Cambridge International AS & A Level

Mathematics 9709/52

Paper 5 Probability & Statistics 1 October/November 2024

Question No(2)

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(a) Find the number of different arrangements of the 9 letters in the word ALGEBRAIC.

(b) Find the number of different arrangements of the 9 letters in the word ALGEBRAIC in which there are no more than two letters between the two As.

Solution:

(a)

Given word

ALGEBRAIC

Total number of letters = 9

Repeated letter, A, two times

Permutations with repeated letters

$$\frac{n!}{k_1!\ k_2!}$$

$n!$ = factorial of total no of letters

k_1 = factorial of the counts of each repeated letter

So total arrangements $= \frac{9!}{2!}$

$$= \frac{3628800}{2} = 181440$$

Here $9!$ = Total no of letters

$2!$ = As letter A repeated 2 times

(b)

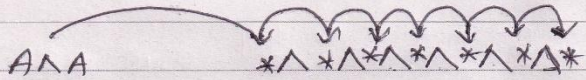
total letters 9

case 1 no letter between two A's

(Remaining 7 letters)

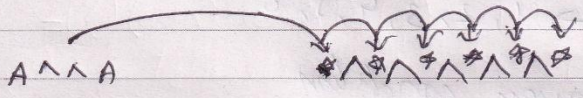
There are 8 possible positions of AA

$\Rightarrow 7! \times 8 = 40320$ (7! Seven character arrangement)



There are 7 possible positions

$7! \times 7 = 35280$ (7! Seven character arrangement)



There are 6 possible positions

$7! \times 6 = 30240$

Total arrangement

$= 40320 + 35280 + 30240$

$= 105840$