

TE

- 4.4.8 C.1 Apply the multiplication principle of counting: permutations: ordered situations with replacement (e.g., number of possible license plates) vs. ordered situations without replacement (e.g., number of possible slates of 3 class officers from a 23 student class).
- 4.4.8 C.3 Apply techniques of systematic listing, counting, and reasoning in a variety of different contexts.

Permutations are arrangements in which order is important. For example, choosing Kate for class president and Kelli for vice-president is not the same as choosing Kelli for class president and Kate for vice-president. In other words, the arrangement AB is different from the arrangement BA.

You can use an organized list, a tree diagram, or the Fundamental Counting Principle to find the number of possible arrangements of a set of elements.

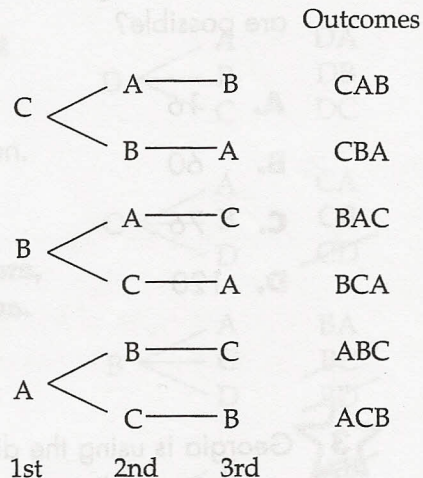
Andrea, Ben, and Chris are to be seated on a bench that seats three. In how many different ways can the three children be arranged on the bench?

Use a tree diagram or use the Fundamental Counting Principle.

Step 1 Draw a tree diagram to create an organized list of outcomes.

Let A = Andrea, B = Ben,
and C = Chris.

Six different arrangements are possible.



Step 2 Use the Fundamental Counting Principle to check your work.

There are 3 ways to select the 1st child.

After the 1st child is selected,
there are 2 ways to select the 2nd child.

After the 2nd child is selected,
there is 1 way to select the 3rd child.

That means there are $3 \times 2 \times 1 = 6$ different ways to arrange the children.

The children can be arranged in six different ways on the bench.

NJ ASK Tip

Fundamental Counting Principle
Multiply the number of outcomes from each stage of an event to find the total number of possible outcomes.