wc19lect

Announcements

- CBTF Quiz 4 next week (10/17-20)
- Do HW14 on Prairie Learn to prepare for Quiz 4
- Have you checked your grades on Compass yet?

❑ Upcoming deadlines:

- Friday (10/13) – TODAY!
  - WA #2
- Wednesday (10/18)
  - PL HW14

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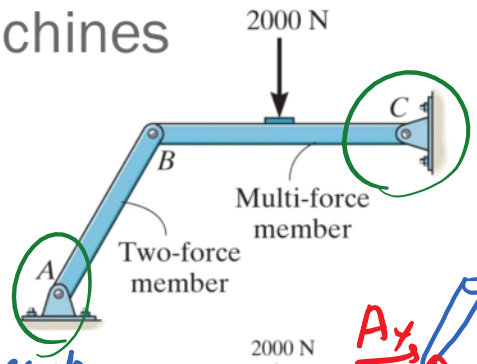
Friday, October 13, 2017 11:20 AM

Recap: Frames and machines

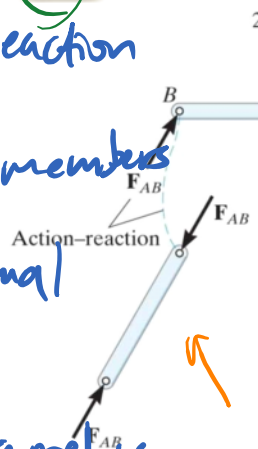
The members can be truss elements, beams, pulleys, cables, and other components. The general solution method is similar to rigid body at equilibrium analysis:

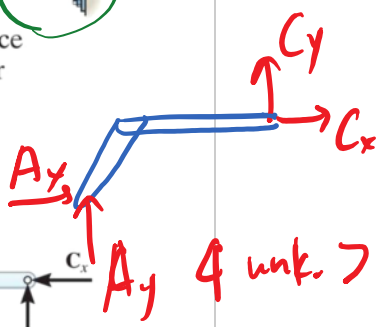


1.) Identify all external reaction

2.) Identify two force members

3.) Analysis on individual member based on the unknown parameters of interest.





4 unk. > 3 Eqt

2

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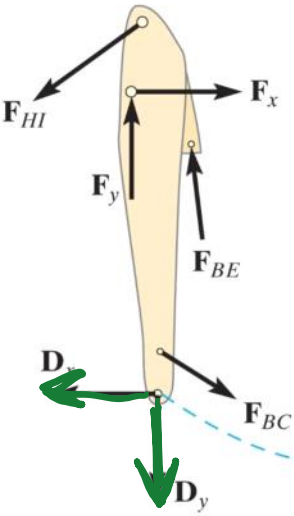
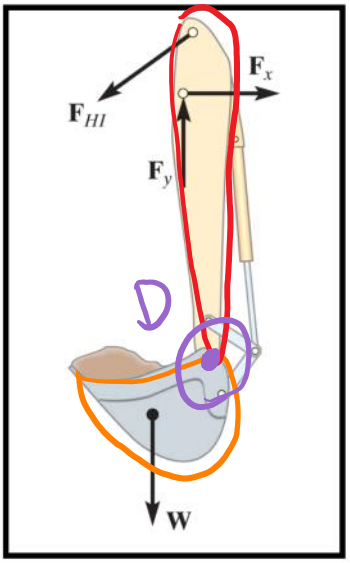
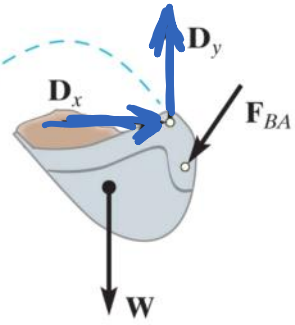
Recap

3

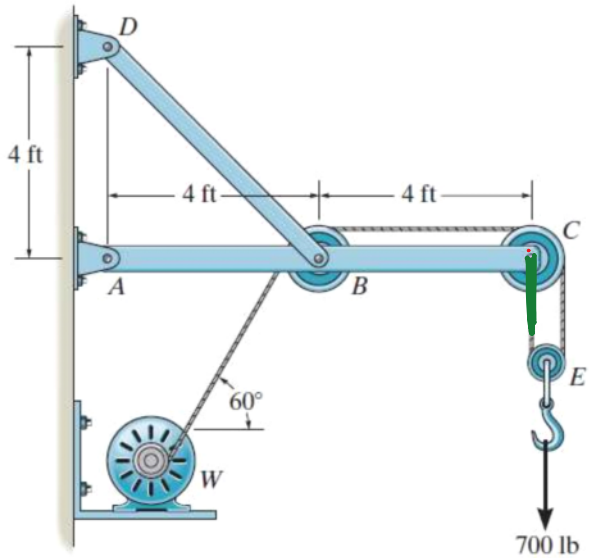


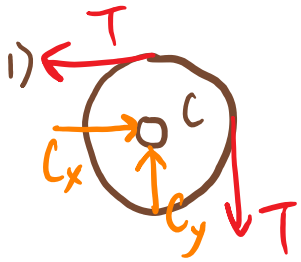


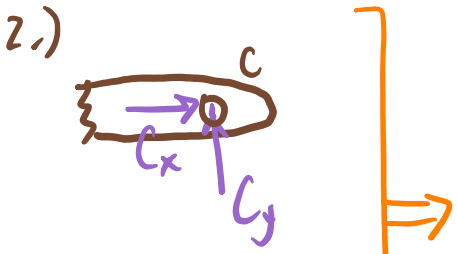


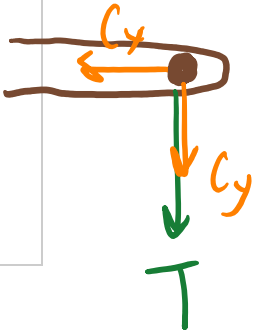
Given: The wall crane supports an external load of 700 lb.

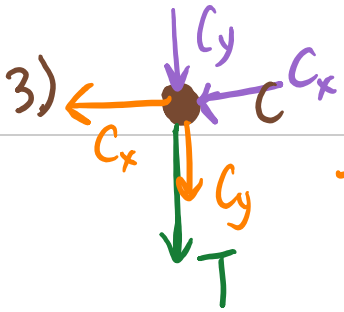
Find: The force in the cable at winch motor W and the horizontal and vertical components of pin reactions at C on beam ABC.



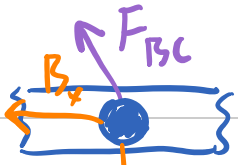








include pin B:



B_y from pulley

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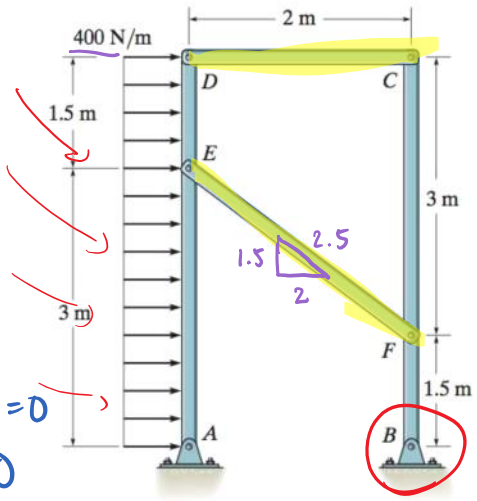
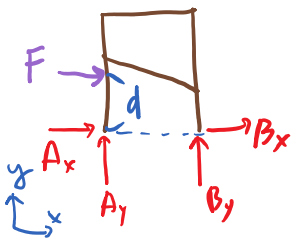
Determine the horizontal and vertical components of force which pin B exert on the frame.



1.) ID ext. F.



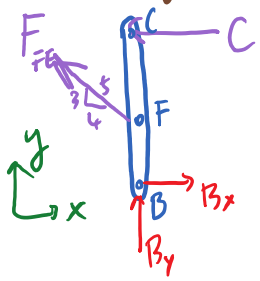
$\Sigma F_x = A_x + F + B_x = 0$

$\Sigma F_y = A_y + B_y = 0$

$\Sigma M_A = -Fd + B_y(2m) = 0 \Rightarrow B_y = \frac{Fd}{2}$

2.) ID 2 force members = CD, EF

3.) Analyze members in parts.



$\Sigma F_x = -C - F_{EF}\left(\frac{4}{5}\right) + B_x = 0 \Rightarrow C = B_x - \left(-B_y\left(\frac{5}{3}\right)\right)$

$\Sigma F_y = F_{EF}\left(\frac{3}{5}\right) + B_y = 0 \Rightarrow F_{EF} = -B_y\left(\frac{5}{3}\right)$

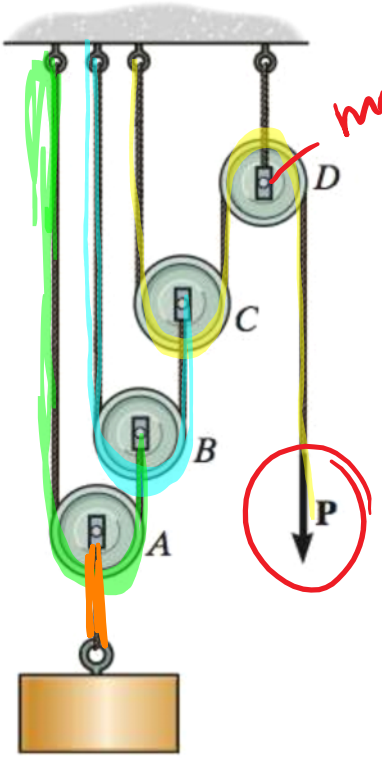
$\Sigma M_F = C(3m) + B_x(1.5m) = 0 \Rightarrow (3m)\left(B_x + B_y\left(\frac{5}{3}\right)\right) + B_x(1.5m) = 0$

$\Rightarrow$ $B_x = 1800N$, $B_y = 2025N$

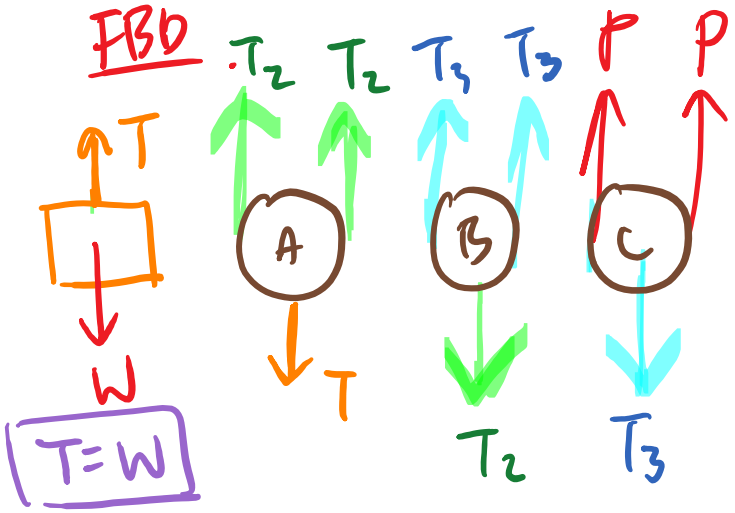
Determine the force **P** required to hold the 100-lb weight in equilibrium.

Given: W = 100lb.

Find: P



FBD



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EoE

C) $\Sigma F_y = 2P - T_3 = 0 \Rightarrow T_3 = 2P$

B) $\Sigma F_y = 2T_3 - T_2 = 0 \Rightarrow T_2 = 2T_3 = 4P$

A) $\Sigma F_y = 2T_2 - T = 0 \Rightarrow T = 2T_2 = 2(4P) = 8P$

$$P = \frac{T}{8} = \frac{W}{8} = \frac{100lb}{8}$$