

## Permutations & Combinations Worksheet

- On my desk, I have 5 different Economics books and 7 different Mathematics books.
  - In how many ways can I select 3 Economics Books? 10
  - In how many ways can I select 4 Mathematics Books? 35
  - In how many ways can I select 6 different books ? 924
  - In how many ways can I select 6 books if I choose an equal number of Economics and Mathematics Books. 350
  - In how many ways can I choose 4 books, if I choose more Mathematics books than Economic books? 210
- My first A Level Class contained 5 girls and 8 boys. I needed to select four of them for a competition. In how many ways could I have done this if
  - I wanted all boys; 70
  - I wanted exactly two girls; 280
  - I wanted at least two girls? 365
- A council contains 10 Labour members, 4 Conservative member and 6 Liberal Democrat members. In how many ways can I select a committee of 6 of them if
  - only Labour members can be picked; 210
  - no Conservatives can be picked; 8008
  - there must be equal numbers of members of each party; 4050
  - there must be at least three Liberal Democrats. 8730
- A Reality Show needs to pick a group of 6 from a group of 5 no-hopers, 6 has-beens and 4 never-weres. In how many ways can this be done if
  - exactly 4 must be no-hopers; 225
  - none of them can be no-hopers; 210
  - there are at least 4 has-beens; 595
  - the number of has-beens is equal to the number of never-weres. 1100
- A group of 14 babies contains 6 boys and 8 girls, including Evie and Ben. In how many ways can I select 6 of the babies if I want to choose
  - more girls than boys; 1414
  - a group that contain neither Evie nor Ben; 924
  - exactly one of Evie or Ben; 1584
  - equal numbers of boys and girls, but only one of Evie and Ben. 560
- Seven clubbers want to travel to a club in two taxis. Each taxi can hold at most 5 people. In how many ways can the group be split up? 56
- Two punts can each hold 6 people. A party of 10 wishes to use these punts. In how many different ways can the party be divided? 462
- Seven books on a shelf. How many ways can they be arranged if there are
  - No constraints 5040

- (b) The three Pingu books all need to be next to each other 720
- (c) The three Pingu books alternate with the other four. 144
9. How many anagrams are there of the words
- (a) JULIEN 720
- (b) RAPHAEL 2520
- (c) ZEZOODOODAH 831600
- (d) TARARABOONDIA 64864800
10. If a class has 6 boys and 6 girls, in how many ways can I choose 5 if
- (a) They can be anyone 792
- (b) There must be 4 girls 90
- (c) There must be more girls than boys 396
- (d) Noelene is not allowed 462
11. 12 Zombies, 8 of whom are male, including Mr and Mrs Wrotte. How many ways can I choose 6 if
- (a) Equal number of male and female zombies 224
- (b) I must have Mr or Mrs Wrotte but not both 504
- (c) I must have both Mr and Mrs Wrotte and equal number of men and women. 63
12. The four members of the Gnome family are having their picture taken with the three members of the Pixie family. In how many ways can they have their picture taken if
- (a) The Gnome family and Pixie family stand together 288
- (b) Only the Gnome family stand together 288
- (c) The Gnomes and the Pixies alternate 144
- (d) Mr and Mrs Gnome stand at either end. 240
13. A STEP paper consists of 8 Pure questions, 4 Statistic questions and 5 Mechanics Questions. In how many ways can a candidate choose 5 questions, if he does at least one of each type? 4040
14. Three dice are rolled. What is the probability that the sum two of the dice is equal to the other one?  $\frac{5}{24}$