Calculation practice:

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

$\boxed{{}^{20}C_5 + {}^{20}C_4 = {}^{21}C_5}$

1st 2nd nth

$2 \times 2 \times \ldots \times 2 = 2^n$

1. $^nP_r = {}^nC_r \times r!$
2. $^nC_r = {}^nC_{n-r}$
3. $^nC_o = {}^nC_n = 1$
4. $^nC_1 = n.$
5. $^nP_o = 1,$
6. $^nP_1 = n$
7. $^nP_{n-1} = {}^np_n = n!$
8. $^nC_r + {}^nC_{r-1} = {}^{(n+1)}C_r$
9. $^nC_o + {}^nC_1 + {}^nC_2 + {}^nC_3 + \ldots + {}^nC_n = 2^n$
10. The number of ways of selecting one or more objects out of 'n' objects is $2^n - 1$. (Since $^nC_0 + {}^nC_1 + {}^nC_2 + \ldots\ldots\ldots\ldots + {}^nC_n = 2^n$)

* 10 toffees

zero or more

$$\begin{array}{ccccccc} T_1 & T_2 & T_3 & T_4 & & & T_{10} \\ 2 & \times\, 2 & \times\, 2 & \times & \dots & & \times\, 2 = 2^{10} \end{array}$$

$= {}^{10}C_0$ या ${}^{10}C_1$ या ${}^{10}C_2$ या ${}^{10}C_3 \dots \quad {}^{10}C_{10}$

$$= \boxed{{}^{10}C_0 + {}^{10}C_1 + {}^{10}C_2 + \quad + {}^{10}C_{10} = 2^{10}}$$

One or more

$${}^{n}C_1 + {}^{n}C_2 + {}^{n}C_3 + \dots \quad + {}^{n}C_n = 2^n - 1$$

coaching center

HW

1. $10_{C_8} = 10_{C_2} = \frac{10\times 9}{2} = 45$

2. $12_{C_3} = \frac{\overset{2}{\cancel{12}}\times 11\times 10}{\cancel{3\times 2}} = 220$

3. $15_{C_1} + 15_{C_2} + 15_{C_3} = 15 + \frac{15\times \overset{7}{\cancel{14}}}{\cancel{2}} + \frac{\overset{5}{\cancel{15}}\times \overset{7}{\cancel{14}}\times 13}{\cancel{3}\times\cancel{2}}$ 91

$= 120 + 455$

$= 575$

4. $8_{C_5} = 8_{C_3} = \frac{8\times 7\times 6}{3\times 2} = 56$

5. $5_{P_2} = 5\times 4 = 20$

6. $6_{P_1} + 6_{P_5} = 6 + 6! = 726$

7. $12_{C_0} + 15_{P_0} = 1 + 1 = 2$

8. $18_{C_1} + 19_{C_1} = 18 + 19 = 37$

9. $5_{P_5} + 5_{C_5} = 5! + 1 = 121$

10. $10_{C_o} + 10_{C_1} + 10_{C_2} + \ldots + 10_{C_{10}} = 2^{10} = 1024$

e1 coaching center

HW

11. $6! + 5! = 720 + 120 = 840$

12. $\dfrac{^{10}C_2}{^{16}C_2} = \dfrac{\frac{10\times 9}{2!}}{\frac{16\times 15}{2!}} = \dfrac{\cancel{10}^{\,2}\times\cancel{9}^{\,3}}{\cancel{16}_{\,8}\times\cancel{15}_{\,3}} = \dfrac{3}{8}$

13. $\dfrac{10!}{6!\times 4!} = \dfrac{10\times\cancel{9}^{\,3}\times\cancel{8}\times 7\times\cancel{6!}}{\cancel{6!}\times\cancel{4}\times\cancel{3}\times\cancel{2}} = 210$

14. $\dfrac{^{11}P_3}{3!} = \dfrac{11\times\cancel{10}^{\,5}\times\cancel{9}^{\,3}}{\cancel{3}\times\cancel{2}} = 165$

15. $\dfrac{12!}{4!\times 4!\times 4!} = \dfrac{\cancel{12}\times 11\times 10\times 9\times\cancel{8}\times 7\times\cancel{6}\times 5\times\cancel{4!}}{\cancel{4!}\times\cancel{4}\times\cancel{3}\times\cancel{2}\times\cancel{4}\times\cancel{3}\times\cancel{2}} = 315\times 11\times 10 = 34650$

$63 \quad 315$

16. $\dfrac{7!}{5!}\times\dfrac{^{4}P_3}{2!} = \dfrac{7\times 6\times\cancel{5!}}{\cancel{5!}}\times\dfrac{4\times 3\times\cancel{2}}{\cancel{2}} = 42\times 12 = 504$

17. If $^{n}C_2 = 36$, find n?

$\dfrac{n(n-1)}{2} = 36$

$n(n-1) = 72$

$9 \quad 8$

18. If $^{n}P_3 = 990$, find n?

$n(n-1)(n-2) = 990$

$9\times 10\times 11$

e1 coaching center

19. If $^nC_1 + {^nC_2} + {^nC_3} + \dots + {^nC_n} = 511$, find n?

19

$2^n - 1 = 511$

$\Rightarrow 2^n = 512 = 2^9$

$n = 9$

20. For what value of n, $^nC_2 + {^nP_2} = 570$.

21. If $^nC_1 + {^nC_2} = 28$, find n?

$6 + 10 + 15 + 21 + 28 = 80$

22. $^4C_2 + {^5C_2} + {^6C_2} + {^7C_2} + {^8C_2} =$

$10 + 20 + 35 + 56$

23. $^5C_3 + {^6C_3} + {^7C_3} + {^8C_3} = 121$

20.

$\frac{n(n-1)}{2} + n(n-1) = 570$

$\Rightarrow n(n-1) \times \frac{\cancel{3}}{2} = \overset{19}{\cancel{57}0}$

$\Rightarrow n(n-1) = 19 \times 20$

21

$\frac{2n + n(n-1)}{\cancel{2}} = \cancel{28}\ 56$

$\Rightarrow n^2 + n - 56 = 0$

$-8, 7$

$n = 7$

1\. If $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$, find x

यदि $\frac{1}{6!}+\frac{1}{7!}=\frac{x}{8!}$ तो x का मान ज्ञात कीजिए

a) 49 b) 56 ~~c)~~ 64 d) 72

$$\frac{1}{\cancel{6!}}+\frac{1}{7\times\cancel{6!}}=\frac{x}{8\times7\times\cancel{6!}}$$

$$\Rightarrow \frac{8}{\cancel{7}}=\frac{x}{8\times\cancel{7}}$$

$$\Rightarrow 64=x$$

$$=5\times4\times3!$$

$$5!=5\times\boxed{4\times3\times2\times1}$$

$$=5\times4!$$

$$n!=n(n-1)!$$

$$=n(n-1)(n-2)!$$

$$8\times7!=8!$$

$n! = n(n-1)(n-2)!$

2. **Find the value of n such that $^nP_5 = 42 \cdot {}^nP_3$, $n > 4$.**

n का मान ज्ञात कीजिए, इस प्रकार कि $^nP_5 = 42 \cdot {}^nP_3$, $n > 4$.

~~a)~~ 10 b) 3 c) 6 d) 8

$$\cancel{n}\cancel{(n-1)}\cancel{(n-2)}(n-3)(n-4) = 42 \times \cancel{n}\cancel{(n-1)}\cancel{(n-2)}$$

$42 = 6 \times 7$

$$\frac{\cancel{n!}}{(n-5)!} = 42 \times \frac{\cancel{n!}}{(n-3)!}$$

$$\Rightarrow \frac{1}{\cancel{(n-5)!}} = \frac{42}{(n-3)(n-4)\cancel{(n-5)!}}$$

$$\Rightarrow (n-3)(n-4) = 42$$

$42 = 7 \times 6$

$$\boxed{n = 10}$$

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

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

PnC

3. Find the value of n such that $\frac{{}^{n}P_4}{{}^{(n-1)}P_4} = \frac{5}{3}$, $n > 4$.

n का मान ज्ञात कीजिए, यदि $\frac{{}^{n}P_4}{{}^{(n-1)}P_4} = \frac{5}{3}$, $n > 4$

a) 10 b) 3 c) 6 d) 8

$$\frac{n\cancel{(n-1)(n-2)(n-3)}}{\cancel{(n-1)(n-2)(n-3)}(n-4)} = \frac{5}{3}$$

10

2

6

coaching center

PnC

५. Find n, if $(n-1)_{P_3} : n_{P_4} = 1:9$

यदि $(n-1)_{P_3} : n_{P_4} = 1:9$ तो n ज्ञात कीजिए।

a) 6 b) 7 c) 8 d) 9

$$\frac{\cancel{(n-1)(n-2)(n-3)}}{n\cancel{(n-1)(n-2)(n-3)}} = \frac{1}{9}$$

coaching center

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

$$n! = n(n-1)(n-2)!$$

5. Find r, if $5 \cdot {}^4P_r = 6 \cdot {}^5P_{r-1}$

r का मान ज्ञात कीजिए, यदि $5 \cdot {}^4P_r = 6 \cdot {}^5P_{r-1}$

a) 8 b) 3 c) 5 d) 6

$$\cancel{5} \times \frac{\cancel{4!}}{(4-r)!} = 6 \times \frac{\cancel{5!}}{(6-r)!}$$

$$5-(r-1)$$
$$=5-r+1$$

$$\Rightarrow \frac{1}{\cancel{(4-r)!}} = \frac{6}{(6-r)(5-r)\cancel{(4-r)!}}$$

$$6-r-1 = 5-r$$

$$\Rightarrow (6-r)(5-r) = 6$$

$$3 \times 2$$

$$r=3$$

6. Find r if $5_{P_r} = 2 \cdot 6_{P_{r-1}}$.

r ज्ञात कीजिए, यदि $5_{P_r} = 2 \cdot 6_{P_{r-1}}$

~~a)~~ 3 b) 4 c) 2 d) 5

$$\frac{\cancel{5!}}{(5-r)!} = 2 \times \frac{\cancel{6!}\; 6 \times \cancel{5!}}{(7-r)!}$$

$$\Rightarrow \frac{1}{\cancel{(5-r)!}} = \frac{12 \rightarrow 4 \times 3}{\underbrace{(7-r)}_{4}\underbrace{(6-r)}_{3}\cancel{(5-r)!}}$$

$6-r+1$

7. Find r if $5_{P_r} = 6_{P_{r-1}}$

r ज्ञात कीजिए, यदि $5_{P_r} = 6_{P_{r-1}}$

a) 3 b) 4 c) 2 d) 5

$$\frac{\cancel{5!}}{(5-r)!} = \frac{\cancel{6!}\ 6}{(7-r)!}$$

$$\frac{1}{\cancel{(5-r)!}} = \frac{6 \rightarrow 3\times 2}{\underbrace{(7-r)}_{3}\underbrace{(6-r)}_{2}\cancel{(5-r)!}}$$

coaching center

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

8. If ${}^{n}C_{9} = {}^{n}C_{8}$, find ${}^{n}C_{17}$

यदि ${}^{n}C_{9} = {}^{n}C_{8}$ तो, ${}^{n}C_{17}$ ज्ञात कीजिए|

a) 17 b) 1 c) 0 d) 9

$$\frac{\cancel{n!}}{(n-9)!\,9!} = \frac{\cancel{n!}}{(n-8)!\,8!}$$

$$\Rightarrow \frac{1}{\cancel{(n-9)!}\,9\times\cancel{8!}} = \frac{1}{(n-8)\cancel{(n-9)!}\,\cancel{8!}}$$

$17 = n$ ${}^{17}C_{17} = 1$

coaching center

PnC

9 . If $n_{C_8} = n_{C_2}$, find n_{C_2}.

यदि $n_{C_8} = n_{C_2}$ तो n_{C_2} ज्ञात कीजिए|

~~a)~~ 45 b) 90 c) 60 d) 80

$8+2=10$

$^{10}C_2 = 45$

e1 coaching center

১০. Determine n, if $2n_{C_3} : n_{C_3} = 12:1$.

n का मान निकालिए, यदि $2n_{C_3} : n_{C_3} = 12:1$.

a) 3 b) 4 ~~c)~~ 5 d) 6

$$\frac{10C_3}{5C_3} = \frac{\frac{10\times9\times8}{\cancel{3!}}}{\frac{5\times4\times3}{\cancel{3!}}}$$

$$\frac{\cancel{2}\cancel{n}(2n-1)\cancel{(2n-2)}^{\,2}}{\cancel{n}\cancel{(n-1)}(n-2)} = \frac{\cancel{12}^{\,3}}{1}$$

$$\Rightarrow 2n-1 = 3n-6$$

$$\Rightarrow n = 5$$

coaching center

11. **Determine n, if $2n_{C_3} : n_{C_3} = 11 : 1.$**

n का मान निकालिए, यदि $2n_{C_3} : n_{C_3} = 11 : 1.$

a) 3 b) 4 c) 5 d) 6 ✓

$$\frac{2\cancel{n}\times(2n-1)\cancel{(2n-2)}^{\,2}}{\cancel{n}\cancel{(n-1)}(n-2)} = \frac{11}{1}$$

$\Rightarrow \quad 8n-4 = 11n-22$

$\Rightarrow \quad 3n = 18$

$\Rightarrow \quad n = 6$

coaching center