Solutions to Workbook-2 [Mathematics] | Permutation & Combination

Level - 0	**CBSE Pattern**

1. $^4P_2 \cdot {}^6P_3 = 1440$

2. Number of ways $^6C_5 \cdot {}^6C_2 + {}^6C_4 \cdot {}^6C_3 + {}^6C_3 \cdot {}^6C_4 + {}^6C_2 \cdot {}^6C_5 = 780$

3. Number of straight lines $= {}^{18}C_2 - {}^5C_2 + 1 = 144$

4. **Case-I :** A is chosen $\Rightarrow {}^6C_4 \quad \Rightarrow {}^6C_4 + {}^7C_6 = 22$

Case-II : A is not chosen $\Rightarrow {}^7C_0$

5. In forming even numbers, the position on the right can be filled either 0 or 2. When 0 is filled, the remaining positions can be filled in $3!$ ways and when 2 is filled, the position on the left can be filled in 2 ways (0 cannot be used) and the middle two positions in $2!$ ways (0 can be used). Therefore, the number of even numbers formed $= 3! + 2(2!) = 10$.

6. $28 \times 27 \times 10 \times 9 \times 8 = 468000$ **7.** $^5C_2 \cdot {}^6C_2 = 200$ **8.** $^{n-3}C_{r-3} \cdot (r-2)! \times 3!$

9. $\times T \times R \times N \times G \times L \times$

$^6C_3 \times 3! \times 5! = 14400$

10.

6			0 or 5
	8	7	2

$8 \times 7 \times 2 = 112$

11. $^3C_1 \cdot {}^6C_2 + {}^3C_2 \cdot {}^6C_1 + {}^3C_3 = 64$

12. $\dfrac{^nC_r}{^nC_{r+1}} = \dfrac{84}{36} \Rightarrow \dfrac{n-r+1}{r} = \dfrac{7}{3} \Rightarrow 3n = 10r - 3$ **...... (i)**

$\dfrac{^nC_{r+1}}{^nC_r} = \dfrac{126}{84} \Rightarrow \dfrac{n-r}{r+1} = \dfrac{3}{2} \Rightarrow 2n = 5r + 3$ **...... (ii)**

From (i) & (ii)

$r = 3,\ n = 9$

$^rC_2 = {}^3C_2 = 3$

13. 4 digits + 5 digits

3	4	3	2

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5	4	3	2	1

$3 \times 4 \times 3 \times 2 + 5 \times 4 \times 3 \times 2 \times 1$, $72 + 120 = 192$

14. $^{20}C_2 = 190$

15.

5	8	7	6	5

Total number $= 5 \times 8 \times 7 \times 6 \times 5 = 8400$

16. Number of choice $= {}^3C_2 = 3$ **17.** $^nC_2 - n = 44 \Rightarrow n = 11$

18.(A) ${}^{n}C_{12} = {}^{n}C_{8} \Rightarrow n = 12 + 8 \Rightarrow n = 20$

19.(B) Number of outcomes $= 2^6 = 64$

20.(C) Total number $= 4! = 24$

21.(B) Sum of digits $= 3! \cdot (3 + 4 + 5 + 6) = 6 \times 18 = 108$

22.(C) ${}^{4}C_{2} \cdot {}^{5}C_{3} \times 5! = 7200$

23.(A) **Case-I :** 0 is not included $(0 + 1 + 2 + 3 + 4 + 5 = 15)$

0, 1, 2, 4, 5
Total number $= 5! = 120$

Case-II : 0 is included
0, 1, 2, 4, 5
Total number $= 4 \times 4b = 96$
$120 + 96 = 216$

24.(B) Let n be the number of persons ${}^{n}C_{2} = 66 \Rightarrow n(n-1) = 12 \times 11 \Rightarrow n = 12$

25.(D) Total number of triangle $= {}^{12}C_{3} - {}^{7}C_{3} = 185$

26.(B) Number of parallelograms $= {}^{4}C_{2} \cdot {}^{3}C_{2} = 18$

27.(C) ${}^{16}C_{9}$

28.(D) Total number of telephone number $= 10^5 - 10 \times 9 \times 8 \times 7 \times 6 = 69760$

29.(C) First, we arrange 3 consonants in $3!$ ways and then at four places (two places between them and two places on two sides) 3 vowels can be placed in ${}^{4}P_{3} \times \frac{1}{2!}$ ways. Hence the required number $= 3! \times {}^{4}P_{3} \times \frac{1}{2!} = 72$.

30.(C) Total 9 digits number $= 9 \times 9!$

31.(B) $A, I, E \longrightarrow$ Vowels

$R, T, C, L \longrightarrow$ Constant

$\underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }\ \underline{\ }$
1 2 3 4 5 6 7

2, 4, 6 should be occupy by vowels = 3!
1, 3, 5, 7 should be occupy by Constant = 4!
Total ways $3! \times 4! = 144$

32.(C) Given set of numbers is {1, 2, ...11} in which 5 are even six are odd, which demands that in the given product it is not possible to arrange to subtract only even number from odd numbers. There must be at least one factor involving subtraction of an odd number form another odd number. So at least one of the factors is even. Hence product is always even.

33.(04) ${}^{n}P_{r} = 840 \Rightarrow {}^{n}C_{r} \cdot r! = 840 \Rightarrow 35 \cdot r! = 840$

$r! = 24 = 4!$
$r = 4$

34.(0) ${}^{15}C_{8} + {}^{15}C_{19} - \left({}^{15}C_{6} + {}^{15}C_{7}\right)$

${}^{16}C_{9} - {}^{16}C_{7} = 0$

35. n^r

36. $\times N \times T \times T \times R \times M \times D \times$

Number of ways $= {}^{7}C_{6} \times \frac{6!}{3! \times 2!} \times \frac{6!}{2!} = 151200$

37. Total number of ways $= {}^{5}C_{2} \cdot {}^{7}C_{1} + {}^{5}C_{3} = 80$

38. Let the number of teams be n

Then ${}^{n}C_{2} = 153 \Rightarrow n(n-1) = 18 \times 17$, $n = 18$

39. $\times + \times + \times + \times + \times + \times + \times$

${}^{7}C_{4} = 35$

40. Number of ways $= {}^3C_1 \cdot {}^6C_2 + {}^3C_2 \cdot {}^6C_1 + {}^3C_3 = 64$ **41.(F)** Number of straight lines $= {}^{12}C_2 - {}^5C_2 + 1$

42.(F) Number of ways $= 5^3$ **43.(F)** **44.(T)** 3^{12} **45.(T)** ${}^nC_1 + {}^nC_2 + ... + {}^nC_n = 2^n - 1$

46.(T) Total number of ways to distribute one Rs. 100 note and five other notes $= 3^6$. **47.(T)** $\frac{11!}{5!\,6!} \times 9! \times 9!$

48. The numbers between 999 and 10000 are of four-digit numbers.

The four-digit numbers formed by digits 0, 2, 3, 6, 7, 8 are ${}^6P_4 = 360$.

But here those numbers are also involved which begin from 0. So, we take those numbers as three-digit numbers.

Taking initial digit 0, the number of ways to fill remaining 3 places from five-digits 2, 3, 6, 7, 8 are ${}^5P_3 = 60$

So, the required numbers = 360 – 60 = 300.

49. ${}^5C_3 \times {}^{22}C_9$