = 50,400 words

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EQUATIONS

EUAIO QT NS

$5! \times 5!$ = 14,400 words

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PAPPA

AA Ppp

$\frac{4!}{2!} \times \frac{2!}{2!}$ = 24 words

(37) How many words can be formed by using letters of word 'CHANNELS' if all consonants should be kept together ?

⟹ CHNNLS A E

$= 3! \times \frac{6!}{2!} = 2160$ diff words

Et

(38) In How many ways can students can stand in a line for photograph if 2 students of them want to be always together ?

⟹ $8! \times$ Internal arrangements

$= 8! \times 2!$

$= 7,25,760$ diff photographs

(39) In How many ways 13 students can stand in a line for photograph if 2 of them want to be

always together

$= 12! \times 2!$

$= 9580,03,200$

Never together

$=$ (All possible arrangements of 13 students − arrangements where those 2 students are always together)

$= 13! - 12!2!$

$= 6227020800 - 958003200$

$= 5269017600$

OR

$= 11! \times {}^{12}P_2$

$= 39916800 \times 132$

$= 5269017600$

(40) In How many ways 'n' students can stand in a line for photograph if 'r' of them want to be always together ?

$\Longrightarrow (n-r+1)! \times r!$

(41) In How many ways is students can stand in a line for a photograph if 3 of them want to be always together ?

$\Rightarrow$ $13! \times 3! = 37362124800$

(42) In How many ways 5 Boys & 6 Girls can stand in a line for a photograph if

- No restriction
  - $= 11!$
  - $= 39916800$ ways
- All boys must be together
  - $= 7! \times 5!$
  - $= 604800$ ways
- All Girls must be together
  - $= 6! \times 6!$
  - $= 518400$ ways

(43) In How many ways 7 Boys & 4 Girls can stand in a line for photograph if

- No restriction
  - $= 11!$
  - $= 39916800$ ways
- All boys must be together
  - $= 5! \times 7!$
  - $= 604800$ ways
- All boys & All Girls must be together
  - $= 2! \times 7! \times 4!$
  - $= 241920$ ways
- All Girls must be together
  - $= 8! \times 4!$
  - $= 967680$ ways

(44) How many 4 digit numbers can be formed by using 8, 7, 9, 6, 2 if repetition of digits is

Not allowed ?

$5P_1 \times 4P_1 \times 3P_1 \times 2P_1$

OR

$5P_4$

= 120 numbers

allowed ?

$5P_1 \times 5P_1 \times 5P_1 \times 5P_1$

= 625 numbers

**Important Note**

If question is silent about repetition of digits then repetition of digits is not allowed

(45) How many 3 digit numbers can be formed by using 8, 3, 6, 9, 0 if repetition of digits is

not allowed ?

$4P_1 \times 4P_2$

= 48 Numbers

allowed ?

$4P_1 \times 5P_1 \times 5P_1$

= 100 Numbers

(46) How many 5 digit numbers can be formed by using 2,3,5,7,8,9,0 if repetition of digits is

not allowed ?

$6P_1 \times {}^{6}P_4$

= 2160 numbers

allowed ?

$6P_1 \times 7P_1 \times 7P_1 \times 7P_1 \times 7P_1$

fix Pix lp

= 14,406 Numbers

(47) 40 How many 4 digit ~~eye~~ numbers can be formed by using 1,2,3,5,6,8 if repetition of digits is

Not allowed ?

$5P_3 \times {}^{3}P_1$

= 180 Numbers

allowed ?

$6P_1 \times 6P_1 \times 6P_1 \times 3P_1$

XLIX

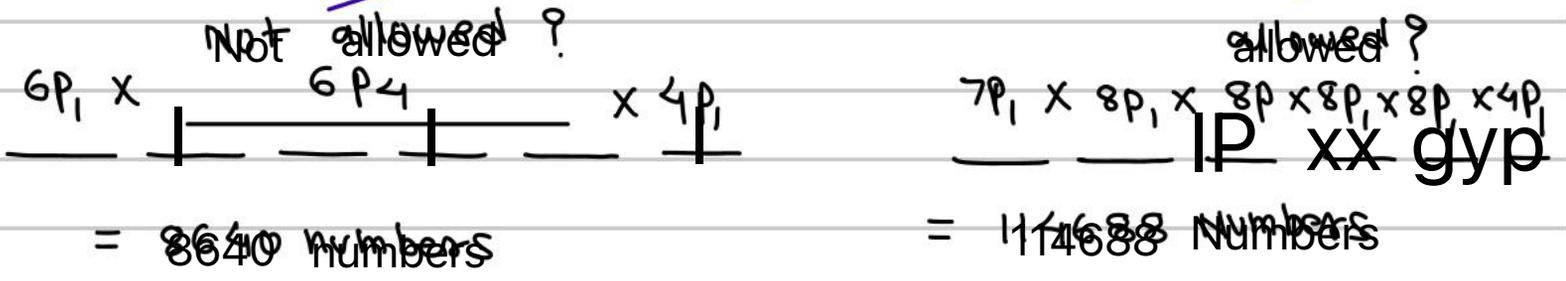
= 648 Numbers

(48) How many 5 digit numbers divisible by 5 can be formed by using 8,2,6,5,3,1

$\Rightarrow$ $5P_4 \times {}^{1}P_1$

= 120 diff numbers

(49) How many 6 digit odd numbers can be formed by using 1,2,3,5,6,9,0,8 if repetition of digits is




$6P_1 \times {}^{6}P_4 \times 4P_1$

$= 8640$ numbers

$7P_1 \times 8P_1 \times 8P \times 8P \times 8P \times 4P_1$

$= 114688$ Numbers

(50) How many 5 digit even numbers can be formed by using 3,5,2,4,6,8,0,1 if repetition of digits is not allowed ?

$\Rightarrow$

case (1) Numbers ending with 2,4,6,8

$GP_1 \times GP_3 \times 4P_1 = 2880$

case (2) Numbers ending with '0'

$7P_3 \times 1P_1 = 840$

$3720$

(S1) How many 4 digit numbers divisible by 5 can be formed by using 2,3,8,9,0,6,5

How many 4 digit numbers divisible by 5 can be formed by using 2,3,8,9,0,6,5

Ending with 0

$\Rightarrow {}^{6}P_3 \times {}^{1}P_1 = 120$

OR - Add

Ending with 5

ftp.i $\times {}^{5}P_2 \times {}^{1}P_1 = 100$

wl

xy

220 Numbers

(S2) How many 5 digit numbers greater than 80,000 can be formed by using 8,9,6,3,1,2 if repetition of digits is

How many 5 digit numbers greater than 80,000 can be formed by using 8,9,6,3,1,2 if repetition of digits is

$\Rightarrow {}^{2}P_1 \times {}^{5}P_4$

$= 240$ Numbers

(S3) How many 5 digit numbers greater than 34000 can be formed by using 1,2,3,6,8,9

How many 5 digit numbers greater than 34000 can be formed by using 1,2,3,6,8,9

$\Rightarrow$

starting with 3

${}^{1}P_1 \times {}^{3}P_1 \times {}^{4}P_3 = 72$

starting with 6,8,9

${}^{3}P_1 \times {}^{5}P_4 = 360$

432

(54) How many 5 digit numbers greater than 26,000 can be formed by using 1,2,3,6,7,8,9

⟹ starting with 2

I $1P_1 \times 4P_4 \times {}^5P_3 = 240$

starting with 6,7,8,9,3

$5P_1 \times 6P_4 = 1800$

2040 Number

(55) How many 4 digit numbers greater than 8300 can be formed by using 1,2,3,6,8,9

⟹ D

i) when repetition is not allowed

starting with '8'

$1P_1 \times 3P_3 \times 4P_4 = 36$

starting with '9'

II $1P_1 \times {}^5P_3 = 60$

96 Numbers

ii) when repetition is allowed

starting with 8

starting with 9

$1P_1 \times 6P_1 \times 6P_1 \times 6P_1 = 144$

$1P_1 \times 6P_1 \times 6P_1 \times 6P_1 = 216$

360 Numbers

S6 How many 5 digit even numbers can be formed by using 1,2,3,4,5,6,7,0

i) when repetition of digits is allowed

ending with 0

$7P_1 \times 8P_1 \times 8P_1 \times 8P_1 \times 1P_1 = 3584$

ending with 2,4,6

$7P_1 \times 8P_1 \times 8P_1 \times 8P_1 \times 3P_1 = 10752$

4.891 81 31 10,752

14336 Numbers

ii) when repetition of digits is not allowed

ending with 0

MEI

$\_ \times \_ \times \_ \times \_ \times 1P_1 = 840$

ending with 2,4,6

$6P_1 \times 6P_1 \times 6P_1 \times 6P_1 \times 3P_1 = 2160$

GP x 683 131 21

3000 Numbers

S7 How many 6 digit numbers greater than 2,001000 can be formed by using 1,2,3,5,6,9,0 when repetition of digits is not allowed?

$5P_1 \times 6P_1 \times 6P_1 \times 6P_1 \times 6P_1 \times 6P_1 = 3600$

sp x GPs

Numbers

allowed?

$5P_1 \times 7P_1 \times 7P_1 \times 7P_1 \times 7P_1 \times 7P_1$

= 84,035 Numbers

84,035

(a) 84035 (b) 98,535

(b) 6,800 (d) None of these

(a) 84035 (b) 84034

(c) 92.00 (d) None of these

(S8) How many 4 digit numbers greater than 1800 can be formed by using 1,2,3,0,9,8 when repetition of digits is

**How many 4 digit numbers greater than 1800 can be formed by using 1,2,3,0,9,8 when repetition of digits is**

i) Not allowed ?

starting with 1

$1_{P_1} \times {}^{2}P_1 \times {}^{4}P_2 = 24$

starting with 2,3,8,9

$4_{P_1} \times {}^{5}P_2 = 240$

264 Numbers

ii) allowed ?

starting with 1

$1_{P_1} \times {}^{6}P_1 \times {}^{6}P_1 \times {}^{6}P_1 = 72$

starting with 2,3,8,9

$4_{P_1} \times {}^{6}P_1 \times {}^{6}P_1 \times {}^{6}P_1 = 864$

936 Numbers

(S9) How many numbers greater than 5000 can be formed by using 2,3,4,5,8 When repetition of digits is not allowed ?

**How many numbers greater than 5000 can be formed by using 2,3,4,5,8 When repetition of digits is not allowed ?**

$\Rightarrow$

4 digit

$4_{P_1} \times {}^{4}P_3 = 48$

5 digit

$5P_5 = 120$

168 Numbers

(60) How many 4 digits odd numbers greater than 7000 can be formed by using 1,2,3,4,5,7,8,0

$\Rightarrow$

ending with 7: $1p_1 \times {}^{5}P_2 \times 1p_1 = 20$

starting with 7: $1p_1 \times {}^{5}P_2 \times 2p_1 = 40$

ending with 1,5: $2p_1 \times {}^{5}P_2 \times 2p_1 = 80$

starting with 8: $1p_1 \times {}^{5}P_2 \times 3p_1 = 60$

100 numbers

100 numbers

(61) How many numbers greater than a million can be formed by using 1,2,3,4,5,6,7,0,8 when repetition of digits is not allowed?

7 digit: ${}^{8}P_1 \times {}^{8}P_6 = 1,61,280$

8 digit: ${}^{8}P_1 \times {}^{8}P_7 = 3,22,560$

9 digit: ${}^{8}P_1 \times {}^{8}P_8 = 3,22,560$

8,06,400 Numbers

(62) How many 4 digit numbers greater than 4,000 and divisible by 5 can be formed by using 2,3,4,5,0,8

⟹

starting with 4,8

$_2P_1 \times {}_4P_2 \times {}_2P_1 = 48$

IX — B — XI

starting with 5

$_1P_1 \times {}_4P_2 \times {}_1P_1 = 12$

Ia — I

60 Numbers

OR

Ending with 0

$_3P_1 \times {}_4P_2 \times {}_1P_1 = 36$

31 — 42 — XI

Ending with '5'

$_2P_1 \times {}_4P_2 \times {}_1P_1 = 24$

a

60 Numbers

---

(63) How many odd numbers greater than 50,000 can be formed by using 2,3,4,5,1,0

⟹

5 digit

$_1P_1 \quad {}_4P_3 \quad {}_2P_1 = 48$

9.3 — I

6 digit

$_4P_1 \times {}_4P_4 \quad {}_3P_1 = 288$

I — 14 — 1

336 Numbers

---

(64) $_nP_4 = 5040$. Find n

⟹

$_nP_4 = 5040 = 10 \times 9 \times 8 \times 7 = {}_{10}P_4$

hpa

$\therefore n = 10$

(65) $\frac{{}^{20}P_3 \times {}^{25}P_4}{{}^{25}P_6} =$

$= \frac{20 \times 19 \times 18 \times 28 \times 24 \times 23 \times 22}{24 \times 24 \times 23 \times 22 \times 21 \times 20 \times 19 \times 18}$

$= \frac{1}{1}$

Ya!

(66) ${}^{6}P_3 \times {}^{n}P_3 = 7 \times {}^{(n-1)}P_2$ . Find $n$

$6 \times n(n-1)(n-2) = 7 \times (n-1)(n-2)(n-3)$

$6n = 7n - 21$

$21 = 7n - 6n$

$\therefore \quad n = 21$

(67) ${}^{n}P_{pg} = 12 \times {}^{n}P_2$ . Find $n$.

$n(n-1)(n-2)(n-3) = 12 \times n(n-1)$

$(n-2)(n-3) = 12$

$\therefore \quad n = 6$

(68) ${}^{n}P_3 : {}^{n}P_2 = 3 : 1$ . Find $n$.

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

$n - 2 = 3$

$n = 5$

680 hp

X

XchD

(69) $\frac{SPS \times 6!}{Ps \times 5!} = \frac{1201 \times 726}{740 \times 120} = 1$

(70) $12Pa = 11880$ then $se = ?$

$\Rightarrow 12Pa = 11880 = 12 \times 11 \times 10 \times 9 = 12P_9$

AS $12Pa = 12P_9$

$12Pa$

$2 = 4$

(71) In How many diff ways 3 students

A, B, C can form a

Line

3 students can form a line in $3P_3 = 6$ diff ways

ABC
ACB
BAC
BCA
CAB
CBA

circle

$= \frac{3!}{3} = \frac{3 \times 2!}{3} = 2!$

$= 2$ ways

ways

AO BO C

O BO AO

(72) In How many ways 4 students can form a _____

Line

$= 4! = 24$ ways

circle

$= \frac{4!}{4} = 3!$

$= 6$ ways

(73) In How many ways 'n' students can form a _____

Line

$= n!$

circle

$= \frac{n!}{n} = \frac{n(n-1)!}{n}$

$= (n-1)!$

(74) In How many ways 11 students can form a _____

Line

$= 11!$

$= 39916800$

circle

$= 10!$

$= 3628800$

(75) In How many 4 students out of 10 students can form a

- Line
  - $= {}^{10}P_4$
  - $= 5040$ ways
- circle
  - $= {}^{10}P_4$
  - $= 1041$
  - $= 1260$ ways

(76) In How many diff ways 'r' students out of 'n' students can form a

- Line
  - $= ({}^{n}P_r)$
  - $= npr$
- circle
  - $= \left(\frac{{}^{n}P_r}{r}\right)$

(77) In How many ways 10 diamonds can form a necklace ?

$\Rightarrow$

$= 9! \times \frac{1}{2}$

$= 1,81,440$ ways

(78) In How many ways 'n' diamonds can form a necklace ?

$\Rightarrow \frac{1}{2} \times (n-1)! = \left[\frac{(n-1)!}{2}\right]_{cl}$

Exam

(79) In How many ways 's' students out of 16 Students can form a

1

Like

$= {}^{16}P_s$

$= 5,24,160$ ways

circle

$= \left(\frac{{}^{16}P_s}{s}\right)_1$

$= 104,832$ ways

(80) In How many ways 4 students out of 's' students can form a

Line

$= {}^{s}P_4$

$= 120$ ways

cite

$= \frac{{}^{s}P_4}{4}$

$= 30$ ways

(81) In How many 8 students out of 12 can form a

Line $= {}^{12}P_8 = 19958,400$

circle $= \frac{{}^{12}P_8}{8} = 29,94800$

(82) In How many ways to exam papers can be arranged in a line so that Best & worst papers are

always together

= 9! 2!

= 725,760 ways

not together

= 10! − 9! 2!

= 29,03,040 ways

OR

= 8! × 9P2

= 29,03,040 ways

(83) In How many ways to students can form a ____ If A wants to be always on immediate right of B

always

right

Line

= 9!

= 3,62,880

circle

= 8!

= 40,320

830

(84) In How many ways 12 students can form a circle If 2 of them want to be always together ?

always together

= 10! × 2! = 72,57600 ways

(85) How many 4 digit even numbers can be formed by using 1,2,3,5,8,0 if repetition of digits is

- Not allowed
  - Ending with 0: $_3P_3 \times {}_1P_1 = 60$
  - Ending with 2,8: $_4P_1 \times {}_4P_2 \times {}_2P_1 = 96$
- x allowed: $_5P_1 \times {}_6P_1 \times {}_6P_1 \times {}_2P_1$ = 540 ways

156 Numbers

(86) In How many ways a photograph of 4 students can be taken out of 10 students if a particular student

- should always be there: $= {}_4P_1 \times {}_9P_3$ = 4 × 504 = 2016 ways
- should never be there: $= {}_9P_4$ = 3024 Ways

bet

87

In How many ways a photograph of 2 students can be taken out of 'n' students if a particular student

should always be there

$= {}^{(n-1)}P_{(r-1)} \times {}^{r}P_{r}$

pen x8P

should never be there

$= {}^{(n-1)}P_{r}$

bet

Dp

88

In How many ways 2 students out of 5 students A, B, C, D, E can be

selected ?

AB, AC, AD, AE, BC, BD, BE, ED, CE, DE

$= {}^{5}C_{2}$

Sez

$52 \times 2! = 5P_2$

No. of selections of 2 objects of n objects

arranged ?

AB, BA, AC, CA, AD, DA, AE, EA, BC, CB, BD, DB, BE, EB, CD, DC, CE, EC, DE, ED

$= {}^{5}P_{2}$

5Pa

no. of arrangements of 'r' objects out of 'n' objects

amingements objects

hey

$nC_r \times r! = nP_r$

(89)

In How many 3 students out of 4 students A, B, C, D can be

selected

atranged

ABC
ABD
ACD
BCD

| ABC | ACB | BAC | BCA | CAB | CBA |
|---|---|---|---|---|---|
| ABD | ADB | BAD | BDA | DAB | DBA |
| ACD | ADC | CAD | CDA | DCA | DAC |
| BCD | BDC | CBD | CDB | DBC | DCB |

$^4C_3 = 4$

48

$^4P_3 = 24$

483

24

$^4C_3 \times 3! = {}^4P_3$

45

31

93

i. $^nC_r \times 2! = {}^nP_r$

ng

x 2

hp

$^nC_r \times r! = \frac{n!}{(n-r)!}$

by

x o

n 2

i. $^nC_r = \frac{n!}{r!\,(n-r)!}$

ng

2 n o

(90)

900

'r' objects out of 'n' objects

y objects out of n objects

can be selected in $^nC_r$ diff ways

can be selected in hey diff ways

where $^nP_r = \frac{n!}{(n-r)!}$

where he $\frac{n!}{(n-r)!\,r!}$

where $n \geq r \geq 0$

230

(91)

$${}^{n}C_{r} = \frac{{}^{n}P_{r}}{r!}$$

$$\therefore \frac{{}^{n}P_{r}}{{}^{n}C_{r}} = r!$$

$$\therefore {}^{n}P_{r} = {}^{n}C_{r} \times r!$$

$$\frac{{}^{n}C_{r}}{{}^{n}P_{r}} = \frac{1}{r!}$$

$${}^{n}C_{r} = \left[\frac{n(n-1)(n-2)\ldots \text{ r terms}}{r!}\right]$$

$${}^{18}C_{8} = \frac{18!}{8!(18-8)!}$$

$${}^{18}C_{8} = \frac{18 \times 17 \times 16 \times 15}{4 \times 3 \times 2 \times 1} = 3060$$

$${}^{18}C_{15} = {}^{18}P_{3}$$

$$= 4896$$

| | |
|---|---|
| ${}^{24}C_{5} = 42504$ | ${}^{555}C_{5} = 34787641$ |
| ${}^{50}C_{3} = 330,300$ | ${}^{100}C_{4} = 3921225$ |
| ${}^{30}C_{6} = 1142,506$ | ${}^{200}C_{3} = 1313400$ |
| ${}^{12}C_{7} = 792$ | ${}^{25}C_{3} = 1081575$ |

(92)

$$\frac{{}^{26}P_{6}}{{}^{27}C_{7}} = \frac{26 \times 25 \times 24 \times 23 \times 22 \times 21 \times 5040}{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1}$$

$$= \left(\frac{5040}{27}\right) = \left(\frac{560}{3}\right)$$

(93)

$$\frac{{}^{5}P_{4} \times {}^{8}P_{3} \times {}^{7}C_{7}}{{}^{10}C_{4} \times {}^{9}P_{5}}$$

$$= \frac{4 \times 3 \times 2 \times 1 \times 8 \times 7 \times 6 \times 5 \times 4!}{4! \times 6 \times 9 \times 8 \times 7 \times 6 \times 5 \times 4!} = \frac{1}{9}$$

(94) (a) $n C_r = \frac{n!}{r!(n-r)!}$ where $n \geq r \geq 0$

(b) $n C_r = \frac{n P_r}{r!}$

(c) $n C_r = \left[\frac{n(n-1)(n-2)(n-3)\ldots\ldots\ldots \text{ } r \text{ terms}}{r!}\right]$

(d) $n C_0 = \frac{n!}{0!(n-0)!} = \frac{n!}{0!\,n!} = \frac{1}{1 \times 1} = \frac{1}{1}$

$= 1$

(e) $n C_1 = n$

(f) $n C_2 = \frac{n(n-1)}{2!}$

(g) $n C_3 = \frac{n(n-1)(n-2)}{3!}$

(h) $n C_4 = \frac{n(n-1)(n-2)(n-3)}{4!}$

(i) $n C_n = 1$

(95) $$^{15}C_4 = \frac{15!}{4!(15-4)!} = \frac{15!}{4!\,11!}$$

$$^{15}C_{11} = \frac{15!}{11!(15-11)!} = \frac{15!}{11!\,4!}$$

$$^{15}C_{11} = {}^{15}C_4$$

$$^{15}C_{11} = {}^{15}C_{15-11}$$

$$\boxed{{}^{n}C_r = {}^{n}C_{(n-r)}}$$

$$\therefore {}^{100}C_{97} = {}^{100}C_3$$

$${}^{50}C_{42} = {}^{50}C_8$$

$${}^{5}C_4 = {}^{5}C_1$$

(96) $${}^{45}C_x = {}^{45}C_{20}$$ then $x = ?$

(a) 20 (b) 25 ~~(c)~~ a or b (d) None

(97) $18C_r = 18C_{r+2}$. Find 'r'

$\Longrightarrow$

$$r + r+2 = 18$$
$$2r = 16$$
$$r = 8$$

(98)

$$3C_0 + 3C_1 + 3C_2 + 3C_3 = 1+3+3+1 = 8 = 2^3$$

$$4C_0 + 4C_1 + 4C_2 + 4C_3 + 4C_4 = 1+4+6+4+1 = 16 = 2^4$$

$$5C_0 + 5C_1 + 5C_2 + 5C_3 + 5C_4 + 5C_5$$
$$= 1 + 5 + 10 + 10 + 5 + 1 = 32 = 2^5$$

$$10C_0 + 10C_1 + 10C_2 + 10C_3 + 10C_4 + 10C_5 + 10C_6 + 10C_7 + 10C_8 + 10C_9 + 10C_{10}$$
$$= 1 + 10 + 45 + 120 + 210 + 252 + 210 + 120 + 45 + 10 + 1$$
$$= 1024 = 2^{10}$$

$$nC_0 + nC_1 + nC_2 + nC_3 + \cdots + nC_n = 2^n$$

99

$${}^nC_0 + {}^nC_1 + {}^nC_2 + \cdots + {}^nC_n = 2^n$$

$${}^nC_1 + {}^nC_2 + {}^nC_3 + {}^nC_4 + \cdots + {}^nC_n = 2^n - {}^nC_0$$
$$= 2^n - 1$$

$${}^nC_1 + {}^nC_2 + {}^nC_3 + \cdots + {}^nC_n = 2^n - {}^nC_0 - {}^nC_n$$
$$= 2^n - 1 - n$$

100

$${}^{13}C_4 + {}^{13}C_5 = {}^{14}C_5$$

$$1287 + 715 = 2002$$

Here Let's put $n = 13,\ r = 5$

$${}^{13}C_4 + {}^{13}C_5 = {}^{14}C_5$$

$${}^nC_r + {}^nC_{r+1} = {}^{(n+1)}C_{r+1}$$

$${}^{10}C_2 + {}^{10}C_3 = {}^{11}C_3$$

$$120 + 45 = 165$$

Let's put $n = 10,\ r = 3$

$${}^{10}C_2 + {}^{10}C_3 = {}^{11}C_3$$

$${}^nC_r + {}^nC_{r+1} = {}^{(n+1)}C_{r+1}$$

101

(No. of selections of r objects out of 'n') $\times r!$ = (No. of arrangements of 'r' objects out of 'n')

hag

$^{n}C_{r} \times r! = {}^{n}P_{r}$

hi

$^{n}C_{r} \times r! = \frac{n!}{(n-r)!}$

hey

$^{n}C_{r} = \frac{n!}{r!\,(n-r)!}$

ng

$^{n}C_{r} = \frac{{}^{n}P_{r}}{r!}$

lf

$= \left[\frac{n(n-1)(n-2)(n-3)\ \text{------}\ r \text{ terms}}{r!}\right]$

100

$\left(\frac{{}^{25}C_{3} \times {}^{21}C_{4} \times 5!}{{}^{26}C_{7}}\right)$

$= \frac{25 \times 24 \times 23 \times 21 \times 20 \times 19 \times 18 \times 5 \times 4!}{31 \times 4! \times 26 \times 25 \times 24 \times 23 \times 22 \times 21 \times 20}$

$= \frac{19 \times 3 \times 5}{26 \times 22} = \left(\frac{285}{572}\right)$

103

$\frac{{}^{S}P_{r}}{{}^{S}C_{r}} = 21$ ----- by using formula

lf

by using formula

$\frac{{}^{n}P_{r}}{{}^{n}C_{r}} = r!$

$\frac{5!/(5-r)!}{5!/r!(5-r)!} = 2!$

$r! = 2!$

$r = 2$

| | |
|---|---|
| $^nP_r = \frac{n!}{(n-r)!}$ | $^nC_r = \frac{n!}{r!(n-r)!}$ |
| $^nP_r = {}^nC_r \times r!$ | $^nC_r = \frac{^nP_r}{r!}$ |
| $^nP_0 = 1$ | $^nC_0 = 1$ |
| $^nP_1 = n$ | $^nC_1 = n$ |
| $^nP_2 = n(n-1)$ | $^nC_2 = \frac{n(n-1)}{2!}$ |
| $^nP_3 = n(n-1)(n-2)$ | $^nC_3 = \frac{n(n-1)(n-2)}{3!}$ |
| $^nP_4 = n(n-1)(n-2)(n-3)$ | $^nC_4 = \frac{n(n-1)(n-2)(n-3)}{4!}$ |
| $^nP_n = n!$ | $^nC_n = 1$ |
| | $^nC_r = {}^nC_{n-r}$ |
| | $^nC_r + {}^nC_{r-1} = {}^{n+1}C_r$ |
| | $^nC_0 + {}^nC_1 + {}^nC_2 + \cdots + {}^nC_n = 2^n$ |
| | $^nC_1 + {}^nC_2 + {}^nC_3 + \cdots + {}^nC_n = 2^n - 1$ |

1050050g Soy then

(a) $x = y$ (b) $x + y = 50$ so sety (c) $x - y = 0$ a or b or c

(ii) If $^{50}C_x = {}^{50}C_y$ and $x = 21$ then $y = ?$

506 50cg

$\Rightarrow$ $y = 29$ OR $y = 21$

100

In How many ways a committee of 5 members can be formed from 11 people ?

$\Rightarrow$ No of diff ways = $^{11}C_5$ = 462 ways

ways 11cg ways

100

5 Red 7 Blue
6 white 2 Green

4 balls are drawn. Find No of selections with 1

No restriction: $= {}^{20}C_4 = 4{,}845$

are'd balls: $= {}^5C_1 \times {}^{15}C_3 = 1050$

3 Blue balls: $= {}^7C_3 \times {}^{13}C_1 = 455$

lateen ball: $= {}^2C_1 \times {}^{18}C_3 = 1632$

not white ball: $= {}^6C_1 \times {}^{14}C_3 = 1001$

20cg Sq 152 7g 29 185 68 144

4,845 1050 455 1632 1001

1080

6 Green
5 pink 4 Black

How many selections of 3 balls are possible with

| No restriction | 2 Green balls | 1 pink ball | 1 ball of each colour | 3 Black balls | No Green ball |
|---|---|---|---|---|---|
| = 15C3 = 455 | = 6C2 × 9C1 = 65 × 9 = 585 | = 5C1 × 10C2 = 5 × 45 = 225 | = 6C1 × 5C1 × 4C1 = 6 × 5 × 4 = 120 | = 4C3 = 4 | = 6C3 × 9C3 = 68 95 = 84 |

AND – Multiply
OR – Addition

1090

7 Green 2 Red
9 pink

How many selections of 5 balls are possible with

| No restriction | 2 Green balls | 1 pink boy | 4 Green balls | No pink ball | All pink balls |
|---|---|---|---|---|---|
| = 18C5 = 8,568 | = 7C2 × 11C3 = 3,465 | = 9C1 × 9C4 = 1,134 | = 7C4 × 11C1 = 385 | = 9C5 × 9C0 = 126 | = 9C5 × 9C0 = 126 |

(110)

4 Green 2 white
3 Red 6 purple

How many selections of 5 balls are possible with

**No restriction**

$= {}^{15}C_5$

$= 3003$

3003 diff selections

**atleast 3 purple balls**

$= ({}^{6}C_3 \times {}^{9}C_2) + ({}^{6}C_4 \times {}^{9}C_1) + ({}^{6}C_5 \times {}^{9}C_0)$

$= 720 + 135 + 6$

$= 861$ ways

**at most 1 Green ball**

$= ({}^{4}C_0 \times {}^{11}C_5) + ({}^{4}C_1 \times {}^{11}C_4)$

$= 1320 + 462$

$= 1782$ selections

(111)

There are 8 males & 7 females. In how many ways a committee of 4 members can be formed with

**No restriction**

$= {}^{15}C_4$

$= 1,365$

**2 males**

$= {}^{8}C_2 \times {}^{7}C_2$

$= 588$

**3 females**

$= {}^{7}C_3 \times {}^{8}C_1$

$= 280$

**atleast 3 males**

$= ({}^{8}C_3 \times {}^{7}C_1) + ({}^{8}C_4 \times {}^{7}C_0)$

$= 392 + 70$

$= 462$

(112) There are 10 males, 12 females. In How many ways a committee of 5 members can be formed with atleast 1 male ?

$= (^{10}C_1 \times {}^{12}C_4) + (^{10}C_2 \times {}^{12}C_3) + (^{10}C_3 \times {}^{12}C_2) + (^{10}C_4 \times {}^{12}C_1) + (^{10}C_5 \times {}^{12}C_0)$

$= 4950 + 9900 + 7920 + 2520 + 252$

$= 25,542$

OR

$= {}^{22}C_5 - (^{10}C_0 \times {}^{12}C_5)$

$= 26334 - 792$

$= 25,542$

(113) There are 8 CA's, 5 Doctors, 3 Engineers 5 Teachers. In How many ways a committee of 6 members can be formed with

at most 2 Doctors

$= (^{5}C_0 \times {}^{16}C_6) + (^{5}C_1 \times {}^{16}C_5) + (^{5}C_2 \times {}^{16}C_4)$

$= 8008 + 21840 + 18200$

$= 48,048$

atleast 1 Teacher

$= {}^{21}C_6 - (^{5}C_0 \times {}^{16}C_6)$

$= 54264 - 8008$

$= 46,256$

1140

8 Red
s white
3 Blue
6Bla

How many selections of
s balls are possible with
atleast one ball of each colour ?

$\Longrightarrow \left({}^8C_1 \times {}^5C_1 \times {}^3C_1 \times {}^6C_1\right) + \left({}^8C_1 \times {}^5C_1 \times {}^3C_2 \times {}^6C_1\right) + \left({}^8C_1 \times {}^5C_1 \times {}^3C_1 \times {}^6C_2\right) + \left({}^8C_1 \times {}^5C_2 \times {}^3C_1 \times {}^6C_1\right)$

$= 1800 + 720 + 1440 + 2520$

$= 6,480$

115

4 CAs, 8 Architects, 3 Teachers

In How many ways a committee of 5 members
can be formed with atleast one person of
each profession ?

$\Longrightarrow \left({}^4C_1 \times {}^8C_2 \times {}^3C_2\right) + \left({}^4C_2 \times {}^8C_2 \times {}^3C_1\right) + \left({}^4C_1 \times {}^8C_3 \times {}^3C_1\right) + \left({}^4C_1 \times {}^8C_2 \times {}^3C_2\right) + \left({}^4C_1 \times {}^8C_1 \times {}^3C_3\right)$

$= 504 + 144 + 336 + 96 + 672 + 32$

$= 1,784$ ways

116

There are 50 guests in a party. Everyone
handshakes with each other. How many handshakes
will take place in total ?

$\Longrightarrow {}^{50}C_2$

$= \frac{50 \times 49}{2 \cdot 1} = 1225$ handshakes

Syd

117 There are 'n' guests in a party. Everyone handshakes with each other. How many handshakes will take place in total?

$\Rightarrow {}^{n}C_2$

Roz

1180 There is a group of 20 friends. Everyone sends a Greeting card to other. How many cards will be used in total?

$\Rightarrow {}^{20}P_2 = 20 \times 19$

$= 380$ diff cards will be used in total.

1190 There are 5 friends for mr. A. In How many ways he can invite for dinner?

| 3 of them | atleast 4 of them | atleast 1 of them | at most 2 of them |
|---|---|---|---|
| $= {}^{5}C_3$ ways | $= {}^{5}C_4 + {}^{5}C_5$ | $= {}^{5}C_1 + {}^{5}C_2 + {}^{5}C_3 + {}^{5}C_4 + {}^{5}C_5$ | $= {}^{5}C_0 + {}^{5}C_1 + {}^{5}C_2$ |
| $= 10$ ways | $= 5 + 1$ | $= 25 - 1$ | $= 1 + 5 + 10$ |
| | $= 6$ ways | $= 31$ ways | $= 16$ ways |

Please Remember: ${}^{n}C_0 + {}^{n}C_1 + {}^{n}C_2 + \cdots + {}^{n}C_n = (2)^n$

${}^{n}C_1 + {}^{n}C_3 + {}^{n}C_5 + \cdots + {}^{n}C_n = (2)^n - 1$

(120) There are 15 players. In How many ways a team of 11 players can be selected If

| No restriction | 2 particular must be included | 2 particular players must be excluded | 3 parti. players must be included & 2 parti. players must be excluded | 1 parti. player should always be there |
|---|---|---|---|---|
| $= {}^{15}C_{11}$ | $= {}^{2}C_{2} \times {}^{13}C_{9}$ | $= {}^{13}C_{11} \times {}^{2}C_{0}$ | $= {}^{3}C_{3} \times {}^{2}C_{0} \times {}^{10}C_{6}$ | $= {}^{1}C_{1} \times {}^{14}C_{10}$ |
| $= 1365$ diff selections | $= 715$ diff selections | $= 78$ diff ways | $= 1 \times 1 \times 210$ $= 210$ diff ways | $= 1001$ diff ways |

(121) In How many ways a committee of 5 males & 3 females can be formed from 8 males & 7 females ?

$\Longrightarrow {}^{8}C_{5} \times {}^{7}C_{3} = 1960$ ways

(122) In How many ways 4 persons can be selected out of 12 persons If a particular person is

- always there: $= {}^{1}C_{1} \times {}^{11}C_{3} = 165$ ways
- never there: $= {}^{11}C_{4} \times {}^{1}C_{0} = 330$ ways

123

In How many ways 4 persons can be arranged out of 12 persons If a particular person is

- always there: $= {}^{11}P_3 \times {}^{4}P_1 = 3960$ ways
- never there: $= {}^{11}P_4 = 7920$ ways

124

120

---

In How many ways 'r' objects out of 'n' objects can be arranged If a particular object is

- always there: $= {}^{(n-1)}P_{(r-1)} \times {}^{r}P_1$
- never there: $= {}^{(n-1)}P_r$

In How many ways 'r' objects out of 'n' objects can be selected If a particular object is

- always there: $= {}^{(n-1)}C_{(r-1)}$
- never there: $= {}^{(n-1)}C_r$

---

125

1250

There are 12 friends. In How many ways can be invited for Dinner?

| 4 of them | 8 of them | atleast 10 of them | atleast 1 of them | atmost 1 of them |
|---|---|---|---|---|
| $= {}^{12}C_4$ | $+ {}^{12}C_8$ | $= {}^{12}C_{10} + {}^{12}C_{11} + {}^{12}C_{12}$ | $= {}^{12}C_1 + {}^{12}C_2 + \dots + {}^{12}C_{12}$ | $= {}^{12}C_0 + {}^{12}C_1$ |
| 495 ways | 495 ways | 66 + 12 + 1 = 79 ways | $2^{12} - 1 = 4095$ ways | 1 + 12 = 13 ways |

120

In a party there are 'x' guests. Everyone hand shakes with other. Total no of hand shakes were 66. Find x.

(a) 11 (b) 12 (c) 13 (d) None of these

As $^{12}C_2 = 66$

1252

127

How many diagonals can be drawn in a Heptagon?

Heptagon

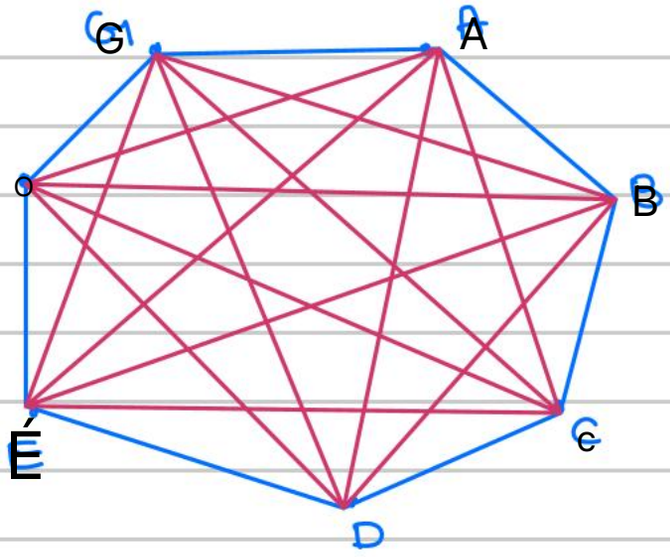
$= ($No of sides plus no of diagonals$) - ($No of diagonals$)$

sift

$= {}^7C_2 - 7$

72

$= 21 - 7 = 14$ diagonals




128

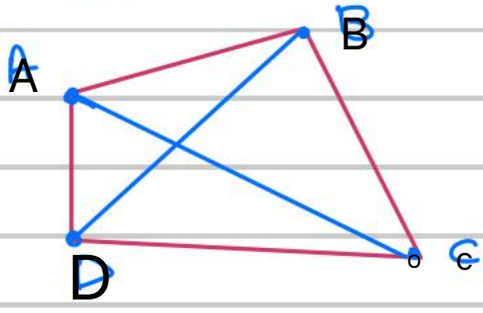
How many diagonals can be drawn in a Quadrilateral?

$= ($No of sides$) - ($No of diagonals$)$

sites

$= {}^4C_2 - 4 = 6 - 4 = 2$

492




129

How many diagonals can be drawn in a polygon having

8 sides $= {}^8C_2 - 8 = 20$

13 sides $= {}^{13}C_2 - 13 = 65$

'm' sides $= {}^mC_2 - m$

82

132

my

130 There are 30 points marked on circumference of a circle. How many diff lines can be drawn by joining them?

$\Rightarrow {}^{30}C_2 = 435$ diff lines

302

130 There are 'm' points marked on circumference of a circle. How many diff lines can be drawn by joining them?

$\Rightarrow {}^{m}C_2$ different lines

1320 There are 50 non-collinear points in a plane. How many diff straight lines can be obtained by joining them?

$\Rightarrow {}^{50}C_2 = 1225$ diff lines

50g

1330 There are 30 points in a plane out of which 12 are collinear. How many diff straight lines can be obtained by joining them?

$\Rightarrow$

0.0000000

OR $^{30}C_2 - {}^{12}C_2 + 1$

30g 122

$= 435 - 66 + 1$

$= 370$ diff lines

$= {}^{18}C_2 + ({}^{18}C_1 \times {}^{12}C_1) + 1$

182

$= 153 + 216 + 1 = 370$

130

There are 'm' points in a plane out of which 'k' are collinear. How many diff straight lines can be obtained by joining them?

$\Rightarrow {}^{m}C_{m-k+1}$

mg kg

1350

There are 60 points in a plane out of which 20 are collinear. How many diff triangles can be obtained by joining them?

$\Rightarrow {}^{60}C_{1} \times {}^{40}C_{2} + {}^{20}C_{1} \times {}^{40}C_{3} + {}^{40}C_{3}$

$= 15600 + 7600 + 9880$

$= 33080$ diff triangles

OR

$({}^{60}C_{3} - {}^{20}C_{3}) = 34220 - 1140 = 33,080$ diff. triangles

136

There are 'k' points in a plane out of which 'm' are collinear. How many diff triangles can be obtained by joining them?

$\Rightarrow {}^{k}C_{3} - {}^{m}C_{3}$

Ks Ms

137 There are 20 points in a plane out of which 6 are collinear. How many —

Triangles can be obtained by joining them?

$= {}^{20}C_3 - {}^{6}C_3$

$= 1120$ diff triangles

Lines can be drawn by joining them?

$= {}^{20}C_2 - {}^{6}C_2 + 1$

$= 176$ diff lines

138 There are 25 Non collinear points in a plane. How many different —

Triangles can be obtained by joining them?

$= {}^{25}C_3 = 2300$

Lines can be drawn by joining them?

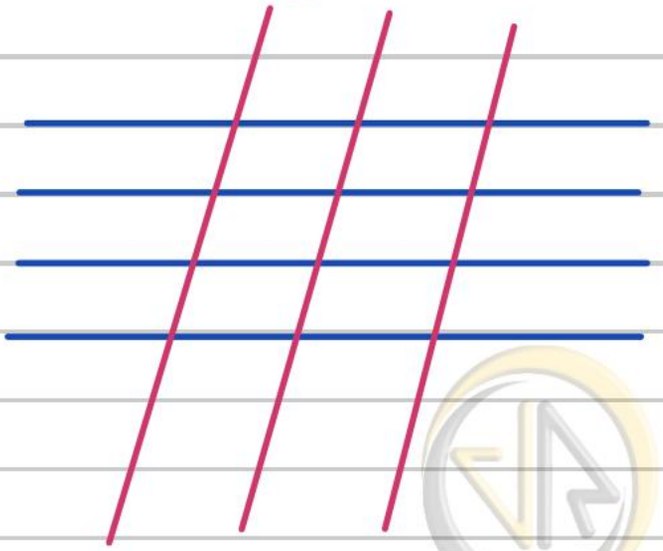
$= {}^{25}C_2 = 300$

139 There are 4 parallel lines intersecting with another set of 3 parallel lines. How many diff. parallelograms can be obtained?

$\Rightarrow {}^{4}C_2 \times {}^{3}C_2$

$= 6 \times 3$

$= 18$ parallelograms



(140) There are 'm' parallel lines intersecting with another set of 'n' parallel lines. How many diff. parallelograms can be obtained?

$\Rightarrow = {}^{m}C_2 \times {}^{n}C_2$

Mg x Nez

(141) The Supreme court Bench consist of 5 Judges. In How many diff ways a majority decision can taken?

$\Rightarrow = {}^{5}C_3 + {}^{5}C_4 + {}^{5}C_5$

Sgt sq Scs

$= 10 + 5 + 1 = 16$ ways

ways

(142) The Supreme court Bench consist of 7 Judges. In How many diff ways a majority decision can taken?

$\Rightarrow {}^{7}C_4 + {}^{7}C_5 + {}^{7}C_6 + {}^{7}C_7$

qt est qt K

$= 35 + 21 + 7 + 1 = 64$ ways

ways

1430 (143) There are 8 males & 12 females. In How many ways a committee of 5 members can be formed so that females are in majority?

many ways

$\Rightarrow = ({}^{12}C_3 \times {}^{8}C_2) + ({}^{12}C_4 \times {}^{8}C_1) + ({}^{12}C_5 \times {}^{8}C_0)$

7 123 85 124 89 1125 88

$= 6160 + 3960 + 792$

$= 10,912$ ways

10,912 ways

(144) There are 4 True False questions. How many diff sequences of answer are possible?

| | |
|---|---|
| T T T T | FT T T |
| T T T F | FT TF |
| T T FT | FT FT |
| TT F F | FT F F |
| TF T T | F F T T |
| TF TF | F F TF |
| TF FT | F F F T |
| TF F F | F F F F |

OR $2p_1 \times 2P_1 \times 2P_1 \times 2P_1$

$= 16$ ways

16 ways

(145) There are 4 multiple choice questions. First 3 questions have 5 options each and last question has 6 options. How many diff sequences of answer are possible?

1450

$\Rightarrow = 5P_1 \times 5P_1 \times 5P_1 \times 6P_1$

$= 750$ diff sequences

so diff sequences

(146) There are 15 buses plying between Pune & Latur. In how many ways a man can go from pune to Latur & return by

1460

plying

by

- Same bus: $= 15C_1 \times 1C_1 = 15$
- diff bus: $= 15C_1 \times 14C_1 = 210$
- any bus: $= 15C_1 \times 15C_1 = 225$

159

(147) There are 7 Mcqs. First 4 questions have 3 options each & last 3 questions having 5 options each. How many sequences of answer are possible?

$\Rightarrow {}^3P_1 \times {}^3P_1 \times {}^3P_1 \times {}^3P_1 \times {}^5P_1 \times {}^5P_1 \times {}^5P_1$

$= 10,125$ diff sequences

(148) A man has 8 friends. In how many he can invite atleast one of them for dinner?

$\Rightarrow {}^8C_1 + {}^8C_2 + \cdots + {}^8C_8 = 2^8 - 1$

$= 255$ ways

1480

(149) In the formula of ${}^nP_r$, ${}^nC_r$, 'n' is always

(a) an integer (b) a Fraction (c) a positive integer (d) can't say

always integer positive integer say

(150) $\dfrac{{}^{20}P_2 \times {}^{21}C_4 \times {}^8C_8}{{}^9P_2 \times {}^{22}P_4 \times {}^{22}C_{11}}$

$= \dfrac{20 \times 19 \times 18 \times 21 \times 20 \times 19 \times 18 \times 8 \times 7 \times 6 \times 24}{24 \times 6 \times XXXX \times 22 \times XX \times 20 \times 19 \times 22 \times 21 \times 20 \times 19}$

$= \dfrac{3}{11 \times 11 \times 7} = \left(\dfrac{3}{82}\right)$ 2x

1500

(151) If ${}^{(m+n)}P_2 = 56$ & ${}^{(m-n)}P_2 = 12$ then

(a) m = 6, n = 2 (b) m = 5, n = 3 (c) m = 10, n = 8 (d) None of these

(152) There are 5 questions in an exam.
In How many ways at least one question can be attempted?

$\Rightarrow 2^5 - 1$

$= 31$ ways

(153) There are 5 questions in an exam.
(Each question has one alternative)
In How many ways at least one question can be attempted?

$\Rightarrow 3^5 - 1$

$= 242$ ways

(154) There are 8 questions in an exam.
(Each question has one alternative)
In How many ways at least one question can be attempted?

$\Rightarrow 3^8 - 1$

$= 6560$ ways

(155) A exam has 4 papers. To pass the exam student has to pass in all 4 papers.
In How many diff ways he can

pass the exam? $= 1$

pp pp

fail in the exam? $= 15$

$= {}^4C_1 + {}^4C_2 + {}^4C_3 + {}^4C_4$

41 413 94

1560 In an exam there are 5 papers. To pass the exam, student has to pass in atleast one paper. In How many diff ways he can

pass the exam ?

= $^5C_3 + {}^5C_4 + {}^5C_5$

= 10 + 5 + 1

= 16

fail in the exam ?

= $^5C_0$

= 1

157 How many 5 digit numbers divisible by 4 can be formed by using 1, 2, 3, 4, 9

Ending with

24 — $^3P_3 \times {}^2P_1 \times {}^1P_1$ = 6

32 — $^3P_3 \times {}^2P_1 \times {}^1P_1$ = 6

12 — $^3P_3 \times {}^2P_1 \times {}^1P_1$ = 6

92 — $^3P_3 \times {}^2P_1 \times {}^1P_1$ = 6

24

158 How many words can be formed by using letters of word TRIANGLE so that word ANGLE is always present ?

T, R, I, ANGLE

= 4! = 24 ways

159 How many diff words can be formed by using letters of word TRIANGLE if letters of word ANGLE are always together ?

= 4! × 5! = 2880 ways

160 If all the words formed by using letters of word VINOD are arranged in Dictionary setuence. what is rank of word VINOD ?

⟹ Starting with 'D' — 24 words
Starting with 'I' — 24
Starting with 'N' — 24
Starting with 'O' — 24

97th VDINO
98 VDON
99 VDOV
100 VDOI
101 VDIN
102 VDIO
103 VDNI
104 VDNO
105 VDON
106th VINOD

161 If all the words formed by using letters of word TALK are arranged in Dictionary setuence. what is rank of word KAT, TALK, KALT

⟹ starting with A — AKLT — 6 words
starting with K — KALT — 7th
starting L — 13th LAKT, 14th LATK
starting T — TAKL, TALKO — 20th

isthLkad

15th, 20th, 7th

1620 A Letter lock has 3 sings, each marked with 5 diff letters. How many maximum unsuccessful attempts can be made to open the lock?

(a) 125 (b) 124 (c) 1 (d) 60

All possible passwords = $5P_1 \times 5P_1 \times 5P_1$

$= 125$

1630 How many words of 5 consonants & 3 vowels can be formed from 8 consonants & 5 vowels?

(a) 9,03,200 (b) 2579200 (c) 8! (d) None of these

$\Rightarrow {}^8C_5 \times 5! \times 8!$

1690 $(n+2)! = 2550 \times n!$, then $n = ?$

(a) 38 (b) 35 (c) 49 (d) 36 (e) None

$\Rightarrow (n+2)(n+1)\,n! = 2550 \times n!$

$(n+2)(n+1) = 2550$

$(49+2) \times (49+1) = 2550$

$\therefore n = 49$

165 $^{12}C_x \times {}^{n}C_3 = {}^{2n}C_3$. Find n

1650 ng g

$\Rightarrow \frac{12 \times n(n-1)}{2!} = \frac{2n(2n-1)(2n-2)}{3!}$

2hangfen

$6 \times x \times (n-1) = x \times (2n-1) \times (n-1)$

$9 = 2n-1$

$\therefore 2n = 10$

$n = 5$

166 $^{10}P_r = 2 \times {}^{9}P_r$ then $r = ?$

160 lOPr 2x 9Pr

$\Rightarrow \frac{10!}{(10-r)!} = \frac{2 \times 9!}{(9-r)!}$

it get.

$\frac{10 \times 9!}{(10-r)(9-r)!} = \frac{2 \times 9!}{(9-r)!}$

$\frac{10}{10-r} = 2$

$5 = 10-r$

$\therefore r = 5$

P is lyllers

167 In how many ways letters of word 'BALLOON' can be arranged so that

100 In s BALLOON can be arranged so that

2 L's are always together ?

always together

LL BA OO N

$= \frac{6!}{2!} \times \frac{2!}{2!}$

31

$= 360$ ways

ways

2 L's are never together ?

never together

All possible arrangements — 360

$= \frac{7!}{2!2!} - 360$

212

$= 1260 - 360$

$= 900$ ways

ways

1680 $4 \times {}^{n}P_3 = 5 \times {}^{n-1}P_3$. Find $n = ?$

$\Rightarrow 4 \times n(n-1)(n-2) = 5(n-1)(n-2)(n-3)$

$4n = 5n - 15$

$15 = n$

$\therefore n = 15$

1690 In how many ways 12 cards can be equally divided among 3 people?

$\Rightarrow$

L

$= {}^{12}C_4 \times {}^{8}C_4 \times {}^{4}C_4$

$= 495 \times 70 \times 1$

$= 34{,}650$ ways

S

$= \frac{12!}{4!\,4!\,4!}$

$= 34{,}650$ ways

170 In how many ways 10 mangoes can be divided among 3 people such that they get 2, 3, 5 mangoes resp.

$\Rightarrow$

L

$= {}^{10}C_2 \times {}^{8}C_3 \times {}^{5}C_5$

$= 2520$ ways

S

$= \frac{10!}{2!\,3!\,5!}$

$= 2520$ ways

(171) In How many ways 52 cards can be equally divided among 4 people?

$\Rightarrow {}^{52}C_{13} \times {}^{39}C_{13} \times {}^{26}C_{13} \times {}^{13}C_{13}$

OR $\dfrac{52!}{13!\,13!\,13!\,13!} = \dfrac{52!}{(13!)^4}$

(172) In How many ways a committee of 4 ladies & 5 Gents can be formed from 10 ladies & 8 Gents if Mrs. A refuses to be in the committee if Mr. B is there?

$\Rightarrow$ = All possible committees − (committees where Mrs. A & Mr. B both are there)

$= ({}^{10}C_4 \times {}^{8}C_5) - ({}^{1}C_1 \times {}^{9}C_4 \times {}^{1}C_1 \times {}^{7}C_4)$

$= 11760 - 2940 = 8820$ ways

OR Mr B is there : ${}^{1}C_1 \times {}^{7}C_3 \times {}^{9}C_4 = 4410$

Mr. B is not there : ${}^{1}C_0 \times {}^{7}C_4 \times {}^{10}C_5 = 4410$

8,820 ways

1730 No. of ways in which is diamonds can form a necklace are:

$\Rightarrow \frac{1}{2} \times (15-1)! = \frac{1}{2} \times 14!$

$= 43589145600$ ways

174 $500C_{92} = 499C_{92} + {}^{n}C_{91}$

then $n = ?$

$\Rightarrow {}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$

$n = 499, r = 92$

$499C_{92} + 499C_{91} = 500C_{92}$

$500C_{92} + 999C_{92} + 499C_{91}$

$n = 499$

175 In how many ways can 6 Ladies & 6 Gents form a line if

te No restriction $= 12!$

$= 479001600$ ways

te All Gents should be together $= 7! \times 6!$

$= 3628800$

te All ladies should be together yep $= 7! \times 6!$

$= 3628800$

te No 2 ladies or no 2 Gents should be together $= (6P_6 \times 6P_6) \times 2$

$= 1036800$

10,316,800

OR

tests tittle

tests test

176

In How many ways 6 Ladies & 5 Gents can form a line if

te yo restriction = 11! = 39916800 Ways

te All Gents should be together = 7! × 5! = 604800 ways

te All ladies should be together = 6! × 6! = 518,400 ways

te No 2 ladies or No 2 Gents should be together = 6! × 5! = 86,400 ways

1

L G L G L G L G L G L

177

In How many letters of word 'DAUGHTER' can be arranged if all consonants should be kept together?

⟹ DGHTR AVE

Dand

= 4! × 5! = 24 × 120 = 2880 words

178

How many distinct 5 digit numbers can be formed if repetition of digits is allowed?

⟹ 9p × 10p × 10P × 10P × 10p

= 90,000

(179) In How many ways a word with 2 consonants & 3 vowels can be formed from 6 consocenants & 4 vowels?

$\Rightarrow (^6C_2 \times {}^4C_3) \times 5!$

$= 7,200$ words

180 (180) In How many ways 8 Books of physics, 6 Books of maths, 3 Books of Accounts can be arranged on a shelf so that Books of same subjects are always together?

$\Rightarrow$ (8 - phy) (6 - maths) (3 - Accounts) ACeountP

$= 3! \times 8! \times 6! \times 3! = 1045094400$ ways

180 (181) There are 3 different rings to be worn in 4 fingers with atmost 1 ring in each finger. In How many diff ways this can be done?

$\Rightarrow {}^4P_1 \times {}^3P_1 \times {}^2P_1$

$= 24$ diff ways

(182) How many numbers less than 1000 can be formed from 0, 2, 5, 7 if repetition of digits is allowed?

$\Rightarrow$ 3 digit $= {}^3P_1 \times {}^4P_1 \times {}^4P_1 = 48$

2 digit $= {}^3P_1 \times {}^4P_1 = 12$

1 digit $= {}^3P_1 = 3$

63 Numbers

1830 How many numbers greater than 300 can be formed by using 1,2,3,4,5 if repeti. of digits is not allowed ?

$\Rightarrow$

3 digits : $^3P_1 \times {}^4P_2 = 36$

4 digits : $5P_4 = 120$

5 digits : $5P_5 = 120$

276

1840 $^{43}C_{r-1} = {}^{43}C_{2r}$ then $r = ?$ 93226 Cart

$\Rightarrow$

$r - 6 = 3r + 1$ OR $r - 6 + 3r + 1 = 43$

$-7 = 2r$ $4r - 5 = 93$

which is impossible $4r = 48$

$r = 12$

12121

1850 The number of ways in which 9 things can be divided in 3 groups containing 2,3,4 things resp :

$\Rightarrow$

$^9C_2 \times {}^7C_3 \times {}^4C_4$ OR $\frac{9!}{2!3!4!}$

$= 1260$ ways

1260 ways

186 In how many ways can 10 people form a line, if tallest must be always to the immediate right of shortest ?

Line
$= 9! = 3,62,880$ ways

circle
$= 8! = 40,320$ ways

187 In how many ways can 10 people form a line, if tallest & shortest are always together ?

Line
$= 9!2!$
$= 7,25,760$ ways

circle
$= 8!2!$
$= 80,640$ ways

188 There are 50 stations on a railway line. How many diff tickets should be painted to enable the passenger to travel from one station to another station ?

$\Rightarrow$ 50 stations

$= {}^{50}P_2 = 2450$ diff types of Tickets

1890 $\frac{{}^{7}P_{n}}{{}^{7}P_{n-3}} = 60$ then $n = ?$

$\Rightarrow \frac{\frac{7!}{(7-n)!}}{\frac{7!}{(7-n+3)!}} = 60$

$\frac{(10-n)!}{(7-n)!} = 60$

$(10-n)(9-n)(8-n) = 60$

$(10-n)(9-n)(8-n) = 5 \times 4 \times 3$

$\therefore n = 5$

190 How many diagonals can be formed in a pentagon ?

$\Rightarrow {}^{5}C_{2} - 5 = 5$ diagonals

191 ${}^{7}P_{x} = 42$ then $x = ?$

$\Rightarrow {}^{7}P_{2} = 7 \times 6 = 42 = {}^{7}P_{x}$

$\therefore {}^{7}P_{2} = {}^{7}P_{x}$

$\therefore x = 2$

1920 $P(5,2) = ?$ $\quad {}^{5}P_{2} = 20$

$C(9,3) = ?$ $\quad {}^{9}C_{3} = 84$

$C(20,8) = 1,25,970$

$P(12,5) = 95,040$

$8! = 8L$

1930

4 Africans, 1 American & 6 Indians wish to form a line. 4 Africans must be at both corners (i.e. 2 on each side), 1 American don't wish to have african of any side. How many arrangements are possible ?

$\Rightarrow$ $\boxed{\quad}_{Dox} \otimes \quad \otimes \boxed{\quad}_{1s}$

$= {}^{4}P_4 \times {}^{5}P_1 \times {}^{6}P_6 = 86,400$ arrangements

1944

How many line can be formed from 36 points marked on a circle ?

$\Rightarrow$ ${}^{36}C_2 = 630$ diff lines

362

1950

We wish to select 6 persons from 8. If A is chosen then B must be chosen too. How many diff selections are possible ?

$\Rightarrow$

A is chosen : ${}^{1}C_1 \times {}^{1}C_1 \times {}^{6}C_4 = 15$

OR

A is not chosen : ${}^{1}C_0 \times {}^{7}C_6 = 7$

69

22

1960

${}^{18}C_{\gamma} = {}^{18}C_{\gamma+2}$ then ${}^{\gamma}C_2 = ?$

$\Rightarrow$

$\gamma + \gamma + 2 = 18$

$2\gamma = 16$

$\gamma = 8$

${}^{8}C_2 = 56$

(197) In a group of 'n' boys, no. of arrangements of 4 boys is 12 times the no. of arrangements of 2 boys. Find n.

$\Rightarrow$ $^{n}P_4 = 12 \times {}^{n}P_2$

$\frac{n(n-1)(n-2)(n-3)}{} = 12 \times \frac{n(n-1)}{}$

$(n-2)(n-3) = 12$

$(n-2)(n-3) = 31$

$(6-2)(6-3) = 12$

$\therefore n = 6$

(198) 1980 There are 18 points in a plane out of which 5 are collinear. How many diff

Lines can be formed?

$= {}^{18}C_2 - {}^{5}C_2 + 1$

$= 153 - 10 + 1$

$= 144$ diff lines

Triangles can be formed?

$= {}^{18}C_3 - {}^{5}C_3$

$= 816 - 10$

$= 806$ diff triangles

(199) A Question paper has 6 questions (each has one alternative). In how many ways one or more question can be attempted?

$\Rightarrow$ $2^6 - 1$

$= 728$ ways

$64 - 1$

63 ways

200 $(n+1)! - n! = n \times n!$ True / False

$\Rightarrow$ L.H.S. $= (n+1)! - n!$

$= (n+1) \times n! - n!$

$= n! \, (n+1-1)$

$= n! \times n$

$= n \times n! =$ R.H.S.

201 There are 2 sections in a exam paper. section A has 8 questions & section B has 6 questions. In How many 6 questions can be selected with at most 4 from any of the section ?

$\Rightarrow$

| A − 8 | B − 6 | |
|---|---|---|
| $^8C_2$ | $\times$ $^6C_4$ | $= 420$ |
| $^8C_3$ | $\times$ $^6C_3$ | $= 1120$ |
| $^8C_4$ | $\times$ $^6C_2$ | $= 1050$ |

2590 ways

2020 $\frac{^{56}P_{r+6}}{^{54}P_{r+3}} = 30,800$ . Find r

$\Rightarrow \frac{\frac{56!}{(56-r-6)!}}{\frac{54!}{(54-r-3)!}} = 30,800$

$\frac{56 \times 55 \times 54!}{(50-r)!} \times \frac{(51-r)!}{54!} = 30800$

$3080 \times \frac{(51-r)(50-r)!}{(50-r)!} = 30800$

$(51-r)(50-r) = 10$

$r = 41$

2030 How many numbers between 0 & 100 can be formed with 7 as

- one of the digit? = 18 Numbers: 7, 17, 27, 37, 47, 57, 67, 70, 71, 72, 73, 74, 75, 76, 78, 79, 87, 97
- atleast one of the digit? = 19 Numbers: 7, 17, 27, 37, 47, 57, 67, 70, 71, 72, 73, 74, 75, 76, 78, 79, 87, 97

1 digit = 1 digit

2 digit = 2 digit

starting with 7 : $1P_1 \times 9P_1 = 9$

Ending with 7 : $8P_1 \times 1P_1 = 8$

Total = 1 + 9 + 8 = 18 Numbers

2040 Find the sum of all 4 digit numbers formed by using 1,2,5,9

$\Rightarrow {}^4P_4 = 24$ Numbers can be formed.

1259 + 1295 + 1529 + 1592 + 1925 + 1952 +
2159 + 2195 + 2519 + 2591 + 2951 + 2915 +
5129 + 5192 + 5219 + 5291 + 5912 + 5921 +
9125 + 9152 + 9215 + 9251 + 9512 + 9521

= 1,13,3221

(OR) $2 \times \frac{24}{2} \times (1111 + 2222 + 5555 + 9999)$

$= 1,13,333 /$

$= 13,3221$

2050 Find sum of all 5 digit numbers formed by using 1, 3, 4, 8, 9

$\Rightarrow 120 \times (11111 + 33333 + 44444 + 88888 + 99999)$

$= 66,66,600 /$

$= 66,66,004$

2060 How many 6 digit numbers divisible by 5 can be formed by using 2, 3, 5, 8, 9, 0

$\Rightarrow$

Ending with '5' : $\_\_\_\_\_ \times 1_P = 96$ (4P4 × 4Pa × X)

Ending with '0' : $\_\_\_\_\_ \times 1_P = 120$ (5P5 × XP)

216 Numbers

207 How many 5 digit odd numbers greater than 40,000 can be formed by using 1, 2, 3, 4, 8, 9

$\Rightarrow$

starting with 4,8 : $\_\_\_\_\_ \times 1_P = 144$ (2P1 × 4P3 × X3P)

starting with 9 : $\_\_\_\_\_ \times 2_P = 48$ (1P1 × 4P3 × 1P)

192 Numbers