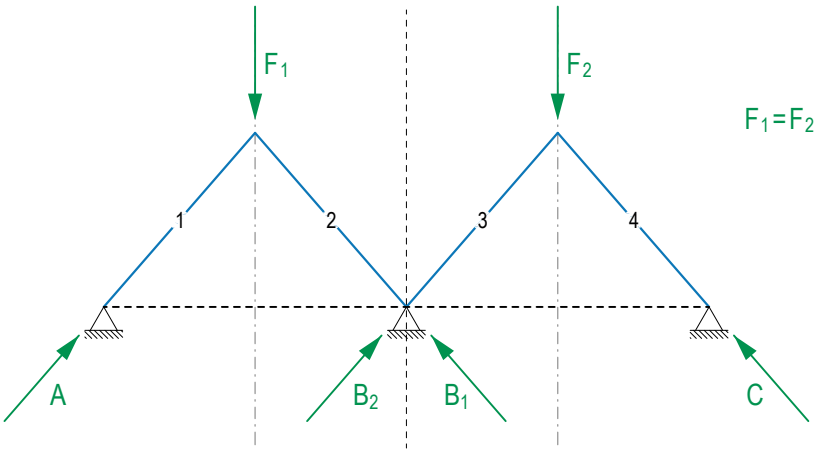
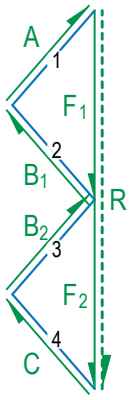
4.3

Dividing systems

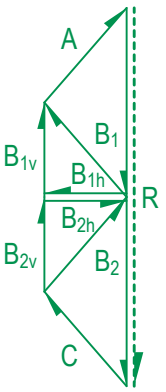
In the following a structure with three supports is analysed. Two point loads and the three supports A, B and C are given. A possible thrust line under the given load and the reaction forces are sought.

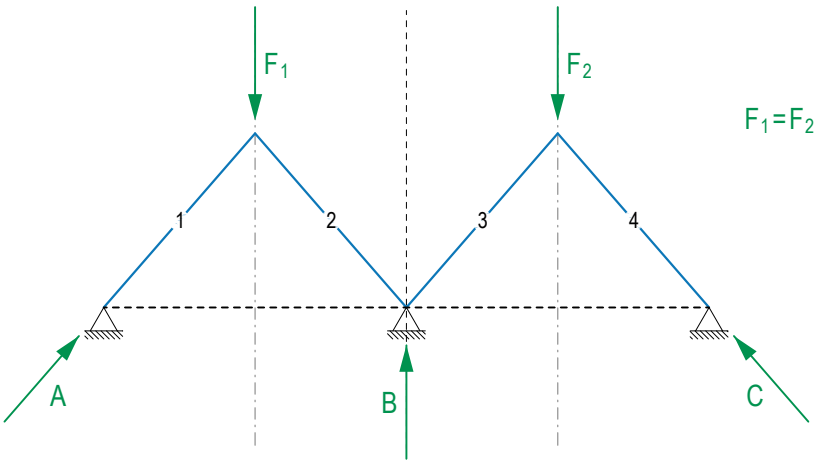
First, the system is divided into a left and a right subsystem. F_1, A and B form the left and F_2, B and C the right part. On the line of action of F_1 a point is now selected and connected to the two supports. This thrust line corresponds to the direction of the reaction forces A and B_1, which are shifted parallel in the force diagram. Equally this happens with the right subsystem, resulting in the force polygon F_2 - C - B_2.

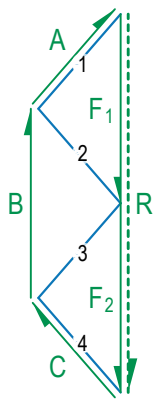




The reaction forces B_1 and B_2 can now be added up to the total reaction force B in the force diagram. Since the horizontal components of B_1 and B_2 are equal but point in opposite directions, they cancel each other out. As a result the reaction force B becomes vertical. Together with the load line, the reaction forces also result in a closed polygon, which proves that the system is in global equilibrium.







form diagrams 1:100

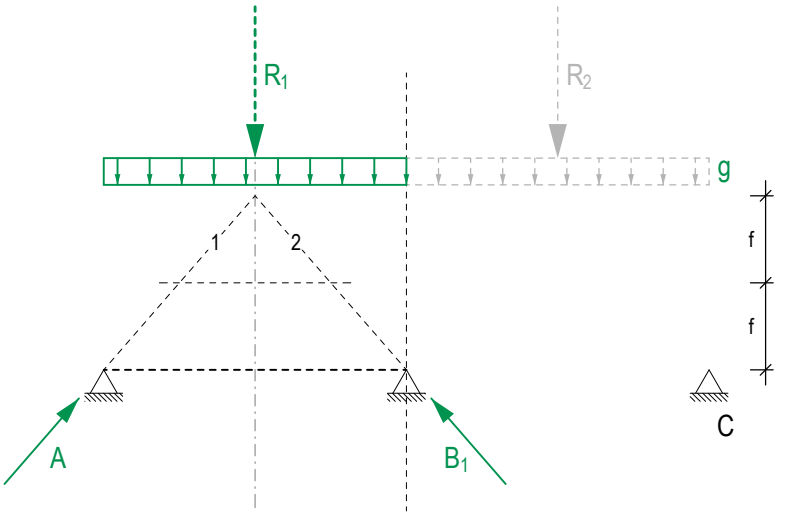
force diagrams 1cm ≙ 10kN

4.3

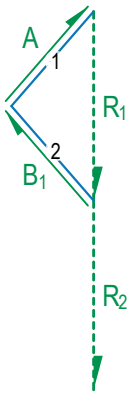
Dividing systems

In the following a structure with three supports is analysed. There is a dead line load and three supports A, B and C. A possible thrust line under the given load and the forces in the three supports are sought.

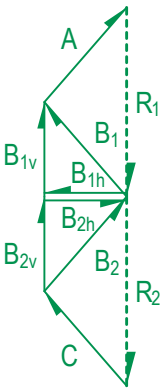
First, the system is divided into a left and a right subsystem. The line load is divided at the middle support and the two partial resultants R_1 and R_2 are calculated. A point is now selected on the line of action of R_1 and connected to the two supports. These are the tangents to the left parabola, which correspond to the direction of the reaction forces A and B_1. Equally this is done with the right subsystem.

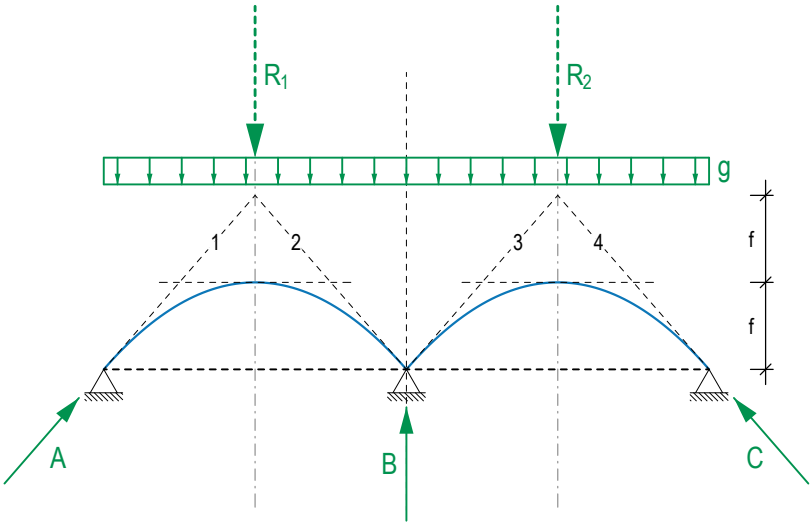


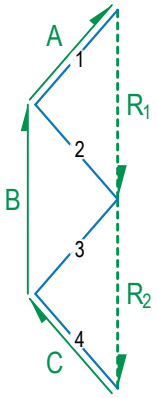
g = 6.25kN/m



Again, B_1 and B_2 can be added up to the reaction force B in the force diagram. Together with the load line, the reaction forces result in a closed polygon, which proves that the system is in global equilibrium.
Finally, the curve can be drawn into the form diagram by hand using the three tangents.







form diagrams 1:100

force diagrams 1cm ≙ 10kN