3. If ${}^nP_5 : {}^nP_3 = 2:1$, find n.

$\Rightarrow {}^nP_5 : {}^nP_3 = 2:1$

$\Rightarrow \dfrac{\lfloor n}{\lfloor n-5} : \dfrac{\lfloor n}{\lfloor n-3} = 2:1$

$\Rightarrow \dfrac{\cancel{\lfloor n}}{\lfloor n-5} \times \dfrac{\lfloor n-3}{\cancel{\lfloor n}} = \dfrac{2}{1}$

$\Rightarrow \dfrac{\lfloor n-3}{\lfloor n-5} = \dfrac{2}{1}$

$\Rightarrow \dfrac{(n-3)(n-4)\cancel{\lfloor n-5}}{\cancel{\lfloor n-5}} = \dfrac{2}{1}$

$\Rightarrow (n-3)(n-4) = 2$

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

$\Rightarrow n-3 = 2$

$n-4 = 1$

$\Rightarrow n = 2+3$

$n = 1+4$

$\Rightarrow \therefore n = 5.$

12

*4. If ${}^{n}P_4 : {}^{n+1}P_4 = 3:4$, find n.

$\Rightarrow {}^{n}P_4 : {}^{n+1}P_4 = 3:4$

$\Rightarrow \dfrac{{}^{n}P_4}{{}^{n+1}P_4} = \dfrac{3}{4}$

$\Rightarrow \dfrac{\dfrac{n!}{(n-4)!}}{\dfrac{(n+1)!}{(n+1-4)!}} = \dfrac{3}{4} \Rightarrow \dfrac{n!}{(n-4)!} \times \dfrac{(n+1-4)!}{(n+1)!} = \dfrac{3}{4}$

$\Rightarrow \dfrac{n!}{(n-4)!} \times \dfrac{(n-3)!}{(n+1)!} = \dfrac{3}{4} \Rightarrow \dfrac{\cancel{n!}}{\cancel{(n-4)!}} \times \dfrac{(n-3)\cancel{(n-4)!}}{(n+1)\cancel{n!}} = \dfrac{3}{4}$

$\Rightarrow 4n - 12 = 3n + 3$

$\Rightarrow 4n - 3n = 3 + 12$

$\therefore n = 15$

~~∴ n = 15~~

*5. If ${}^{10}P_{n-1} : {}^{11}P_{n-2} = 30 : 11$, find n.

13

$$\Rightarrow \frac{{}^{10}P_{n-1}}{{}^{11}P_{n-2}} = \frac{30}{11} \quad \Rightarrow \frac{\dfrac{\lfloor 10}{\lfloor 10-(n-1)}}{\dfrac{\lfloor 11}{\lfloor 11-(n-2)}} = \frac{30}{11}$$

$$\Rightarrow \frac{\lfloor 10}{\lfloor 10-n+1} \times \frac{\lfloor 11-n+2}{\lfloor 11} = \frac{30}{11}$$

$$\Rightarrow \frac{\lfloor 10}{\lfloor 11-n} \times \frac{\lfloor 13-n}{\lfloor 11} = \frac{30}{11}$$

$$\Rightarrow \frac{\cancel{\lfloor 10}}{\cancel{\lfloor 11-n}} \times \frac{(13-n)(12-n)\cancel{\lfloor 11-n}}{11\times\cancel{\lfloor 10}} = \frac{30}{11}$$

$$\Rightarrow (13-n)\cdot(12-n) = \frac{30}{\cancel{11}} \times \cancel{11}$$

$$\Rightarrow (13-n)(12-n) = 6\times 5$$

$$\Rightarrow \begin{aligned} 13-n &= 6 \\ 12-n &= 5 \end{aligned}$$

$$\Rightarrow \begin{aligned} 13-6 &= n \\ 12-5 & \end{aligned}$$

$\therefore n = 7.$

7. If ${}^{m+n}P_2 = 90$ and ${}^{m-n}P_2 = 30$, find m and n.

a) ${}^{m+n}P_2 = 90$

$\Rightarrow \frac{\lfloor m+n}{\lfloor m+n-2} = 90 \Rightarrow \frac{(m+n)(m+n-1)\cancel{\lfloor m+n-2}}{\cancel{\lfloor m+n-2}} = 90$

14

$\Rightarrow (m+n)(m+n-1) = 90$

$\Rightarrow (m+n)(m+n-1) = 10 \times 9$

$\Rightarrow m+n = 10$

$m+n-1 = 9 \Rightarrow m+n = 9+1 \Rightarrow m+n = 10$ —— (1)

${}^{m-n}P_2 = 30$

$\Rightarrow \frac{\lfloor m-n}{\lfloor m-n-2} = 30 \Rightarrow \frac{(m-n)(m-n-1)\cancel{\lfloor m-n-2}}{\cancel{\lfloor m-n-2}} = 30$

$\Rightarrow (m-n)(m-n-1) = 30$

$\Rightarrow (m-n)(m-n-1) = 6 \times 5$

$\Rightarrow m-n = 6$

$m-n-1 = 5 \Rightarrow m-n = 5+1 \Rightarrow m-n = 6$ —— (11)

by Substracting eq (1) from (11), we get;

$m+n = 10$

$-m \mp n = -6$

$2n = 4$

$\Rightarrow n = \frac{4}{2} = 2$

putting the value of n in eq: 1

$m + n = 10$

$m + 2 = 10$

$m = 10 - 2$ $\therefore$ $m = 8$ & $n = 2$.

15

*6. ${}^{20}P_r = 6840$, find r.

$\Rightarrow \dfrac{\underline{|20}}{\underline{|20-r}} = 6840$

$\Rightarrow \underline{|20-r} = \dfrac{\underline{|20}}{6840} \Rightarrow \underline{|20-r} = \dfrac{\cancel{20 \times 19 \times 18} \times \underline{|17}}{\cancel{20 \times 19 \times 18}}$

$\Rightarrow \underline{|20-r} = \underline{|17}$

$\Rightarrow 20 - r = 17$

$\Rightarrow r = 20 - 17$

$\therefore r = 3$.

*8. ${}^{12}P_r = 11880$, find r.

$\Rightarrow \dfrac{\underline{|12}}{\underline{|12-r}} = 11880$

$\Rightarrow \underline{|12-r} = \dfrac{\underline{|12}}{11880}$

$$\Rightarrow \lfloor 12-r = \frac{\cancel{12 \times 11 \times 10 \times 9} \times \lfloor 8}{\cancel{12 \times 11 \times 10 \times 9}}$$

$$\Rightarrow \lfloor 12-r = \lfloor 8$$

$\Rightarrow 12 - r = 8$

$\Rightarrow r = 12 - 8$

$\therefore r = 4.$

*4. If ${}^{n}P_{3} = 60$, find n.

$${}^{n}P_{3} = 60$$

$$\Rightarrow \frac{\lfloor n}{\lfloor n-3} = 60 \qquad \Rightarrow \frac{n(n-1)(n-2)\cancel{\lfloor n-3}}{\cancel{\lfloor n-3}} = 60$$

$\Rightarrow n(n-1)(n-2) = 60$

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

$\Rightarrow n = 5$

$n - 1 = 4$

$n - 2 = 3$

$\Rightarrow n = 5$

$n = 4 + 1$

$n = 3 + 2$

$\therefore n = 5.$

Scanned with CamScanner

15. If ${}^nP_r = 336$ and ${}^nC_r = 56$, find r.

17

$${}^nC_r = \frac{1}{\lfloor r} \times {}^nP_r$$

$$\Rightarrow 56 = \frac{1}{\lfloor r} \times 336$$

$$\Rightarrow \lfloor r = \frac{\cancel{336}^{\,6}}{\cancel{56}}$$

$$\Rightarrow \lfloor r = 6$$

$$\Rightarrow \lfloor r = \lfloor 3$$

$$\therefore r = 3.$$

7. If ${}^{2n}P_3 = 100 \times {}^nP_2$, find the value of n?

$$\Rightarrow {}^{2n}P_3 = 100 \times {}^nP_2$$

$$\Rightarrow \frac{\lfloor 2n}{\lfloor 2n-3} = 100 \times \frac{\lfloor n}{\lfloor n-2}$$

$$\Rightarrow \frac{2n(2n-1)(2n-2)\cancel{\lfloor 2n-3}}{\cancel{\lfloor 2n-3}} = 100 \times \frac{n(n-1)\cancel{\lfloor n-2}}{\cancel{\lfloor n-2}}$$

Scanned with CamScanner

$\Rightarrow \quad 2n(2n-1)(2n-2) = 100\,n(n-1)$

$\Rightarrow \quad \cancel{(2n-1)(}$

$\Rightarrow \quad \dfrac{(2n-1)\cancelto{2}{(2n-2)}}{\cancel{(n-1)}} = \dfrac{\cancelto{50n}{100n}}{\cancel{2n}}$

$\Rightarrow \quad 2n-1 = \cancelto{25}{\dfrac{50}{2}}$

18

$\Rightarrow \quad 2n-1 = 25$

$\Rightarrow \quad 2n = 26.$

$\Rightarrow \quad n = \cancelto{13}{\dfrac{26}{2}}.$

$\therefore n = 13.$

Q1 SALOON Arrange the word in this manner so that vowels are always seperated.

$\frac{n!}{r!} = \frac{6!}{2!} = \frac{6 \times 5 \times 4 \times 3 \times \cancel{2}}{\cancel{2!}} = 360$

$\Rightarrow$ {SLN} — 3

{AOO} — 1

Total no. of words,

3+1=4

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

$\Rightarrow \frac{4 \times 3 \times \cancel{2!}}{\cancel{2!}} = 12$ ans.

*Q. In how many ways the word ~~LA~~ACCOUNTANT be arranged.

$\dfrac{\lfloor n}{\lfloor n}$ $\left[\begin{array}{l} n = \text{Total no. of words} \\ n = \text{no. words repeating} \end{array}\right]$

2.0

$\Rightarrow \dfrac{\lfloor 10}{\lfloor 2 \times \lfloor 2 \times \lfloor 2 \times \lfloor 2}$

$\Rightarrow \dfrac{\overset{5}{\cancel{10}} \times 9 \times 8 \times 7 \times \overset{3}{\cancel{6}} \times 5 \times \overset{2}{\cancel{4}} \times 3 \times \cancel{\lfloor 2}}{\cancel{\lfloor 2}\ \cancel{2} \times \cancel{2} \times \cancel{2}}$

$\Rightarrow 226800$

{CNTNT} - 6

(AOUA) - 1

Total no. of words

6+1=7

$\dfrac{\lfloor 7}{\lfloor 2 \times \lfloor 1 \times \lfloor 1} = \dfrac{7 \times 6 \times 5 \times 4 \times 3 \times \cancel{\lfloor 2}}{\cancel{\lfloor 2}} = 2520.$