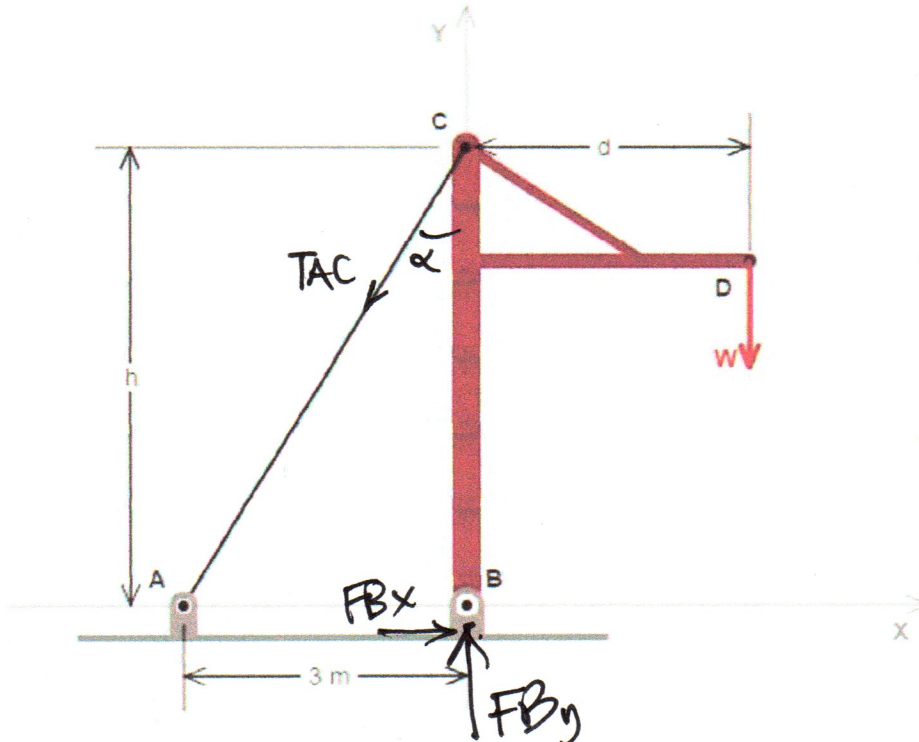SOLUTION

ip4STATICS Worksheet for U04_P03

A rigid frame supports weight W. At equilibrium the frame post BC is vertical and the arm D is horizontal, positioned by the cable between A and C.

Instance variables: force W in kN; lengths h and d in m.

Geometry.

$$\tan \alpha = 3/h$$

So $\alpha = \tan^{-1}(3/h)$

(1) What is the tension TAC in the cable at equilibrium?

(2) What is the reaction force FB at B? (Enter 'FBx,FBy')

(3) What is the reaction force FB at B? (Enter 'mag,deg')

(1) $TAC = d \times W / h \times \sin(\alpha)$ $(\Sigma M_B = 0)$

(2) $FBx = TAC \times \sin(\alpha)$ $(\Sigma F_x = 0)$

$FBy = W + TAC \times \cos(\alpha)$ $(\Sigma F_y = 0)$

(3) $|FB| = SQRT(FBx^2 + FBy^2)$

$\angle FB = \tan^{-1}(FBy/FBx)$