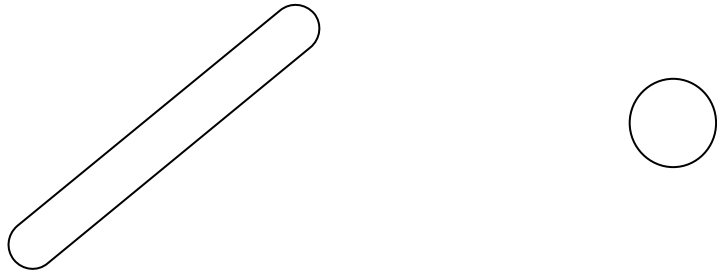
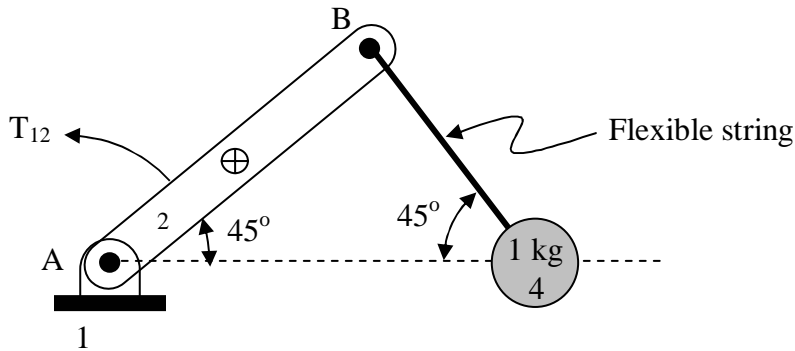


Show your work if you would like to receive any partial credit!

1. (40 pts.) A link is rotating about fixed point A and a string is attached at point B. A 1 kg point mass, with mass m , is connected to the other end of the string. Length $AB = 1\text{ m}$, $m_2 = 3\text{ kg}$
 $a_{g2} = 1\text{ m/s}^2, <180^\circ$ $a_{g4} = 1\text{ m/s}^2, <90^\circ$
 I_{g2} , m_2 , and α_2 are all known quantities. Express your answer in terms of these variables.

a) Fill in the blanks for the A and C matrices below for the equation $AB=C$ at this instant.



$$\left[\begin{array}{c} \phantom{F_{12x}} \\ \phantom{F_{12y}} \\ \phantom{T_{12}} \end{array} \right] \left[\begin{array}{c} F_{12x} \\ F_{12y} \\ T_{12} \end{array} \right] = \left[\begin{array}{c} \phantom{F_{12x}} \\ \phantom{F_{12y}} \\ \phantom{T_{12}} \end{array} \right]$$

b) Find the numerical value of the magnitude of the shaking force.

2. (30 pts.) A 20 deg. full-depth, involute spur gear with 35 teeth has a diametral pitch of 10 in.^{-1} . Determine the following (circle all answers):

a) Pitch Diameter

b) Circular Pitch

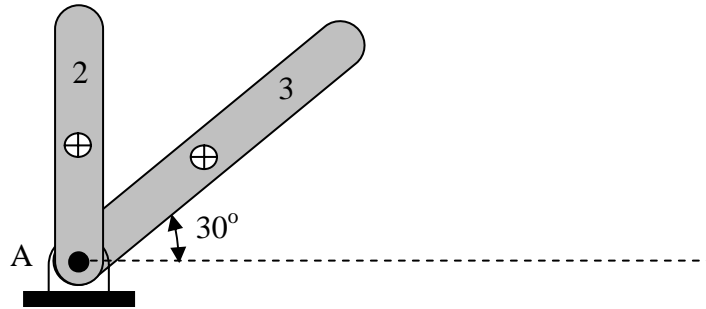
c) Calculate the Addendum

d) Calculate the Addendum Circle Diameter

e) Calculate the Dedendum Circle Diameter

f) Calculate the Minimum Clearance

3. (30 pts.) The two links are rotating together about point A.
Link 2 = 4 m long and Link 3 = 6 m long.
 $M_2 = 2$ kg and $M_3 = 3$ kg and have a uniform mass distribution



a) What weight is needed to be added at a radial distance 0.5 m from point A (magnitude and orientation) in order to balance the links?

b) What is the magnitude of the shaking force if the **unbalanced** links are rotating together at 100 rpm?