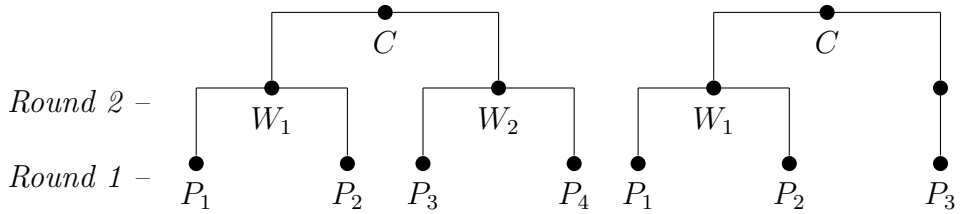
A knockout tournament is a competition format where each participant or team is eliminated from the tournament after losing a single match. In the first round, all participants are paired off, with the losers eliminated and winners advancing to the second round. Similarly, in the subsequent rounds, the remaining participants are paired off, with the losers eliminated and the winners advancing. This continues until only one participant remains, who is then declared the overall winner of the tournament. This format is commonly used in sports tournaments such as the FIFA World Cup and the Wimbledon tennis tournament.



In a four-player knockout tournament with players P_1, P_2, P_3 and P_4, there are initially two matches in Round 1 to determine the winners W_1 and W_2. These winners then face off in Round 2 to decide the champion C. Thus, in a four player tournament, three matches are played in two rounds to determine the champion.

If there are odd number of teams in any round, one participant gets a "bye" (a free pass) to the next round without playing a match. For example, in a three-player match, player P_3 gets a bye in Round 1 to proceed to Round 2 without having to play.

Count the number of matches –

1. In a FIFA World Cup featuring 32 teams, how many matches are played in how many rounds to determine the champion?
2. How many matches in how many rounds must be played in a Wimbledon tournament with 64 players to crown the champion?
3. If there are 5 players competing, how many matches must take place and in how many rounds to decide the victor? What if there were 9 players? Can you now compute the number of matches and rounds for 60 players?

Food for thought and Bonus questions –

- Do you notice a pattern after solving the above three questions? Can you now guess the formula for counting the number of matches to decide the champion for n players in a tournament?
- Notice that when the number of players is not a power of 2, there must be some players who got a "bye" to the next round. Can you count the number of byes when there are 60 players?
- You have been tasked with creating a chart that shows the number of byes for every possible number of players, ranging from 1 to 60. Can you think of a way to do this with minimal effort?