

# [permutations + combinations]

1. Evaluate the following:
  - a.  $\binom{7}{2}5!$
  - b.  $\frac{52!}{49!2}$
  - c.  ${}_8C_2$
  - d.  $3! - 2 \times 4! + P(7,0) - P(3,3) + 0!$
  - e.  $\binom{7}{7} + P(4,4) - C(5,0) + \binom{6}{4}$
2. Prove  $P(n, 2) + P(n + 1, 2) = 2n^2$
3. Solve for  $n$  in  $P(n + 1, 3) = 12P(n - 1, 2)$
4. Simplify  $\frac{(n-2)!}{(n-r+1)!}$
5. How many 3 letter words can be formed from the letters of the word SHORTEN if
  - a. No repetitions
  - b. With repetitions
  - c. S has to be at the start of the word
  - d. The letters TEN must stay together, although not necessarily in that order, and you use **all** the given letters.
6. A cleaning staff of 4 is needed form a total of 10 workers on their payroll. How many different ways can a work crew be picked?
7. How many odd 4 digit numbers, all of the digits different, can be formed with the digits from 0 to 7? If the number 4 has to be in the number?
8. A package of 20 transistors contain 15 perfect and 5 defective. In how many ways can:
  - a. 1 battery is selected
  - b. 2 defective batteries
  - c. 1 defective and 2 perfect
  - d. 5 selected so at least 3 are perfect
9. In how many ways can 8 people be seated around a round table in a board room?
10. There are 5 speakers, A, B, C, D, and E. How many different orders of speaking are possible if
  - a. No special conditions
  - b. B must speak first
  - c. C & D must speak one after the other
  - d. A & E cannot follow one another
11. Data obtained from a survey says that most families eat on a daily basis: 114 meat, 100 bread, 70 fruit, 48 meat and bread, 41 meat and fruit, 27 bread and fruit, 17 meat and bread and fruit.
  - a. Use a Venn diagram to illustrate this survey
  - b. How many families were used in the survey?
12. In Lotto649, there are 49 numbers and you choose 6. What are your chances of winning?  
(Note: these numbers may be chosen in any order)

13. In the old Wintario, you had to pick 5 numbers out of 50 numbers, in the correct order. What are your chances of winning?
14. James has 6 close friends. In how many ways can he invite a friend over for dinner?
15. Using the letters in EXCITEMENT, how many 10 lettered words can be formed?
16. A hockey team of 15 players is about to choose a captain and co-captain of the team. How many different choices are possible?
17. A coordinated wardrobe has 4 sweaters, 2 pairs of pants, and 3 shirts that all go together. How many different outfits can be formed?
18. I have 3 pennies, 2 dimes, and 4 quarters. How many different sums of money can I make?

