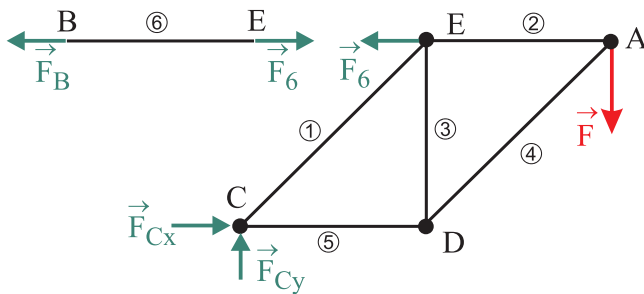


## Description:

A system of 6 straight bars. The bars 1 to 5 are joint with at least one other bar on both of their ends (this is not the case of the bar No. 6, therefore this bar is not comprised in the plane framework created by the other bars) and the whole system is supported by the base and by the bar No.9 (supported by another pin support in point B).

All the joints among the bars 1 to 5 can be modelled as pin supports, the external load  $\vec{F}$  acts in the joint A  $\Rightarrow$  the system meet the assumptions of an immovable plane framework, supported by the base and by the bar No. 6, which is not comprised in the framework (it is not joint with another bar of the system on both of its ends).

## Isolation of the system as free bodies:



The bar No. 6 is loaded only by forces in points B and E. Two forces are in static equilibrium if they act on the same line and are equal in magnitude and opposite in orientation. Thus the bar No. 6 can be isolated as a free body using two forces  $\vec{F}_B$  and  $\vec{F}_6$  acting in the points B and E.

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## Statical analysis:

### 1. Bar No. 6:

loaded by two forces on the same line, there is one applicable equation of static equilibrium  $\nu = 1$ :

$$F_B - F_6 = 0 \quad \Rightarrow \quad F_B = F_6$$

static  
equations

The force  $\vec{F}_6$  is acting in the point E of the bar and the same (in magnitude but with opposite orientation) force  $\vec{F}_6$  is acting in the joint E of the framework.

### 2. The plane framework:

*the necessary condition of the external statical determinateness:*  $\nu = \mu_{ex}$

$s_{ext} = \mu_{ex} - \nu = 3 - 3 = 0 \quad \Rightarrow \quad$  the problem is externally statically determinate

*the necessary condition of the internal statical determinateness:*  $2k - 3 = p$

$s_{int} = p - (2k - 3) = 5 - (2 \cdot 4 - 3) = 0 \quad \Rightarrow \quad$  the problem is internally statically determinate

The problem is statically determinate externally as well as internally.