Exploring the World of Math

Name: _____ Date: _____

Voting Math

1. Using the Borda Count Method. We vote for where we want to go on vacation after graduation. Our choices are London (A), New York (B), Mexico City (C) or Melbourne (D).

1	2	3	4	5	6	7	8	9	10
A	B	A	C	B	A	D	B	C	D
B	A	B	A	A	B	B	A	A	B
C	C	C	D	C	C	A	C	D	A
D	D	D	C	D	D	C	D	C	C
11	12	13	14	15	16	17	18	19	20
D	A	B	B	D	D	B	C	D	B
B	B	A	A	B	B	A	A	B	A
A	C	C	C	A	A	C	D	A	C
C	D	D	D	C	C	D	C	C	D
21	22	23	24	25	26	27	28	29	30
C	B	D	A	A	C	D	D	D	C
A	A	B	B	B	A	B	B	C	A
D	C	A	C	C	D	A	A	B	D
C	D	C	D	D	C	C	C	A	C

2. Organize the different ballots and do a points tally

1st (4)									
2nd (3)									
3rd (2)									
4th (1)									

3. Total each choice:

   A =

   B =

   C =

   D =

4. Determine the Banzhaf Power Index for the four players. Player one gets 4 votes, player two gets 3 votes, player three gets 2 votes, and player four gets 1 vote. Determine all the possible sets. Add their weighted number to get the total weight. Identify winning sets of 6 and above. Then underline all critical players that will allow the total weight to fall below 6 if that player was removed from the team.

2 person coalition	Wt	3 person coalition	Wt	4 person coalition	Wt

5. How many times are all players critical?

6. How many times is P_1 critical? Divide P_1 by the total critical to get its Banzhaf power index.

7. How many times is P_2 critical? Divide P_2 by the total critical to get its Banzhaf power index.

8. How many times is P_3 critical? Divide P_3 by the total critical to get its Banzhaf power index.

9. How many times is P_4 critical? Divide P_4 by the total critical to get its Banzhaf power index.

10. Determine the Banzhaf Power Index for the five players. Player one gets 5 votes, player two gets 4 votes, player three gets 3 votes, player four gets 2 votes, and player five gets 1 vote. Determine all the possible sets. Add their weighted number to get the total weight. Identify winning sets of 8 and above. Then underline all critical players that will allow the total weight to fall below 8 if that player was removed from the team.

2 person coalition	Wt	3 person coalition	Wt	4 person coalition	Wt	5 person coalition	Wt

11. How many times are all players critical?

12. How many times is P_n critical? Divide P_n by the total critical to get its Banzhaf power index.