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Q.11)	How many numbers greater than 1000 but not greater than 4000 can be formed with the digits 1000 < no.s ≤ 4000 0,1,2,3,4 if (i) Repeated of digits allowed (ii) Repeated of digits not allowed	
Sol.11)	1000 < no.s ≤ 4000 ∴ it is 4 digits number Digits available = 0,1,2,3,4 1. When repeated of digits allowed (i) The first place (thousand's) can be filled in 3 ways (ii) The second place (hundred) can be filled in 5 ways (iii) The third place (ten's) can be filled in 5 ways (iv) The fourth place (unit's) can be filled in 5 ways ∴ the numbers formed = 3 x 5 x 5 x 5 = 375 But there 375 numbers contains a number 1000 but does not contain 4000 (v) The required 4 digit numbers are = 375 - 1 (for 1000) + 1 (for 4000) = 375 ans. 2. Repeated digits not allowed (1,2,3) [3 | 4 | 3 | 2] Required no.s are = 3 x 4 x 3 x 2 = 72 ans.	
Q.12)	How many natural numbers less than 1000 can be formed from the digits 0,1,2,3,4,5 when a digit may be repeated any no. of times?	
Sol.12)	digits available 0,1,2,3,4,5 Repeated of digit allowed Required 1 digit, 2 digits and 3 digits no.s (i) Number less than 1000 can be 1 digit , 2 digit and 3 digit (i) Total (one) digit numbers 5= 5 (ii) 2 digit numbers [5 | 6] = 5 x 6 = 30 (iv) 3 digit numbers [5 | 6 | 6] = 5 x 6 x 6 = 180 ∴ the required number which are less than 1000 = 5 + 30 + 180 = 215 ans.	
Q.13)	How many numbers divisible by 5 and lying between 4000 and 5000 can be formed from the digits 4,5,6,7 and 8?	
Sol.13)		25
Q.14)	How many numbers are there lying between 3000 to 5000 Which are divisible by 2 (i) when number of digits is repeated (ii) when repeated of digits allowed	
Sol.14)	(i) 576 (ii) 999 HINT: Two cases (i) (3) 0,2,4,6,8 [1 | 8 | 7 | 5] (ii)	

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	(4) 0,2,6,8 | 1 | 8 | 7 | 4 |	
Q.15)	Find the number of numbers greater than a (1000000) million, that can be formed with the digits 0 to 9.	
Sol.15)		360
Q.16)	How many 4 digits even numbers can be formed using digits 0 to 9 when repeated of digits allowed and when not allowed?	
Sol.16)	(i) 2296 = (9x8x7x1)+(8x8x7x4) (ii) 4500	
Q.17)	How many numbers between 400 and 1000 can be formed with the digits 0,2,3,4,5,6 if no digit is repeated?	
		60
Q.18)	Given 4 flags of different colours, how many different signals can be generated using at least 2 flags?	
Sol.18)	Given: 4 flags Required at least 2 flags i.e. 2,3 or 4 flag (i) Signals using 2 flags | 4 | 3 | = 12 (ii) No. of signals using 3 flags | 4 | 3 | 2 | = 4 x 3 x 2 = 24 (iii) No. of signals using 4 flags | 4 | 3 | 2 | 1 | = 4 x 3 x 2 x 1 = 24 ∴ total no of signals using at least 3 flags are = 12+24+24 = 60 ans.	
Q.19)	In how many ways can 3 prizes be distributed among y boys when (i) No boy gets more than one prize (ii) A boy may get any number of prizes (iii) No boy gets all the prizes	
Sol.19)	1. | 4 | 3 | 2 | (i) The first prize can be given away in 4 ways (ii) The second prize can be given in 3 ways (iii) The third prize can be given in 2 ways ∴ no of ways in which 3prizes can be 91cm such that no boy gets more than 1 prize are = 4 x 3 x 2 = 24 ans. 2. | 4 | 4 | 4 | (i) The first prize can be given in 4 ways (ii) The second prize can be given in 4 ways (iii) The third prize can be given in 4 ways ∴ required no. of ways = 4 x 4 x 4 = 64 3. | 4 | 4 | 4 | (i) Total no of ways of distributing 3 prizes among 4 boys = 4 x 4 x 4 = 64 (ii) No of ways in which a boy get all the 3 prizes is 4 (iii) ∴ required no of ways in which no boy get all the prizes = 64 – 4 = 60 ans.	
Q.20)	Word "ORDINATE" Total letters = 8 , vowels = O,I,A,E = 4	

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	Consonants = R,D,N,T = 4	
Sol.20)	1. Total no. of words using all letters = 8p8 = 8! ans.	
	2. No. of words using 5 letters:- 8p8 = $\frac{8!}{3!} = \frac{40320}{6}$ = 6720 ans.	
	3. The words start by with R and end with T: (i) Fix the letter 'R' in first position and 'T' in the last position (ii) The remaining 6 letters can be arranged in 6! Ways (iii) ∴ required no of words = 1 x 6! X 1 = 72c ans.	
	4. Using 5 letters, the words start by with D and end with E (i) Fix the position of letter 'D' in first position and 'E' in the last position (ii) The remaining 3 letters can be arranged in 6p3 = $\frac{6!}{3!}$ ways (iii) ∴ required no of words = 1 x $\frac{6!}{3!}$ x 1 = 120 ans.	
	5. The words starting and ending with vowel (i) There are 4 vowels available (ii) The first position /place can be filled in 4 ways (iii) The last place can be filled in 3 ways (iv) The remaining 6 letters can be arranged in 6 ways (v) ∴ the required no of words = 4 x 6! = 3 = 4 x 720 x 3 = 8640 ans.	
	6. Words in which letter 'D' is not included in any word: (i) Then 7 letters are remaining (ii) These 7 letters can be arranged in 7! Ways (iii) ∴ required no of words 7! = 5040 ans.	
	7. Words in which all vowels are together: (i) Consider all faces vowels as 1 letter I,O,A,E = 1 (ii) Now we have to arrange (4+1) = 5 letters (iii) There 5 letters can be arranged in 5! Ways (iv) Now four vowels can mutually arrange in 4! Ways (v) ∴ no of words in which all vowels occur together are = 5! X 4! = 120 x 24 = 2880 ans.	
	8. Words in which all vowels never together: Required no of words = (total no. of words) – (no of words in which all vowels together) = 8! – 5! X 4! = 40320 – 2880 = 37440 ans.	
	9. Words in which all vowels together and all consonants together: (i) Consider 4 vowels as 1 letter I,O,E,A = 1 (ii) 4 consonants as another letter R,D,N,T = 1 (iii) Now we have to arrange (1+1) = 2 letters (iv) These 2 letters can be arranged in 2! Ways (v) 4 vowels can mutually arrange in 4! Ways (vi) 4 consonants can mutually arrange in 4! Ways (vii) The required no of words = 2! X 4! X 4! = 2 x 24 x 24 = 1172 ans.	
	10. Words in which no two vowels are together: $\_\_c_1\_\_c_2\_\_c_3\_\_c_4\_\_$ (i) Fix the position of 4 consonants alternatively (ii) Now there are 5 places available for 4 vowels	

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(iii) Which they can arrange in ${}^5p_4$ ways
(iv) Now, 4 consonants can mutually arrange in 4! Ways
(v) ∴ required no of words in which no two vowels are together = ${}^5p_4$ x 4!
= 120 x 24
= 2880 ans.

11. Words such that the letter 'R' is always next to 'A':
(i) Consider AR as 1 letter (they can't mutually interchange)
(ii) Now, we have to arrange (6+1) = 7 letters
(iii) These 7 letters can be arranged in 7! Ways
(iv) AR can arrange only in 1 way
∴ required no. of words = 1 x 7! = 5040 ans.

12. Words in which consonants occupy odd places:

$$\frac{c_1}{1}\,\frac{v_1}{2}\,\frac{c_2}{3}\,\frac{v_2}{4}\,\frac{c_3}{5}\,\frac{v_3}{6}\,\frac{c_4}{7}\,\frac{v_4}{8}$$

(i) Let the 4 consonants are at odd places (1,3,5,7)
(ii) ∴ 4 vowels must be at even places (2,4,6,8)
(iii) 4 consonants can mutually arrange in 4! Ways
(iv) 4 vowels can mutually interchange in 4! Ways
(v) ∴ required no. of words = 4! X 4!
= 24 x 24
= 576 ans.

13. Words such that vowels and consonants are alternating:
There are two cases;
1. v c v c v c v c
(i) let the word start by with a vowel
(ii) 4 vowels can mutually arrange in 4! Ways
(iii) 4 consonants can mutually arrange in 4! ways
(iv) No. of words = 4! X 4!
= 24x24
= 576 ans.
2. c v c v c v c v
(i) let the word start by with a consonant
(ii) 4 consonants can mutually arrange in 4! Ways
(iii) 4 vowels can mutually arrange in 4! ways
(v) No. of words = 4! X 4!
= 24x24
= 576 ans.
∴ the required no. of words in which vowels and consonants are alternating = 576 + 576 = 1152 ans.

14. Words such that the letters A and R are not together:-
(i) Consider A and R as 1 letter
(ii) Now, we have to arrange (6+1) = 7 letters
(iii) Then 7 letters can be arranged in 7! Ways
(iv) Now, A and R can mutually arrange in 2! Ways
(v) No. of words in which A and R are together = 7! X 2! = 5040 x 2 = 10080
No. of vowels in which A and R are not together = (total no. of words) – (no of words in which A and R are together) = 8! – 10080 = 40320 – 10080 = 30240 ans.

15. Words such that there are always 2 letters between A and R

A A

A	A	A	R	R	R	R	R

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(i) Let A in the first place and R in the fourth place
(ii) The remaining 6 letters can be arranged in 6! Ways
(iii) Now, there are 5 such cases in which there are 2 letters between A and R
(iv) No. of words = 6! + 6! + 6! + 6! + 6! = (720) x 5 = 3600
(v) Similarly, same no. of words can be formed in which R comes first and A later
(vi) ∴ required no. of words = 3600 + 3600 = 7200 ans.

16. How many 5 letters words consisting of 3 vowels and 2 consonants :
(i) First we have to select 3 vowels out of 4 vowels and 2 consonants out of 4 consonants
(ii) These letters can be selected in = $4c_3$ x $4c_2$ ways
(iii) Now these selected 5 letters can be mutually arranged in 5! ways A and R
(iv) ∴ the required no. of words = $4c_3$ x $4c_2$ x 5! = 4 x 6 x 120 = 2880 ans.

17. Find the RANK of the word INVOLUTE
E, I, L, N, O, T, U, V
No. of words starting with E= 7! = 5040
I, E, _, _, _, _, _ = 6! = 720
I, L, _, _, _, _, _ = 6! = 720
I, N, E, _, _, _, _, _ = 5! = 120
I, N, L, _, _, _, _, _ = 5! = 120
I, N, O, _, _, _, _, _ = 5! = 120
I, N, T, _, _, _, _, _ = 5! = 120
I, N, U, _, _, _, _, _ = 5! = 120
I, N, V, E, _, _, _, _ = 4! = 24
I, N, V, L, _, _, _, _ = 4! = 24
I, N, V, O, E, _, _, _ = 3! = 6
I, N, V, O, L, E, _, _ = 2! = 2
I, N, V, O, L, U, E, T, _ = 1
I, N, V, O, L, U, E, T, E = 1
∴ Rank = 5040 + 720 + 720 + 120 + 120 + 120 + 120 + 120 + 24 + 24 + 6 + 2 + 2 + 1 + 1
= 7140 ans.

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