

1. (a) $\underline{L} \underline{L} \underline{n} \underline{n} \underline{n} \underline{n} \underline{n}$ $L \rightarrow 26$ $n \rightarrow 10$
 $26 \times 26 \times 10 \times 10 \times 10 \times 10 \times 10 = 67600000$

(b) $26 \times 25 \times 10 \times 9 \times 8 \times 7 \times 6 = 19656000$

3. $20!$ \therefore first worker can choose 20 jobs and second worker can choose 19 jobs \dots

4. if each of the boys can play all 4 instruments $\rightarrow 4!$

if John and Jim can play 4 instruments but Jay and Jack can each play only piano and drums? $\rightarrow 2! \times 2!$ \therefore Jay and Jack choose instrument to play $\rightarrow 2!$
 $= 4$ John and Jim choose instrument to play $\rightarrow 2!$

5. $8 \times 2 \times 9 = 144$

Area code that starting with 4 $\rightarrow 1 \times 2 \times 9 = 18$.

7. a) $6! = 720$

b) $\underline{G} \underline{B} \underline{G} \underline{B} \underline{G} \underline{B}$
 $\underline{B} \underline{G} \underline{B} \underline{G} \underline{B} \underline{G} \therefore 2 \times 3! \times 3! = 72$

c) $\underline{B} \underline{B} \underline{B} \underline{\quad} \underline{\quad} \underline{\quad}$
 $\underline{\quad} \underline{B} \underline{B} \underline{B} \underline{\quad} \underline{\quad}$
 $\underline{\quad} \underline{\quad} \underline{B} \underline{B} \underline{B} \underline{\quad}$
 $\underline{\quad} \underline{\quad} \underline{\quad} \underline{B} \underline{B} \underline{B} \therefore 4 \times 3! = 144$

d) $\underline{G} \underline{B} \underline{G} \underline{B} \underline{G} \underline{B}$
 $\underline{B} \underline{G} \underline{B} \underline{G} \underline{B} \underline{G} \therefore 2 \times 3! \times 3! = 72$

9. $12! / 6! \times 4! = 27720$

11. a) $6!$

b) $\underline{n} \underline{n} \underline{n} \underline{m} \underline{m} \underline{c} \quad \underline{c} \underline{n} \underline{n} \underline{n} \underline{m} \underline{m} \quad \underline{m} \underline{n} \underline{c} \underline{n} \underline{n} \underline{n}$
 $\underline{n} \underline{n} \underline{n} \underline{c} \underline{m} \underline{m} \quad \underline{m} \underline{m} \underline{n} \underline{n} \underline{n} \underline{c} \quad \underline{c} \underline{m} \underline{m} \underline{n} \underline{n} \underline{n} \therefore 6 \times 2 \times 3! = 72$

c) $\underline{n} \underline{n} \underline{n} \underline{\quad} \underline{\quad} \underline{\quad} \rightarrow 3! \times 3!$
 $\underline{\quad} \underline{n} \underline{n} \underline{n} \underline{\quad} \underline{\quad} \rightarrow 3! \times 3!$
 $\underline{\quad} \underline{\quad} \underline{n} \underline{n} \underline{n} \underline{\quad} \rightarrow 3! \times 3!$
 $\underline{\quad} \underline{\quad} \underline{\quad} \underline{n} \underline{n} \underline{n} \rightarrow 3! \times 3!$
 $\therefore 4 \times 3! \times 3! = 144$

17. men $\rightarrow 12C_5$ women $\rightarrow 10C_5$

$12C_5 \times 10C_5 \times 5! = 23950080$.

18. a)

If the Subject is Math $\rightarrow {}^6C_2$

// Science $\rightarrow {}^7C_2$

// Economics $\rightarrow {}^4C_2$

$$\therefore {}^6C_2 + {}^7C_2 + {}^4C_2 = 42$$

b)

If Math and Science $\rightarrow {}^6C_1 \times {}^7C_1 = 42$

If Math and Economics $\rightarrow {}^6C_1 \times {}^4C_1 = 24$

If Science and Economics $\rightarrow {}^7C_1 \times {}^4C_1 = 28$

$$\therefore 42 + 24 + 28 = 94$$

19. $10 \times 8 \times 8 \times 7 \times 6 \times 5 \times 4 = 604800$

20. ${}^5C_2 \times {}^6C_2 \times {}^4C_3 = 600.$

21. a) Selecting 3 men $\rightarrow {}^6C_3 = 20$

If A and B selected $\rightarrow 4$

$$20 - 4 = 16$$

Selecting 3 women $\rightarrow {}^8C_3 = 56$

$$\therefore 16 \times 56 = 896$$

b) Similarly, $({}^8C_3 - {}^6C_1) \times {}^6C_3 = 1000$

c) ${}^8C_3 \times {}^6C_3 = 1120$

$${}^5C_2 \times {}^7C_2 = 210$$

$$1120 - 210 = 910$$

22. a) ${}^8C_5 = 56$

If A and B selected $\rightarrow {}^6C_3 = 20$

$$56 - 20 = 36.$$

b) ${}^6C_3 = 20$

Neither A nor B $\rightarrow {}^6C_5 = 6$

$$20 + 6 = 26.$$

30. ${}^{12}C_3 \times {}^9C_4 \times {}^5C_5 = 27720.$

31. $4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^8$

If each School must receive 2 teachers $\rightarrow {}^8C_2 \times {}^6C_2 \times {}^4C_2 \times {}^2C_2 = 2520.$