

The types of voting procedures under study are: *Majority vote*, *Plurality Vote*, the *Borda Count*, the *Condorcet Method*, the *Elimination Method*, the *Proportional Representation* method, and the *Approval Voting*.

Candidate	A	B	C	Total
# votes received	23	28	13	64

A) Majority Vote

In the above table no one wins because none of the candidates won majority votes (which is 50% +1 vote of the 64 total votes or 32 + 1 or **33**)

In a **majority voting rule**, the candidate must win at least 50% plus one vote.

B) Plurality Vote

In the above example, candidate B wins, with 28 votes, since he/she has the highest votes regardless of the fact he/she did not have the majority vote.

C) Borda Count

Table is ranked by the voters in the order of their preferences of the candidates.

Election results:

# of voters who ranked the candidates this way	45	32	28	23
1 st choice (3 points)	B	C	C	A
2 nd choice (2 points)	C	B	A	B
3 rd choice (1 point)	A	A	B	C

Procedures:

- For each candidate, each preference choice is associated with a weighting value or point. If there are n candidates, the first choice will be associated with a value of n, the second will associated with the value of n-1, and so on.
- **Apply the Borda count:**
 Candidate A: $45(1) + 32(1) + 28(2) + 23(3) = 202$ points (not votes)
 Candidate B: $45(3) + 32(2) + 28(1) + 23(2) = 273$ points
 Candidate C: $45(2) + 32(3) + 28(3) + 23(1) = 293$ points

Conclusion: Candidate **C wins with Borda count**

D) Condorcet Method

The table is ranked by the voters in the order of their preferences of the candidates

Procedure: confront (or compare) two candidates at a time

1) Compare A and C

23 voters prefer A over C

45+32+28 or 105 voters prefer C over A

→ C wins over A

2) Compare A and B

28+23 or 51 voters prefer A over B

45+32 or 77 voters prefer B over A

→ B wins over A

3) Compare B and C

45+23 or 63 voters prefer B over C

32+28 or 60 voters prefer C over B

B wins over C

Conclusion: B wins **using the Condorcet method**.

E) The Elimination Method

Procedure:

- 1) **Identify 1st choice votes only for each candidate.** If the candidate won a majority then the process stops. The candidate in question wins the overall vote, otherwise go to step 2) below.
- 2) Discard or **eliminate** the candidate with lowest 1st choice votes in the table
- 3) Re-arrange the rankings in the table by pushing the candidates below the empty cells upwardly.
- 4) Re-start the process from step 1) **until a candidate obtains a majority vote**

Example:

# of voters who ranked the candidates this way	45	32	28	23
1 st choice	B	C	A	A
2 nd choice	C	B	C	B
3 rd choice	A	A	B	C

Elimination procedure:

Candidate A's 1st Choice votes: 28 + 23 = 51 votes

Candidate B's 1st Choice votes: 45 votes

Candidate C's 1st Choice votes: 32 votes

Candidate A has the highest votes 51, but it's not a majority: 51 is not greater than half (or 50%) of the total number of votes (45+32+28+23) or 128 → half of 128 is **64**

Candidate C will be eliminated since it has the lowest votes (32)

# of votes who ranked the candidates this way	45	32	28	23
1 st choice	B		A	A
2 nd choice		B		B
3 rd choice	A	A	B	

Move the candidates up in the empty cells.

# of votes who ranked the candidates this way	45	32	28	23
1 st choice	B	B	A	A
2 nd choice	A	A	B	B
3 rd choice				

Re-start the Elimination procedure:

Candidate A's 1st Choice votes: 28 + 23 or 51 votes

Candidate B's 1st choice votes: 45+32 or 77 votes

Therefore, Candidate B wins since 77 is greater than 50% of 128

F) Proportional Representation Method

In this type of voting procedure a number of elected members representing political parties or groups will be taking a number of seats out of a total number of available seats in a collegial institution, such as parliament, board of directors, City counsellors, and so on.

Example: During an election of municipal counselors in a small town, 10 seats must be filled in by members of 4 political parties. **The result of the election is shown in the table below. Determine how many seats each political party won?**

Party elected by voters	PARTY A	PARTY B	PARTY C	PARTY D	Total
Number of votes	400	370	280	160	1210

Procedure:

Determine the number of seats won by each party:

	Number of Seats Calculation	Results	Number of seats automatically won (record the whole number before decimal point)	Decimal value
The number of seats won by PARTY A:	$\frac{400}{1210} \times 10 \text{ seats}$	3.305785124	3	.305785124
The number of seats won by PARTY B:	$\frac{370}{1210} \times 10 \text{ seats}$	3.05785124	3	.05785124
The number of seats won by PARTY C:	$\frac{280}{1210} \times 10 \text{ seats}$	2.314049587	2	.314049587
The number of seats won by PARTY D:	$\frac{160}{1210} \times 10 \text{ seats}$	1.32231405	1	.32231405

- 1) **Identify the number of seats automatically won by each party, which is the whole number resulting from the number of seats calculation :**

Party A won 3 seats, PARTY B 3, Party C 2 and PARTY 1, which make up a total of 9 seats (3 +3 +2 +1).

One more seat needs to be filled

- 2) **Identify the party that has the highest decimal value**

In the table above, PARTY D has the highest decimal value. An additional seat is given to PARTY D.

Conclusion: Official result showing the seats won by each party.

PARTY A	PARTY B	PARTY C	PARTY D	Total # of seats
3	3	2	2	10

G) Approval Voting

The voters are free to vote as many candidates as they like, in any order of their preferences.

Example:

The results of an election, where A, B, C and D are the candidates, are summarized below.

Number of voters who votes for a candidate or candidates	45	32	28	23
	A	B	A	D
	C	C	B	
		D	C	
			D	

The number of votes received by each candidate is as follows:

Candidate A: $45 + 28 = 73$ votes

Candidate B: $32 + 28 = 60$ votes

Candidate C: $45 + 32 + 28 = \mathbf{105}$ votes *

Candidate D: $32 + 28 + 23 = 83$ votes

Conclusion: Candidate C wins.

Important note:

A table with order of preferences is given. If you are to determine the **majority vote** or the **plurality vote** in this case, you need to evaluate or analyze the results of **1st choice votes** only.

Example: Election results:

# of voters who ranked the candidates this way	45	32	28	23	Total 128
1 st choice	B	C	C	A	
2 nd choice	C	B	A	B	
3 rd choice	A	A	B	C	

- No one wins a majority vote: C has $32 + 28$ or 60 votes, B 45, and A 23. To win, one has to have $64 + 1$ or 65 votes
- C wins a plurality vote with $32 + 28$ or 60 votes