

Answer to Question #83990 – Math – Combinatorics | Number Theory

Given word assassination

a is 3 times, s is 3 times, i is 2 times, n is 2 times, t once and o once

CASE I : $(\alpha, \beta, \gamma, \delta, \theta)$ all the letters are different

There are 6 different letters so number of 5 letter words = ${}^6P_5 = \frac{6!}{(6-5)!} = \frac{6!}{1!} = 720$

CASE II : $(\alpha, \alpha, \gamma, \delta, \theta)$ one letter repeated and other 3 are different

Repeated letters α can be selected out of a, s, i or n in 4 ways and 3 different letters can be selected in 5C_3 ways

Hence in this case number of 5 letter words = $4 \times {}^5C_3 \times \frac{5!}{2!} = 4 \times 10 \times 60 = 2400$

CASE III : $(\alpha, \alpha, \beta, \beta, \gamma)$ two letters repeated and other 1 different

In this case number of 5 letter words = ${}^4C_2 \times {}^4C_1 \times \frac{5!}{2!2!} = 6 \times 4 \times \frac{5!}{4} = 720$

CASE IV : $(\alpha, \alpha, \alpha, \beta, \gamma)$ one letter repeated 3 times and other 2 different

In this case number of 5 letter words = ${}^2C_1 \times {}^5C_2 \times \frac{5!}{3!} = 2 \times 10 \times \frac{5!}{3!} = 400$

CASE V : $(\alpha, \alpha, \alpha, \beta, \beta)$ one letter repeated 3 times and one letter repeated 2 times

In this case number of 5 letter words = ${}^2C_1 \times {}^3C_1 \times \frac{5!}{3!2!} = 2 \times 3 \times \frac{5!}{3!2!} = 60$

Total number of different five letter words = CASE I + CASE II + CASE III + CASE IV + CASE V

$$= 720 + 2400 + 720 + 400 + 60$$

$$= 4300.$$

Answer: 4300.

Answer provided by <https://www.AssignmentExpert.com>