

# WORCESTER POLYTECHNIC INSTITUTE

## MECHANICAL ENGINEERING DEPARTMENT

### DESIGN OF MACHINE ELEMENTS

COURSE No.: ME-3320, A'2011  
 TEXT: *Machine Design, an Integrated Approach*, 4ed.  
 R. L. Norton, Prentice-Hall, 2010

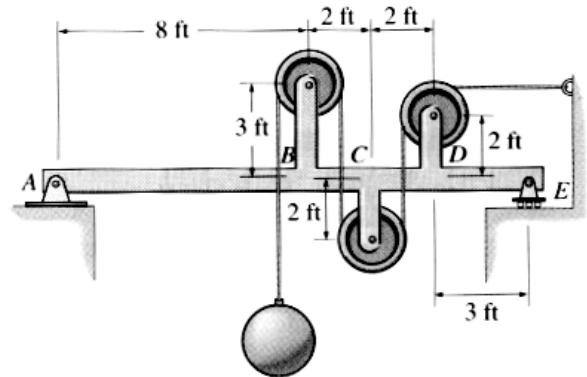
INSTRUCTOR: Cosme Furlong  
 HL-151  
 (508) 831-5126  
 cfurlong@wpi.edu

WEB PAGE: <http://users.wpi.edu/~cfurlong/me3320.html>  
 LECTURES: M, Tu, Th, F @ 9:00 AM, WB-229  
 SECTION MTGS: Tu @ 10:00 AM, HL-230  
 DATE: 25 August 2011

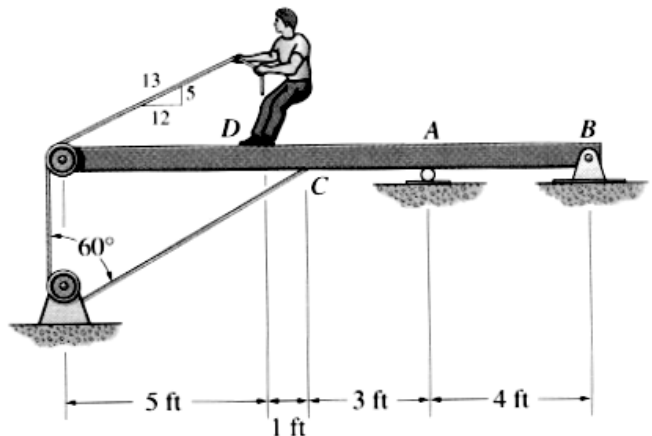
TA: Brandon Bacon  
 HL-309/310  
 baconb@wpi.edu

**NOTE:** In all your work, state explicitly every assumption and/or approximation made, explain every procedure, and justify its use. Dimensional analyses are absolutely necessary. All results must be expressed in appropriate units. PLEASE, ALWAYS SHOW ALL WORK, while writing your results only on one side of the sheet(s) of paper; start each problem on a new sheet.

**Problem 1.9.** For the machine shown, draw free body diagrams of (a) entire device and (b) each of the components.



**Problem 1.10.** An 80 lb<sub>f</sub> boy stands on a beam and pulls with a force of 50 lb<sub>f</sub>. Determine (a) the frictional force between his shoes and the beam assuming a friction coefficient of 0.4 and (b) the reaction forces at A and B. The beam is uniform and has a weight of 100 lb<sub>f</sub>. Neglect the size of the pulleys and the thickness of the beam.



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