

Below are questions from various previous examinations.

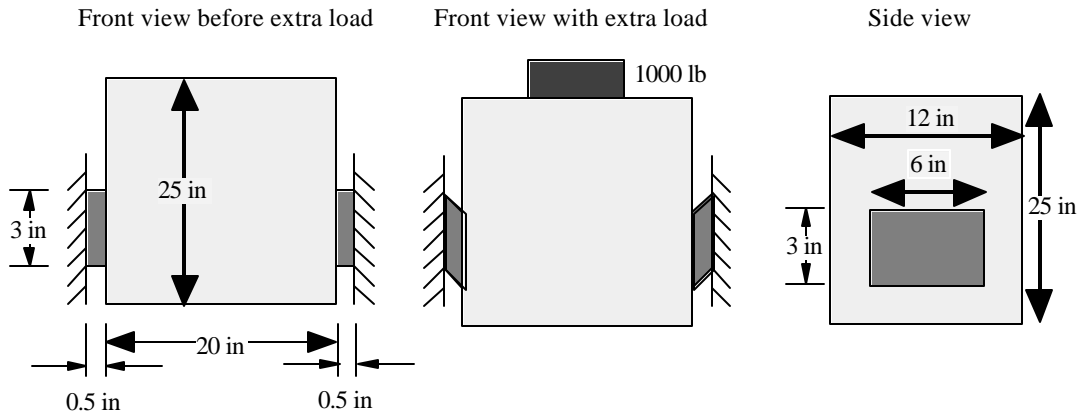
The solutions can also be downloaded from the web.

I would say the Supplementary Statics problems are also good practice.

Use these problems at your own risk. The actual topics covered by any particular exam will vary from year to year.

1. A machine is supported by rubber pads as shown. When an extra 1000 pound weight is added to the machine, the rubber pads deform as shown and the machine moves down by 0.1 in.

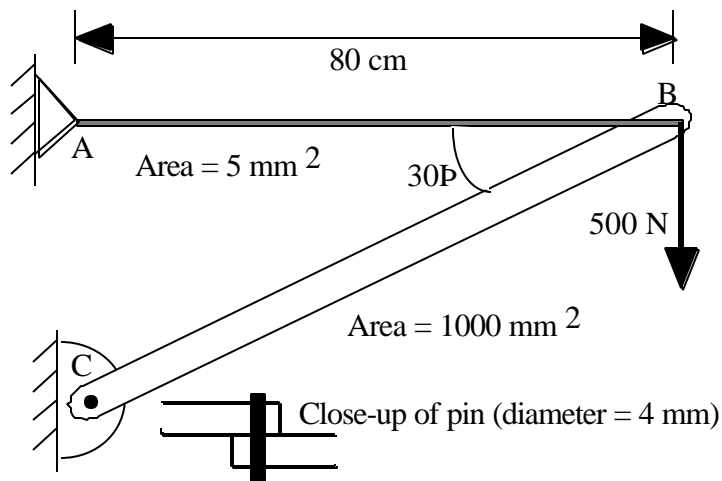
What property of the rubber pads can you determine from the information? (Give the name and symbol.) Compute the value of this property.



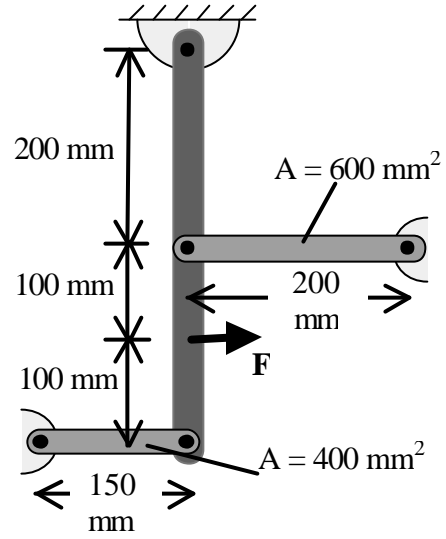
2. The strut BC is supported by the cable AB and is loaded at B as shown. (Both the cable and the strut have a Young's modulus of 200 GPa.)

Specify any assumptions that you are making in the following calculations.

- (i) Determine completely the motion of the point B.
- (ii) Find the shear stress in the pin at C.



3. The vertical member is rigid and it is connected to the two links as shown. The links both have modulus 200 GPa. The cross-sectional areas and lengths of the links are shown. Determine the maximum allowable force F_{allow} if the maximum allowable stress (tensile or compressive) in either link is 50 MPa. Neglect forces due to gravity.



4. The rod, which consists two segments with distinct properties E and A , is restrained against axial motion at ends A and D . Forces are applied to the rod at points B and C . Neglect the effect of gravity. In terms of the variables given, derive expressions for: (a) the force reactions of the supports at A and D ; (b) the stress at the cross-section mid-way between B and C ; (c) the displacement of the point C .

