

# DTP-Math-Circle: Session 1—Counting

Sept 02 2022

## 1 Standing in lines, winning competitions...

1. You are standing in a line in your school assembly with two of your friends. How many different places in the line can you stand? And how many different lines can you form?

How does this work if two more friends join, so that there are now five of you?

Can you generalize this to your whole class standing in line? How many different places can you stand? And how many different ways can the whole class stand in line?
2. Now your teacher has chosen five of your friends - three girls and two boys - to form a choir group. One day, they have to stand in a straight line on stage during Morning Assembly and sing a welcome song on stage for the visiting School Inspector. The teacher would like the boys and girls to alternate when they form this line and start singing. How many different ways can your friends stand?

If there is a larger choir group, with 71 girls and 70 boys, and again they alternate boys and girls when they stand in a line to give a concert, how many different arrangements are possible?
3. In a school debate competition, there are only five students competing, and the school will give out one gold, one silver and one bronze medal after ranking their performance. How many different medal award outcomes are possible?

Now, in the school athletics competition there are 10 competitors. In how many ways could the medals be awarded in this competition?

Can you generalize this to an essay competition in which the whole school has to compulsorily participate? How many different medal outcomes are possible?

In the school final exam, a merit list of students who are ranked 1<sup>st</sup> up to 10<sup>th</sup> is formed. How many different merit lists are possible?