



### Combinations Ex 17.3 Q6

There are  $x$  things

Two specific things are to occur together, so remaining things are  $(r - 2)$ .

Now, number of ways to arrange  $(r - 2)$  things out of  $(n - 2) = {}^{(n-2)}P_{(r-2)}$

Two things can be arranged in  $(r - 1)$  ways.

and these two can be placed in 2 ways.

Therefore,

$$\text{Required number of ways} = 2(r - 1) {}^{(n-2)}P_{(r-2)}$$

### Combinations Ex 17.3 Q7

The given word is P R O P O R T I O N.

Total letters = 10

Number of P = 2, Number of R = 2

Number of O = 3, Number of T = 1

Number of I = 1, Number of N = 1

(i) Case I: There are 6 different letters in which all the four are distinct to selected.

$$\begin{aligned} \text{Number of ways to select therefour} &= {}^6C_4 \\ &= 15 \end{aligned}$$

Case II: Two same and two distinct letters are selected there are three pairs which more than, letters.

$$\begin{aligned} \text{Number of ways to select therefour} \\ &= {}^3C_1 \times {}^5C_2 \\ &= 3 \times 10 \\ &= 30 \end{aligned}$$

Case III: Two alike of one kind and two alike of other kind.

There are 3 pairs of letters in the more than one letters. Any 2 of these 3 letters.

$$\begin{aligned} \text{Number of ways to select these letters} \\ &= {}^3C_2 \\ &= 3 \end{aligned}$$

Case IV: Three alike and one different.

Number of ways to select these letters

$$\begin{aligned} &= 1 \times {}^5C_1 \\ &= 5 \end{aligned}$$

Therefore,

Number of ways to select four letters

$$\begin{aligned} &= 15 + 30 + 3 + 5 \\ &= 53 \end{aligned}$$

Required number of ways to select = 53

(ii) For case I:

$$\begin{aligned}\text{Number of arrangements of four letters all distinct} &= {}^6C_4 \times 4! \\ &= 15 \times 24 \\ &= 360\end{aligned}$$

For case II:

Number of arrangements of four letters two same kind and two of different kind

$$\begin{aligned}&= {}^3C_1 \times {}^5C_2 \times \frac{4!}{2!1!1!} \\ &= 3 \times 10 \times 12 \\ &= 360\end{aligned}$$

For case III:

Number of arrangements of four letters two alike of one kind and two of other kind

$$\begin{aligned}&= {}^3C_2 \times \frac{4!}{2!2!} \\ &= 3 \times 6 \\ &= 18\end{aligned}$$

Case IV:

Number of arrangements of four letters 3 alike and 1 other kind

$$\begin{aligned}&= 1 \times {}^5C_1 \times \frac{4!}{3!1!} \\ &= 20\end{aligned}$$

Therefore,

Total number of arrangements of four letters selected =  $360 + 360 + 18 + 20$

Required number of arrangement = 758

### Combinations Ex 17.3 Q8

M O R A D A B A D

Number of M = 1, Number of O = 1

Number of R = 1, Number of A = 3

Number of D = 2, Number of B = 1

(i)  $\frac{\text{Four distinct letters}}{\text{There are 6 letters}}$

Number of arrangement of 4 letters

$$\begin{aligned}\text{selected from these 6} &= {}^6C_4 \times 4! \\ &= 15 \times 24 \\ &= 360\end{aligned}$$

(ii) Two alike and two different letters

There are 2 pairs with more than one

So, one pair from these and 2 from letters from rest 5 letters.

Number of ways to arrange therefour

$$\begin{aligned}&= {}^2C_1 \times {}^5C_2 \times \frac{4!}{2!} \\ &= 2 \times 10 \times 12 \\ &= 240\end{aligned}$$

(iii) Two alike and two alike of other kinds.

Number of ways to arrange therefour

$$\begin{aligned}&= {}^2C_2 \times {}^5C_2 \times \frac{4!}{2!2!} \\ &= 6\end{aligned}$$

(iv) There alike and one different number of ways to arrange therefour

$$\begin{aligned}&= 1 \times {}^5C_1 \\ &= 5 \times \frac{4!}{3!1!} \\ &= 20\end{aligned}$$

Therefore,

Required number of ways =  $240 + 360 + 6 + 20$

Required number ways = 626

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