# COMBINATIONS

1. How many different teams of 11 players can be chosen from 15 players?

2. If there are 12 persons in a party and if each two of them shake hands with each other, how many handshakes are possible?

3. How many chords can be drawn through 21 points on a circle?

4. From a class of 25 students, 4 are to be chosen for a competition. In how many ways can this be done?

5. In how many ways can 5 sportsmen be selected from a group of 10?

6. A bag contains 5 black and 6 red balls. Find the number of ways in which 2 black and 3 red balls can be selected.

7. Find the number of ways of selecting 9 balls from 6 red balls, 5 white balls and 4 blue balls if each selection consists of 3 balls of each colour.

8. How many different boat parties of 8 consisting of 5 boys and 3 girls can be made from 20 boys and 10 girls?

9. In how many ways can a student choose 5 courses out of 9 courses if 2 specific courses are compulsory for every student?

10. In how many ways can a cricket eleven be chosen out of a batch of 15 players, if
    (i) there is no restriction on the selection?
    (ii) a particular player is always chosen?
    (iii) a particular player is never chosen?

11. In how many ways can a committee of 5 members be selected from 6 men and 5 ladies, consisting of 3 men and 2 ladies?

12. For the post of 5 teachers, there are 23 applicants. 2 posts are reserved for SC candidates and there are 7 SC candidates among the applicants. In how many ways can the selection be made?

1. Evaluate:
   (i) ${}^{20}C_4$ (ii) ${}^{16}C_{13}$ (iii) ${}^{90}C_{88}$
   (iv) ${}^{71}C_{71}$ (v) ${}^{n+1}C_n$ (vi) $\sum_{r=1}^{6} {}^{6}C_r$
2. Verify that:
   (i) ${}^{15}C_8 + {}^{15}C_9 - {}^{15}C_6 - {}^{15}C_7 = 0$ (ii) ${}^{10}C_4 + {}^{10}C_3 = {}^{11}C_4$
3. (i) If ${}^{n}C_7 = {}^{n}C_5$, find $n$.
   (ii) If ${}^{n}C_{14} = {}^{n}C_{16}$, find ${}^{n}C_{28}$.
   (iii) If ${}^{n}C_{16} = {}^{n}C_{14}$, find ${}^{n}C_{27}$.
4. (i) If ${}^{20}C_r = {}^{20}C_{r+6}$, find $r$.
   (ii) If ${}^{18}C_r = {}^{18}C_{r+2}$, find ${}^{r}C_5$.
5. If ${}^{n}C_{r-1} = {}^{n}C_{3r}$, find $r$.
6. If ${}^{2n}C_3 : {}^{n}C_3 = 12:1$, find $n$.
7. If ${}^{15}C_r : {}^{15}C_{r-1} = 11:5$, find $r$.
8. If ${}^{n}P_r = 840$ and ${}^{n}C_r = 35$, find the value of $r$.
9. If ${}^{n}C_{r-1} = 36$, ${}^{n}C_r = 84$ and ${}^{n}C_{r+1} = 126$, find $n$ and $r$.
10. If ${}^{n+1}C_{r+1} : {}^{n}C_r = 11:6$ and ${}^{n}C_r : {}^{n-1}C_{r-1} = 6:3$, find $n$ and $r$.

ANSWERS:

1. (i) 4845 (ii) 560 (iii) 4005 (iv) 1 (v) $n+1$ (vi) 63
3. (i) $n = 12$ (ii) 435 (iii) 4060 **4.** (i) $r = 7$ (ii) 56
5. $r = \frac{1}{4}(n+1)$ **6.** $n = 5$ **7.** $r = 5$ **8.** $r = 4$ **9.** $n = 9, r = 3$
10. $n = 10, r = 5$ **11.** 1365 **12.** 66 **13.** 210 **14.** 12650