

ES226
Engineering Mechanics: Statics
Lafayette College
Engineering Division

Exam 1
Time Span: 2 hours

Closed Book. Closed Notes. Each student is allowed a single page of handwritten notes (no photocopied notes of other students allowed), pencils, erasers, straight edge and calculator, only.

Name:

Answer each question on the same page, with final answers in the box in the bottom right-hand corner of the page. (Continue on the back of the question sheet if needed).

Show all work **Clearly and Neatly**

Score (Max Points 100)

Problem #1. (Max Points 20):

Problem #2. (Max Points 20):

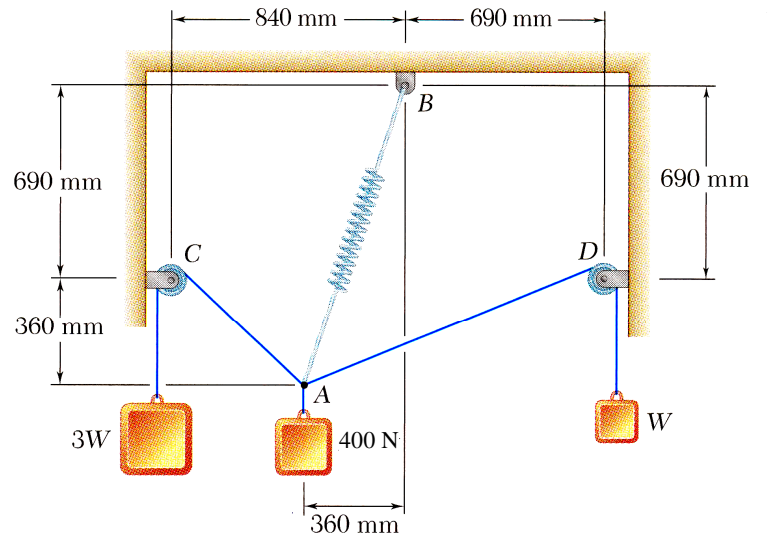
Problem #3. (Max Points 20):

Problem #4. (Max Points 20):

Problem #5. (Max Points 20):

Problem 1: A block weighing 400 N is suspended from a spring and two cords that are attached to blocks of weights $3W$ and W as shown. The cords pass over pulleys at C and D . The spring constant is 800 N/m.

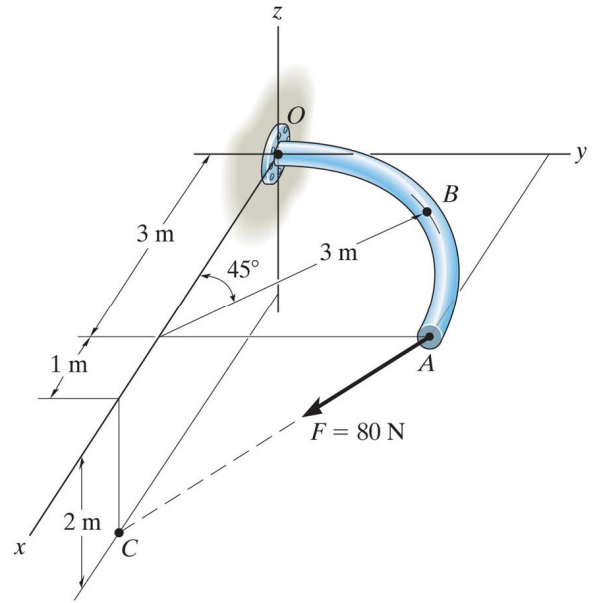
Determine the value of W .



Final Answers:

Problem 2: The curved rod lies in the x-y plane and a force with a magnitude of $\|\mathbf{F}\| = 80 \text{ N}$ acts at its end as shown.

Determine the moment of this force about point O.

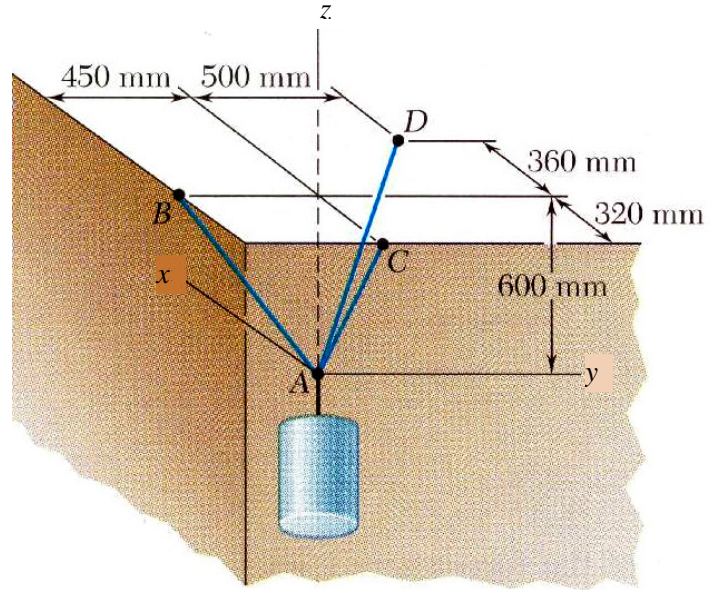


Final Answers:

Problem 3: Part A

A container is supported by three cables that are attached to a ceiling as shown.

Determine the weight W of the container knowing that the tension in cable AB is 4.3 kN.

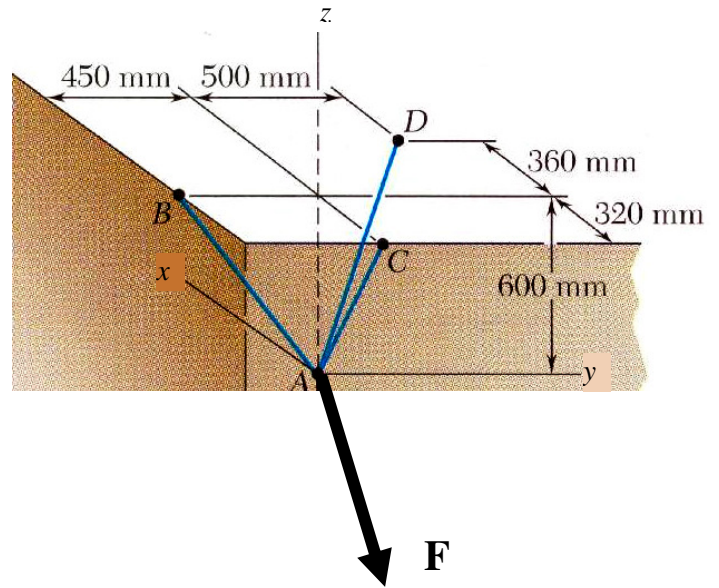


Final Answers:

Problem 3: Part B

The weight is replaced by a force vector F as shown in the figure. What direction does the vector F need to act in to create equal tension forces in each of the three suspending cables,

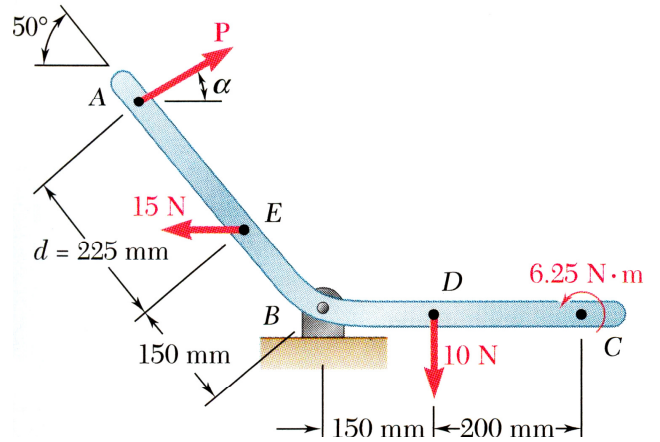
i.e. $\|T\| = \|T_{AB}\| = \|T_{AC}\| = \|T_{AD}\|$



Final Answers:

Problem 4: Three forces and a couple act on crank ABC.
 For $P = 35 \text{ N}$ and $\alpha = 40^\circ$

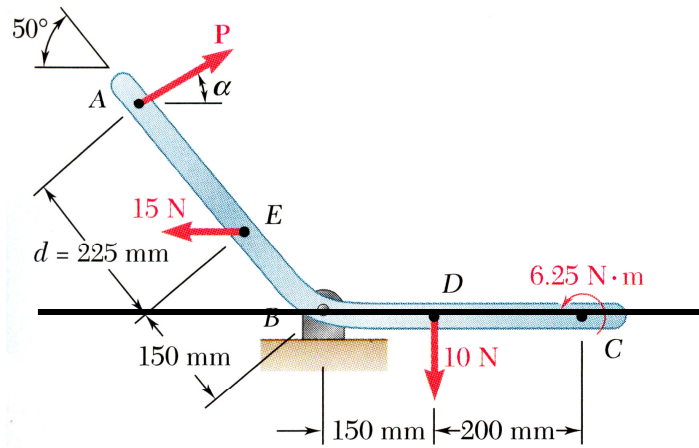
Determine the equivalent system consisting of the force resultant, \mathbf{F}_R , and the resultant moment, \mathbf{M}_R , about point B. You can do scalar moment calcs or run some $(\mathbf{r} \times \mathbf{F})$ or both.



Final Answers:

Problem 4: Part B

Locate the point where the line of action of the resultant force, \mathbf{F}_R , intersects a line drawn through points B and C



Final Answers:

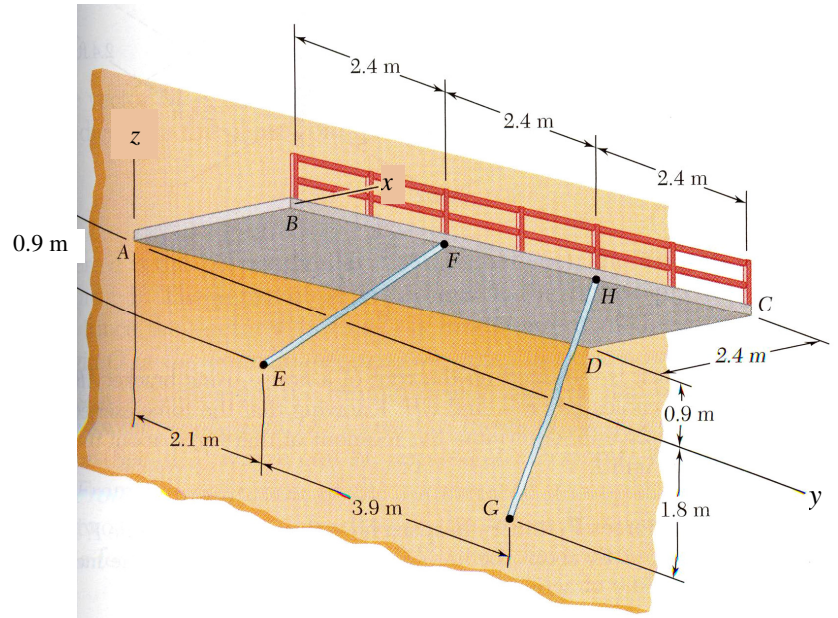
Problem 5:

The 2.4-m-wide portion of ABCD of an inclined, cantilevered walkway is partially supported by members EF and GH.

The compressive force exerted by member GH on the walkway at H is 21.3 kN

Determine the moment of that force about edge AD of the walkway.

Note: Dimensions are a little tricky, so look carefully at the x, y, and z directions before you start.



Final Answers: