

1. Draw a tree diagram to illustrate the possible travel itineraries for Paul if he can travel from home to Ottawa by bus, car, or train, and then from Ottawa to Orlando, Florida by bus, train or plane
2. A physical education teacher has five pairs of running shoes, eight pairs of sweat pants and twelve t-shirts. How many different outfits can she wear?
3. In how many ways can you choose a president and vice-president from a group of 11 people?
4. How many distinct words can you make using all the letters of the word PARALLELEPIPED
5. Julie is having a party and wants to seat guests at her dining room table along one side. In how many ways can Julie seat herself and her six guests?
6. Jerrie works in a store and she spends some of her time organizing the stationary section. If there are nine different items on the rack, in how many ways can she organize the rack so that the two most expensive items are NOT together?
7. An executive of three (president, vice-president, treasurer) is to be formed from a group of five math teachers and four English teachers. In how many ways can the executive be formed if:
 - a) there are no restrictions
 - b) there must be exactly one math teacher
 - c) there must be at least one math teacher
 - d) there must be only math teachers?
8. In how many ways can five adults and five teenagers in a choir stand in line if adults and teenagers must alternate positions?
9. Find the number of ways of arranging all the letters of the word TENNESSEE
 - a) if there are no restrictions
 - b) if the first two letters must be EE
 - c) if the first two letters must not be EE
10. How many different 7-digit telephone numbers contain three 5s, two 2s, and two 1s?
11. Assuming that everyone in a particular school has three initials, determine the smallest number of students in a school for which there must be at least two with the same initials.
12. There are seven members in the track team. If all of them run a race, how many different top three finishes could there be?
13. A quarterback has six of their favorite plays to choose from. If the coach asks the quarterback not to repeat any plays in a game, how many different orders of plays are possible for the next six downs?
14. Laura's soccer team played a good season finishing with twelve wins, four losses and two ties. In how many orders could this have happened?
15. How many 5-digit numbers contain at least one 8?

Answers: 1. 9 ways 2. 480 3. 110 4. 201,801,600 5. 5,040 6. 282,240 7. a) 504 b) 180 c) 840 d) 60
8. 28,800 9. a) 3,780 b) 630 c) 3,150 10. 210 11. 17 577 12. 210 13. 720 14. 278 450 15. 37,512