First scenario

There are 10 combinations (order doesn’t matter) of 2 programs  (“LL”, “LC”,”LP”,”LN”, “CC”, “CP”, “CN”, “PP”, “PN”, “NN”)

Permutations for the 4 burdens in this scenario would be as follows:

Let's list the permutations for each combination:

1. **LL**: 1 permutation
   * L\_L
2. **LC**: 2 permutations
   * L\_C
   * C\_L
3. **LP**: 2 permutations
   * L\_P
   * P\_L
4. **LN**: 2 permutations
   * L\_N
   * N\_L
5. **CC**: 1 permutation
   * C\_C
6. **CP**: 2 permutations
   * C\_P
   * P\_C
7. **CN**: 2 permutations
   * C\_N
   * N\_C
8. **PP**: 1 permutation
   * P\_P
9. **PN**: 2 permutations
   * P\_N
   * N\_P
10. **NN**: 1 permutation
    * N\_N

In summary:

For each combination where the two burdens are different (6 combinations), there are 2 permutations.

For each combination where the two burdens are the same (4 combinations), there is 1 permutation.

So, the total number of permutations is: 6×2+4×1=12+4=16

Second Scenario

Let's list the permutations for each combination:

1. **All three elements the same (4 combinations)**:
   * LLL: 1 permutation ("L\_L\_L")
   * CCC: 1 permutation ("C\_C\_C")
   * PPP: 1 permutation ("P\_P\_P")
   * NNN: 1 permutation ("N\_N\_N")
2. **Two elements the same, one different (12 combinations)**:
   * LLC: 3 permutations ("L\_L\_C", "L\_C\_L", "C\_L\_L")
   * LLP: 3 permutations ("L\_L\_P", "L\_P\_L", "P\_L\_L")
   * LLN: 3 permutations ("L\_L\_N", "L\_N\_L", "N\_L\_L")
   * LCC: 3 permutations ("L\_C\_C", "C\_L\_C", "C\_C\_L")
   * LPP: 3 permutations ("L\_P\_P", "P\_L\_P", "P\_P\_L")
   * LNN: 3 permutations ("L\_N\_N", "N\_L\_N", "N\_N\_L")
   * CCP: 3 permutations ("C\_C\_P", "C\_P\_C", "P\_C\_C")
   * CCN: 3 permutations ("C\_C\_N", "C\_N\_C", "N\_C\_C")
   * CPP: 3 permutations ("C\_P\_P", "P\_C\_P", "P\_P\_C")
   * CNN: 3 permutations ("C\_N\_N", "N\_C\_N", "N\_N\_C")
   * PPN: 3 permutations ("P\_P\_N", "P\_N\_P", "N\_P\_P")
   * NNP: 3 permutations ("N\_N\_P", "N\_P\_N", "P\_N\_N")
3. **All three elements different (4 combinations)**:
   * LCP: 6 permutations ("L\_C\_P", "L\_P\_C", "P\_L\_C", "P\_C\_L", "C\_L\_P", "C\_P\_L")
   * LCN: 6 permutations ("L\_C\_N", "L\_N\_C", "C\_L\_N", "C\_N\_L", "N\_L\_C", "N\_C\_L")
   * LPN: 6 permutations ("L\_P\_N", "L\_N\_P", "P\_L\_N", "P\_N\_L", "N\_L\_P", "N\_P\_L")
   * CPN: 6 permutations ("C\_P\_N", "C\_N\_P", "P\_C\_N", "P\_N\_C", "N\_C\_P", "N\_P\_C")

In summary:

* For each combination where all three elements are the same (4 combinations), there is 1 permutation each.
* For each combination where two elements are the same and one is different (12 combinations), there are 3 permutations each.
* For each combination where all three elements are different (4 combinations), there are 6 permutations each.

Thus, the total number of permutations is: 4×1+12×3+4×6=4+36+24=64

Third Scenario

Let's list the permutations for each combination:

1. All four elements the same (4 combinations)

1. LLLL: 1 permutation

2. CCCC: 1 permutation

3. PPPP: 1 permutation

4. NNNN: 1 permutation

2. Three elements the same, one different (12 combinations)

5. LLLC: 4 permutations

- LLLC

- LLCL

- LCLL

- CLLL

6. LLLP: 4 permutations

- LLLP

- LLPL

- LPLL

- PLLL

7. LLLN: 4 permutations

- LLLN

- LLNL

- LNLL

- NLLL

8. CCCL: 4 permutations

- CCCL

- CCLC

- CLCC

- LCCC

9. CCCP: 4 permutations

- CCCP

- CCPC

- CPCC

- PCCC

10. CCCN: 4 permutations

- CCCN

- CCNC

- CNCC

- NCCC

11. PPPL: 4 permutations

- PPPL

- PPLP

- PLPP

- LPPP

12. PPPC: 4 permutations

- PPPC

- PPCP

- PCPP

- CPPP

13. PPPN: 4 permutations

- PPPN

- PPNP

- PNPP

- NPPP

14. NNNL: 4 permutations

- NNNL

- NNLN

- NLNN

- LNNN

15. NNNC: 4 permutations

- NNNC

- NNCN

- NCNN

- CNNN

16. NNNP: 4 permutations

- NNNP

- NNPN

- NPNN

- PNNN

3. Two pairs of different elements (6 combinations)

17. LLCC: 6 permutations

- LLCC

- LCLC

- LCCL

- CLLC

- CLCL

- CCLL

18. LLPP: 6 permutations

- LLPP

- LPLP

- LPPL

- PLLP

- PLPL

- P\_P\_L\_L

19. LLNN: 6 permutations

- LLNN

- LNLN

- LNNL

- NLLN

- NLNL

- NNLL

20. CCPP: 6 permutations

- CCPP

- CPCP

- CPPC

- PCCP

- PCPC

- PPCC

21. CCNN: 6 permutations

- CCNN

- CNCN

- CNNC

- NCCN

- NCNC

- NNCC

22. PPNN: 6 permutations

- PPNN

- PNPN

- PNNP

- NPPN

- NPNP

- NNPP

4. Two elements the same, two different (12 combinations)

23. LLCP: 12 permutations

- LLCP

- LLPC

- LCLP

- LCPL

- LPLC

- LPCL

- CLLP

- CLPL

- CPLL

- PLLC

- PLCL

- PCLL

24. LLCN: 12 permutations

- LLCN

- LLNC

- LCLN

- LCNL

- LNLC

- LNCL

- CLLN

- CLNL

- CNLL

- NLLC

- NLCL

- NCLL

25. LLPN: 12 permutations

- LLPN

- LLNP

- LPLN

- LPNL

- LNLP

- LNPL

- PLLN

- PLNL

- PNLL

- NLLP

- NLPL

- NPLL

26. CCLP: 12 permutations

- CCLP

- CCPL

- CLCP

- CLPC

- CPCL

- CPLC

- LCCP

- LCPC

- LPCC

- PCCL

- PCLC

- PLCC

27. CCLN: 12 permutations

- CCLN

- CCNL

- CLCN

- CLNC

- CNCL

- CNLC

- LCCN

- LCNC

- LNCC

- NCCL

- NCLC

- NLCC

28. CCPN: 12 permutations

- CCPN

- CCNP

- CPCN

- CPNC

- CNCP

- CNPC

- PCCN

- PCNC

- PNCC

- NCCP

- NCPC

- NPCC

29. PPLN: 12 permutations

- PPLN

- PPNL

- PLPN

- PLNP

- PNPL

- PNLP

- LPPN

- LPNP

- LNPP

- NPPL

- NPLP

- NLPP

30. PPLC: 12 permutations

- PPLC

- PPCL

- PLPC

- PLCP

- PCPL

- PCLP

- LPPC

- LPCP

- LCPP

- CPPL

- CPLP

- CLPP

31. NNLP: 12 permutations

- NNLP

- NNPL

- NLNP

- NLPN

- NPNL

- NPLN

- LNNP

- LNPN

- LPNN

- PNNL

- PNLN

- PLNN

32. NNLC: 12 permutations

- NNLC

- NNCL

- NLNC

- NLCN

- NCNL

- NCLN

- LNNC

- LNCN

- LCNN

- CNNL

- CNLN

- CLNN

33. NNCP: 12 permutations

- NNCP

- NNPC

- NCNP

- NCPN

- NPNC

- NPCN

- CNNP

Thus, the total number of permutations is:

4×1+12×4+6×6+12×12+1×24=4+48+36+144+24=256