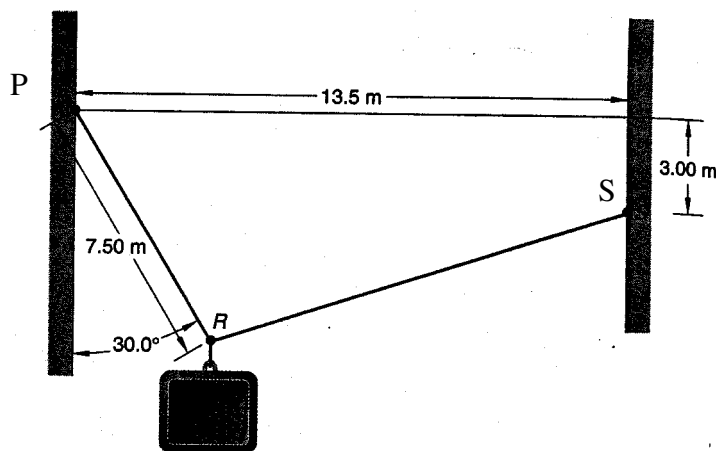


Homework 4.**Due: 3:35pm, Monday October 10, 2005.**

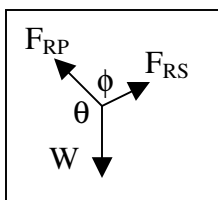
Please use a word processor for preparing your answers to Problems 3 and 4. For Problem 1 and 2, please use free sheets of paper (i.e. NOT paper torn from your notebook) and present your answers neatly, clearly and understandably. Follow the guidelines given on 9/12/05. Again, I would prefer you to get into the habit of using engineering paper, but that is not a requirement. For Problem 2 you will turn in a printout of your spreadsheet. You should include comments to explain clearly and concisely what you have done.

QUESTION 1.

Consider Question 3 from homework 3 as shown below. Answer the following multiple choice questions for parts a and b. and then complete part c using your answers for parts a. and b.



a. The free body diagram for R is:



i) $\theta = 30, \phi = 90$

ii) $\theta = 150, \phi = \tan^{-1} (13.5 - 7.5 \sin 30) / (7.5 \cos 30 - 3)$

iii) $\theta = 150, \phi = 90$

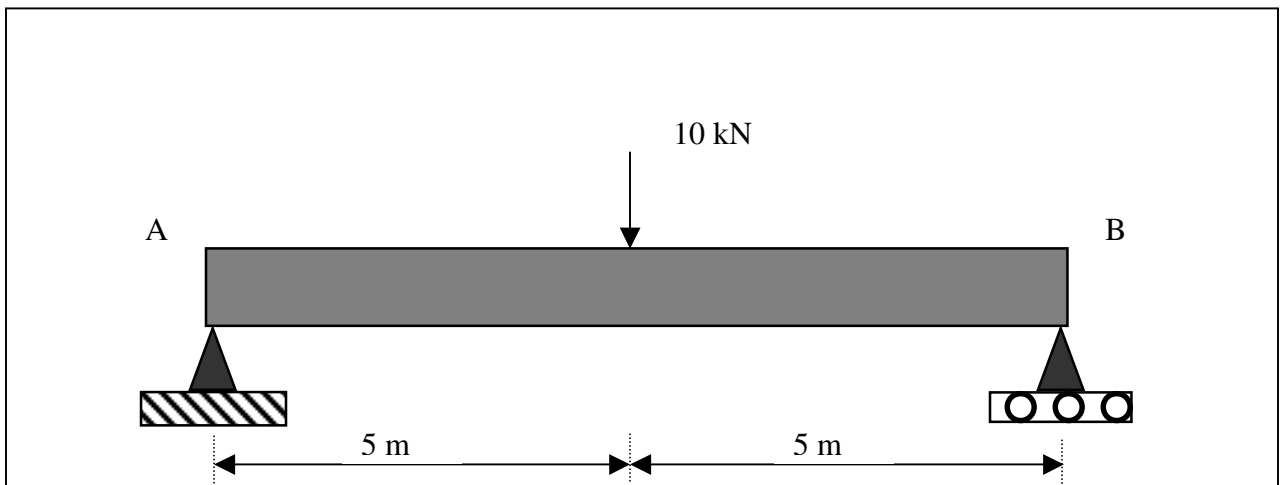
b. The equilibrium equations are:

a. $F_{RP} \cos \theta + F_{RS} \cos \phi = W, F_{RP} \sin \theta + F_{RS} \sin \phi = W,$

b. $F_{RP} \cos (180 - \theta) + F_{RS} \cos (\phi + \theta - 180) = W, -F_{RP} \sin (\theta - 90) + F_{RS} \sin (270 - \theta - \phi) = W,$

- c. $F_{RP} \cos (180-\theta) + F_{RS} \cos (\phi+\theta-180) = W, -F_{RP} \sin (\theta-90) + F_{RS} \sin (270-\theta-\phi) = W,$
- d. $F_{RP} \cos (180-\theta) + F_{RS} \cos (\phi+\theta-180) = W, -F_{RP} \cos (\theta-90) + F_{RS} \cos (270-\theta-\phi) = 0,$
- c. Determine F_{RP} and F_{RS} if W is 10 kN.

QUESTION 2.



- a) Assume the beam above is weightless.
- Draw the free body diagram for the beam.
 - Write the equilibrium equations for
 - The forces in the vertical direction.
 - The forces in the horizontal direction
 - Moments about the joint A.
 - Compute the reactions at A and B by solving the equations in 1 a) b).
- b) Now assume the beam in the above diagram has a mass of 200 kg per meter.
- Compute the equivalent force to the weight of the applied at the center.
 - Draw the free body diagram for the beam including the equivalent force for the weight of the beam.

- c. Write the equilibrium equations for
 - i. The forces in the vertical direction.
 - ii. The forces in the horizontal direction
 - iii. Moments about the joint A.
- d. Compute the reactions at A and B by solving the equations in 1 a) b).

QUESTION 3.

Read the article titled “Indian River Inlet Bridge: A Community’s Vision in Harmony with Nature” that describes the recently designed Indian River Inlet bridge and answer the following questions:

- a. Why did the Delaware Department of Transportation decide to build a new bridge over the Indian River Inlet?
- b. What type of bridge form was selected, how did it get selected, and what were the reasons for the final choice?
- c. If you were going to monitor the bridge with equipment, what would you monitor and why?

QUESTION 4.

- a. Using data on the web at <http://www.hut.fi/Units/Departments/R/Bridge/chronological.html> plot a curve using Excel showing the evolution of bridge spans (in meters) over time from 1850 to the present. Your plot should include a title, and labels on the x and y axes. Your plot from excel should be “cut and pasted” into your word document and clearly labeled.
- b. In two or three sentences, describe the trend?
- c. In two or three sentences, describe what the plot tells you about what we might expect to see in the future?

GRADING SHEET – HOMEWORK 4.

CIEG 125 - Introduction to Civil Engineering.

NAME: _____

This sheet MUST be stapled to the front of your homework.

		Points awarded	Max points
General Presentation (6 points total)	Name, Date, Assignment #		2
	Neatness (don't forget to staple the sheets together in the correct order!)		2
	Logical Presentation		1
	Spelling/Grammar		1
Question 1. (22 points total)	a) Free body diagram		5
	b) Equations		5
	c) Forces		12
Question 2. (37 points total)	a)FBD		4
	Equations		6
	Reactions		6
	Equivalent force		5
	b)FBD		4
	Equations		6
Reactions		6	
Question 3. (20 points)	a) Why		8
	b) Type		7
	c) Monitoring		5
Question 4. (15 points total)	a) Plot		
	• correctness		5
	• layout		4
	b) Trend		3
c)Future		3	
TOTAL			100