

Counting Problems

1. There are 14 boys and 12 girls in the class. Work out the total number of ways that I can choose:
 - a. 1 boy and 1 girl
 - b. 2 girls
 - c. 2 girls and 1 boy
2. How many ways can 8 books be arranged on a shelf?
3. In a race there are 6 runners.
 - a. How many ways are there for them to finish?
 - b. How many ways are there to get Gold, Silver and Bronze?
4. I play an album on 'shuffle' (no repeats). There are 10 tracks on the album. How many ways could it play them?
5. A restaurant has 4 starters, 7 main courses, and 5 desserts.
 - a. I order one of each. How many combinations are there?
 - b. Dan & Kate order one main meal each. How many ways can they do this?
 - c. Chris & Abbie want to order 2 different desserts. How many combinations are there?
 - d. A group want to share 2 starters. How many ways can they do this?
6. At a dog show, 20 dogs enter.
 - a. If there are 1st and 2nd prize, how combinations of dogs COULD be awarded a prize?
 - b. If there are 2 'Best in Show' certificates, how does this change your answer to (a)?
7. A School Committee needs two new members. There are 12 applicants. How many ways can they be chosen?
8. A company needs to appoint a Director and Deputy Director from 7 applicants. How many combinations of the 7 people are possible?
9. How many different 4 letter 'words' can be formed by using the letters A B C & D exactly once?
10. How many different 5 letter 'words' can be formed by using the letters AABCD exactly once?
11. How many 3 digit numbers can be formed by the following cards:
 - a. 4 8 5
 - b. 3 3 7
12. In a choir there are 32 kids auditioning for the next concert:
 - a. How many ways could the 2 soloists be cast?
 - b. How many ways could a duet be cast?

Answers:

1. a) $14 \times 12 = 168$ b) $(12 \times 11)/2 = 66$ c) $(14 \times 12 \times 11)/2 = 924$
2. $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 40320$
3. a) $6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$ b) $6 \times 5 \times 4 = 120$
4. $10 \times 9 \times 8 \times \dots \times 3 \times 2 \times 1 = 3,628,800$
5. a) $4 \times 5 \times 7 = 140$ b) $7 \times 7 = 49$ c) $5 \times 4 = 20$ d) $(4 \times 3)/2 = 6$
6. a) $20 \times 19 = 380$ b) $(20 \times 19)/2 = 190$
7. $(12 \times 11)/2 = 66$
8. $7 \times 6 = 42$
9. $4 \times 3 \times 2 \times 1 = 24$
10. $(5 \times 4 \times 3 \times 2 \times 1)/2 = 60$
11. a) $3 \times 2 \times 1 = 6$ b) $(3 \times 2 \times 1)/2 = 3$
12. a) $32 \times 31 = 992$ b) $(32 \times 31)/2 = 496$