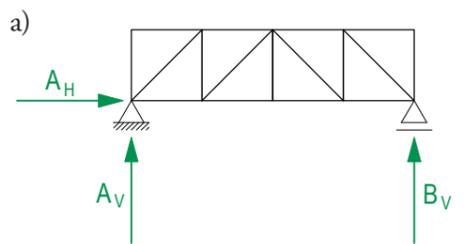


Task 1 Statical Determinacy

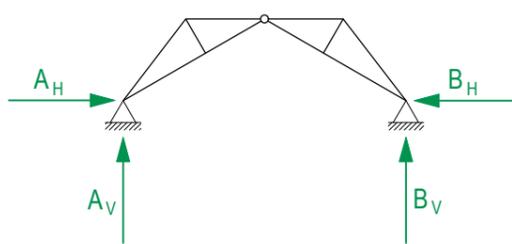
Draw the possible reaction forces for each form diagram.

a) Determine the degree of external statical determinacy.

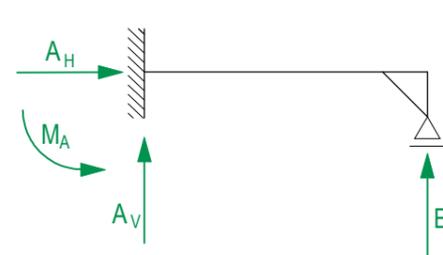
b) Determine the degree of internal statical determinacy.



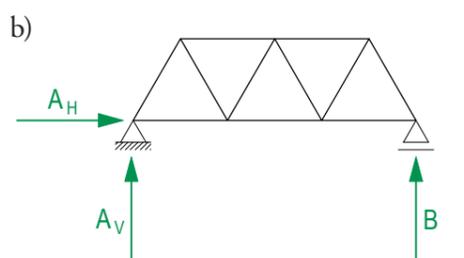
$$\begin{aligned} &3 \text{ reaction forces} \\ &- 3 \text{ EQ conditions} \\ \hline &0 = \text{statically determinate} \end{aligned}$$



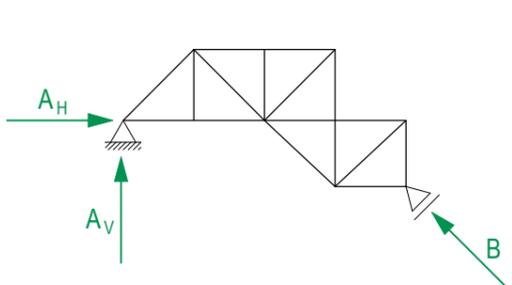
$$\begin{aligned} &4 \text{ reaction forces} \\ &- 3 \text{ EQ conditions} - 1 \text{ hinge} \\ \hline &0 = \text{statically determinate} \end{aligned}$$



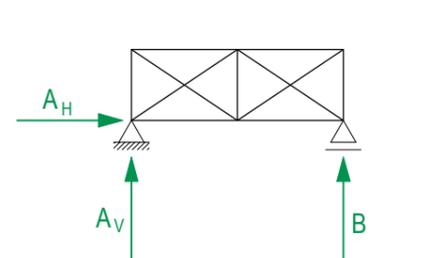
$$\begin{aligned} &4 \text{ reaction forces} \\ &- 3 \text{ EQ conditions} \\ \hline &1 = \text{onefold statically indeterminate} \end{aligned}$$



$$\begin{aligned} &11 = 14 - 3 \\ \hline &\text{statically determinate} \end{aligned}$$



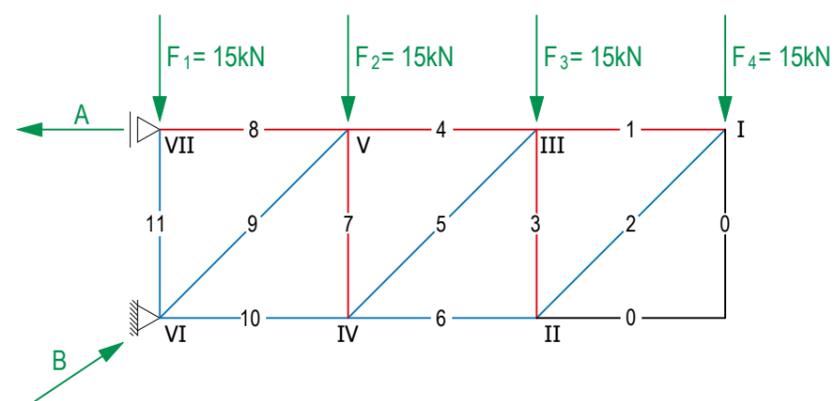
$$\begin{aligned} &17 = 20 - 3 \\ \hline &\text{statically determinate} \end{aligned}$$



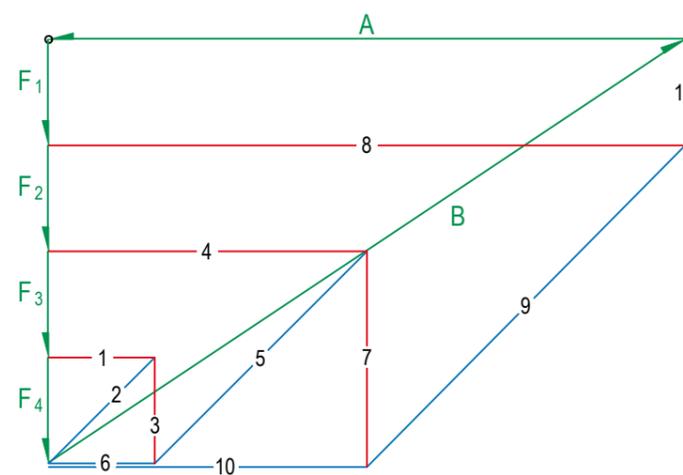
$$\begin{aligned} &15 > 16 - 3 \\ \hline &\text{statically indeterminate} \end{aligned}$$

Task 2 Truss cantilever

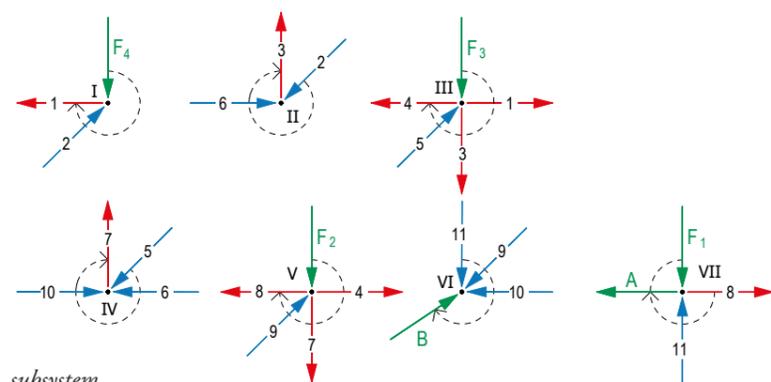
Draw the corresponding force diagram for the given case. Indicate tension forces with red and compression forces with blue. Determine the relevant tension and compression forces within the truss.



form diagram 1:100



force diagram 1cm ≙ 10kN

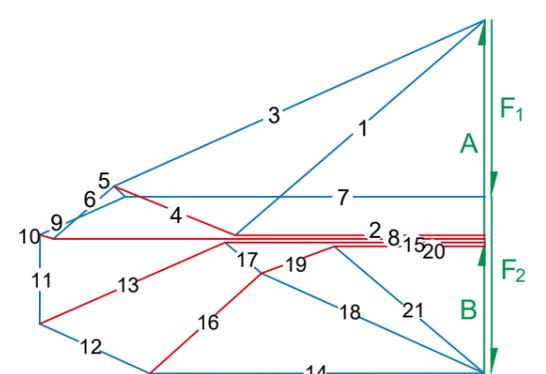
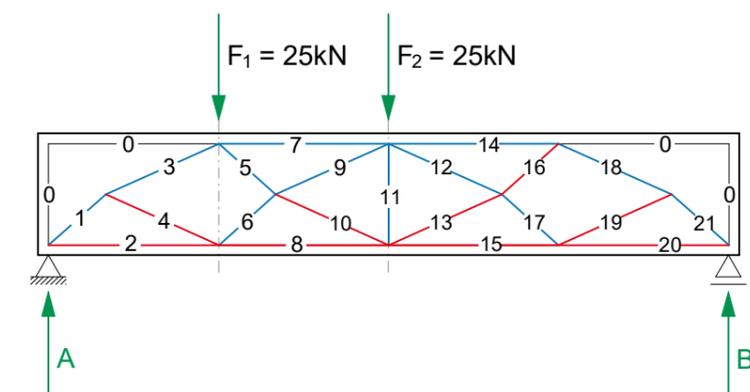
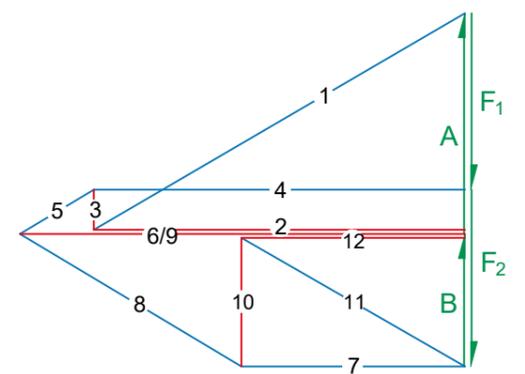
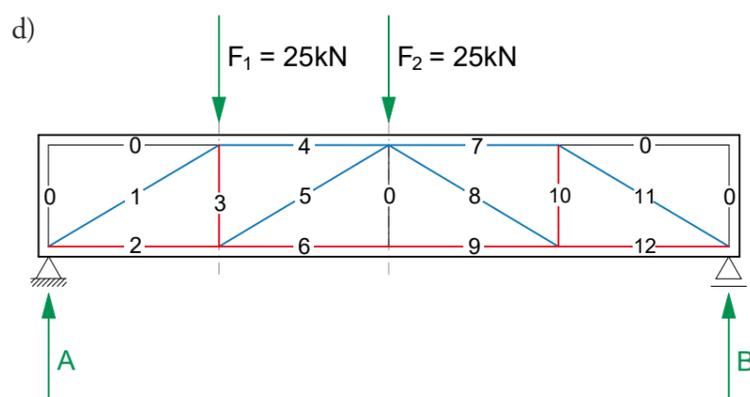
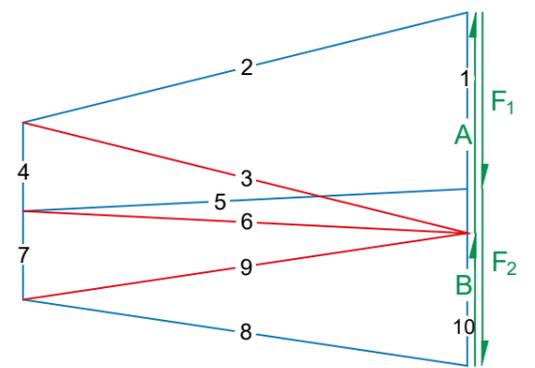
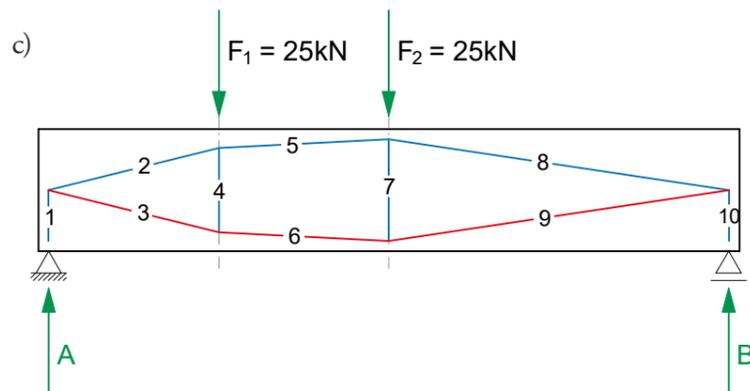
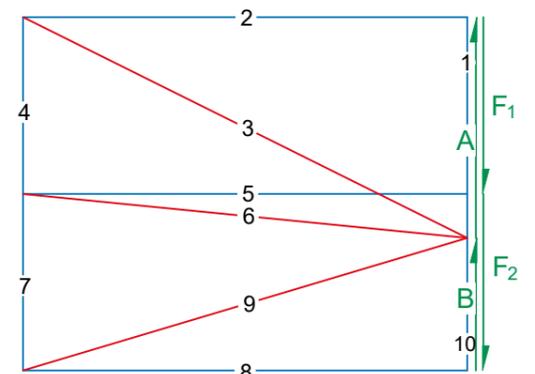
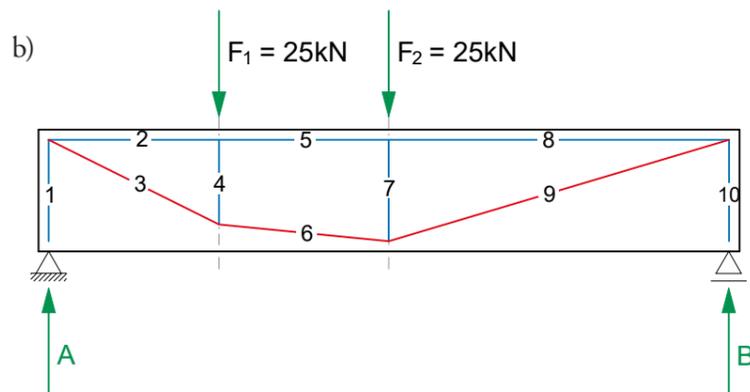
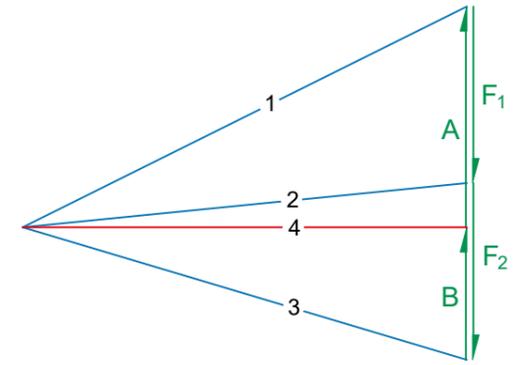
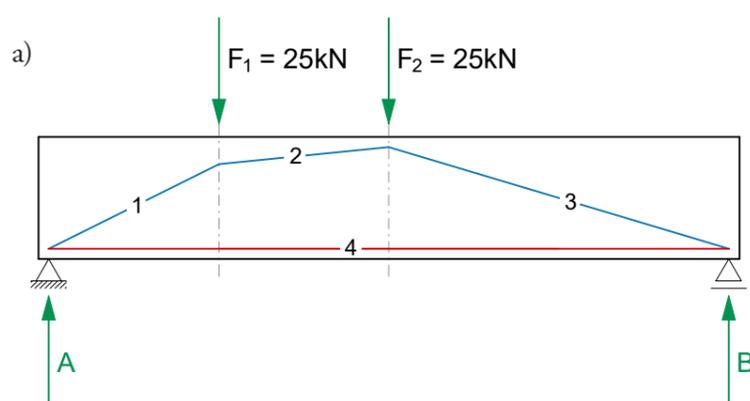


subsystem

	$F_{c,max}$	$F_{t,max}$
Force [kN]	64 kN	90 kN

Task 3 Internal Force Distribution in a Simple Beam

Draw the force diagrams for the given distribution of internal forces for the beams in a) - c). For the cases d) and e), the force diagram is already provided. Indicate tension forces with red and compression forces with blue. Compare in f) the distribution of internal forces in a) - c) with the versions in d) and e).



form diagrams 1:100

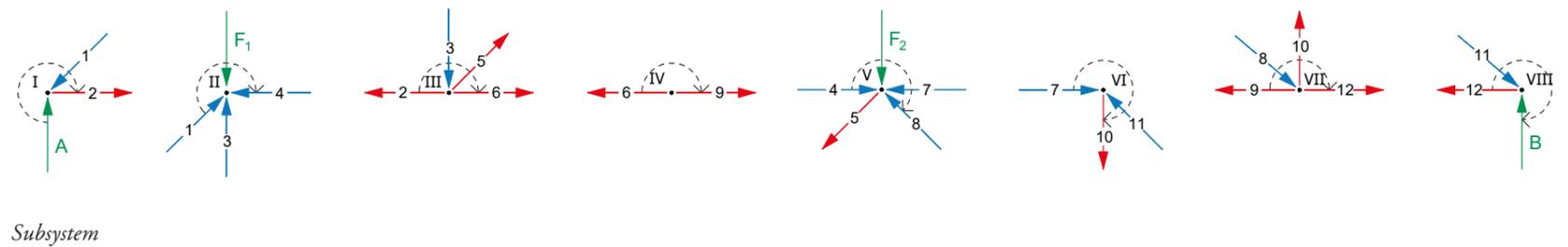
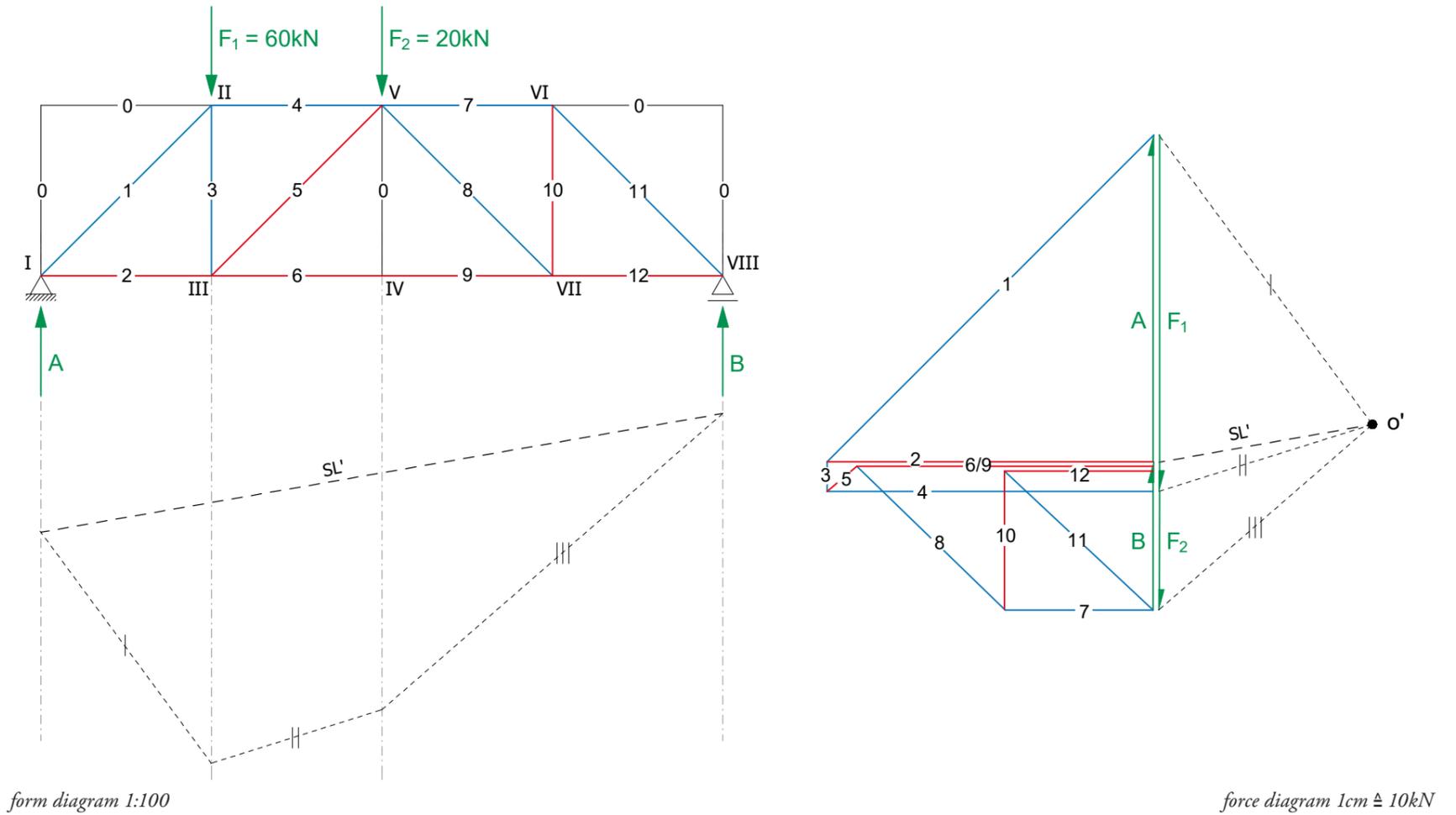
force diagrams 1cm ≙ 10kN

f)

The cases a) to c) show solutions with cable-arch-constructions within the beams. For such a solution within reinforced concrete, the tension elements should be pre-stressed. Otherwise large cracks can occur in the concrete. In cases d) and e) there is a truss-like structure formed inside the beam. The forces are distributed better, as well as possible cracks (a lot of small cracks instead of big ones). This way pre-stress can be avoided.

Additional Truss under non-Uniformly Distributed Load

Task 1 Determine both reaction forces A and B for the following truss. Draw the corresponding force diagram for the given case. Indicate tension forces with red and compression forces with blue.



Additional Truss under Inclined Load

Task 2 Determine the resultant force R and both reaction forces A and B for the following truss. Draw the corresponding force diagram for the given case. Indicate tension forces with red and compression forces with blue.

