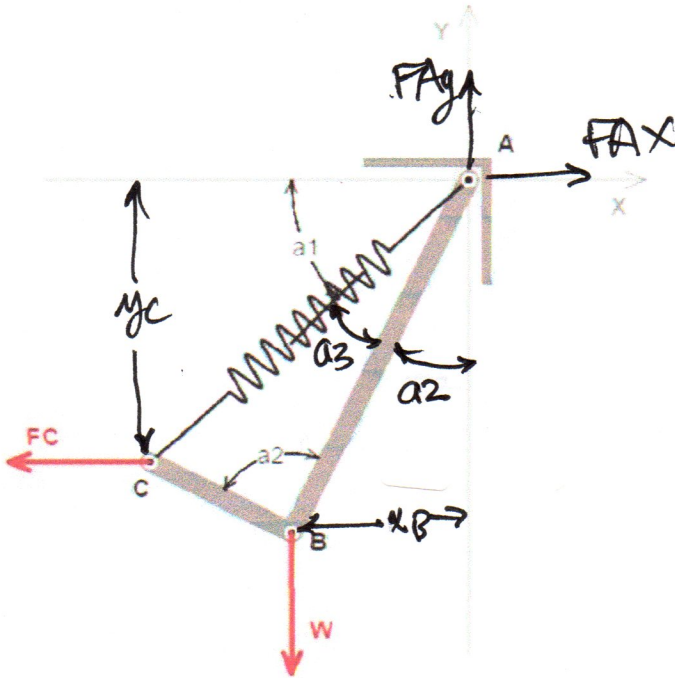


SOLUTION**ip4STATICS Worksheet for U04\_P05**

A flexible spring-loaded frame has pin joints at A, B and C. Angle ABC is fixed at  $90^\circ$ . LAB is the length of link AB; LBC is the length of link BC. At equilibrium force FC acting horizontally supports weight W at angle  $a_1$ .

Instance variables: force W in lbs; lengths LAB and LBC in ft; angle  $a_1$  in deg.

Geometry

$$(i) LAC = \sqrt{LAB^2 + LBC^2}$$

$$*(ii) y_C = LAC \cdot \sin(a_1)$$

$$(iii) a_3 = \sin^{-1}(LBC/LAC)$$

$$(iv) a_2 = 90 - a_1 - a_3$$

$$*(v) x_B = LAB \cdot \sin(a_2)$$

(1) What is the force FC? (Enter 'lb,deg')

(2) What is the reaction force FA at A? (Enter 'lb,deg')

$$(1) \sum M_A = 0: y_C \cdot FC = x_B \cdot W, \text{ so } |FC| = x_B \cdot W / y_C$$

$$\left\{ \begin{array}{l} \angle FC = 180^\circ \end{array} \right.$$

$$(2) \sum F_x = 0: FAX = |FC|$$

$$\sum F_y = 0: FAY = |W|$$

$$\therefore |FA| = \sqrt{|FC|^2 + |W|^2}$$

$$\left\{ \begin{array}{l} \angle FA = \tan^{-1}(FAY/FAX) \end{array} \right.$$