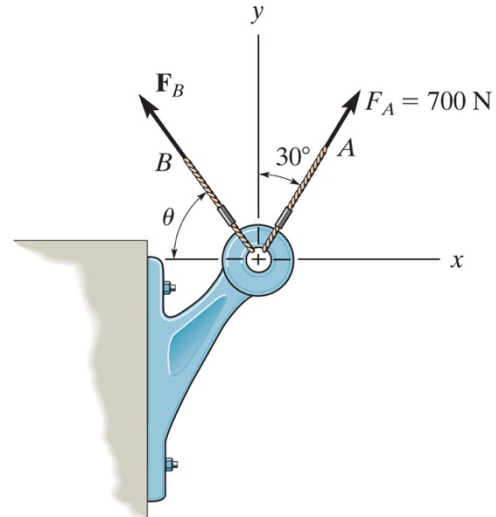


**Instructions:**

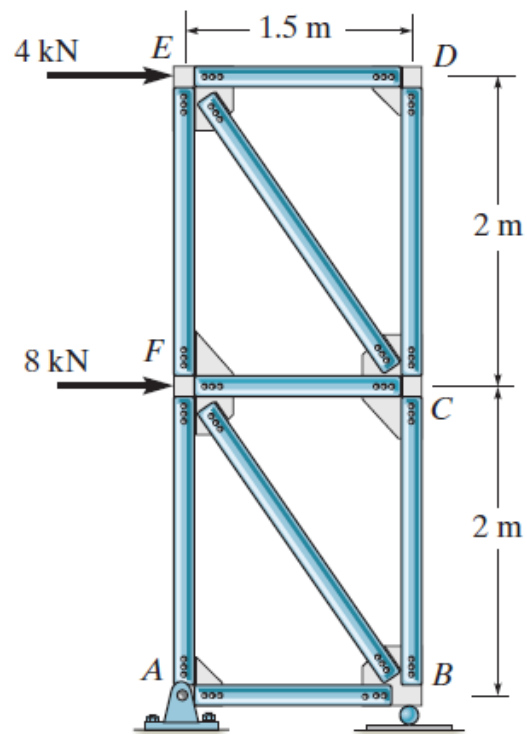
- Read the questions carefully. Detail all steps of your solution and include free-body diagrams. Writing only the equations and their solutions is not enough for full points.
- Make sure your answers include units.

**Exercise 1**

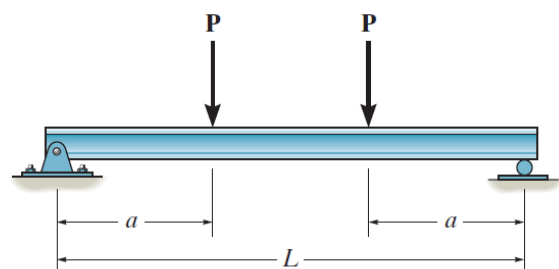
Determine the magnitude and orientation  $\theta$  of  $\mathbf{F}_B$  so that the resultant force is directed along the positive y axis and has a magnitude of 1500 N. (10 pts)

**Exercise 2**

Determine the force in members  $EF$ ,  $CF$ , and  $BC$ , and state if the members are in tension or compression. (20 pts)

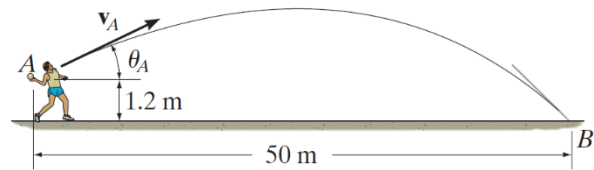
**Exercise 3**

Draw the shear and bending moment diagrams for the beam provided that  $P = 20 \text{ kN}$ ,  $a = 1.5 \text{ m}$ ,  $L = 6 \text{ m}$ . (20 pts)

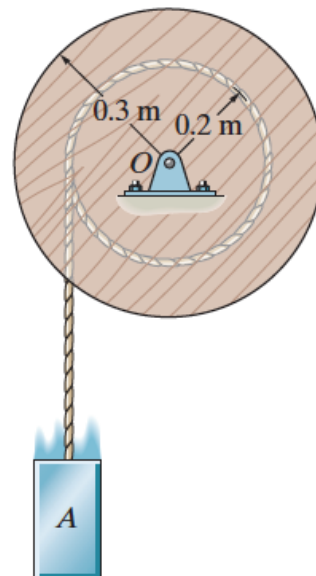


**Exercise 4**

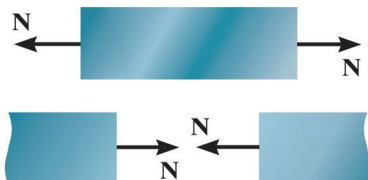
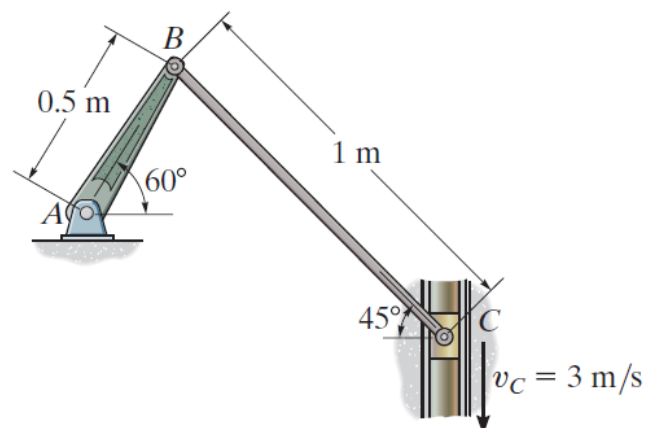
It is observed that the time for the ball to strike the ground at  $B$  is 2.5 s. Determine the speed  $v_A$  and angle  $\theta_A$  at which the ball was thrown. (10 pts)

**Exercise 5**

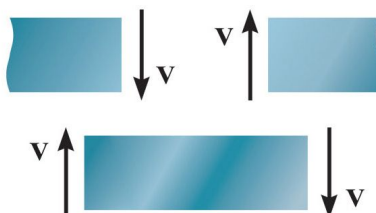
The spool has a mass of 50 kg and a radius of gyration of  $k_O = 0.280$  m. If the 20 kg block  $A$  is released from rest, determine the velocity of the block when it descends 0.5 m. (20 pts)

**Exercise 6**

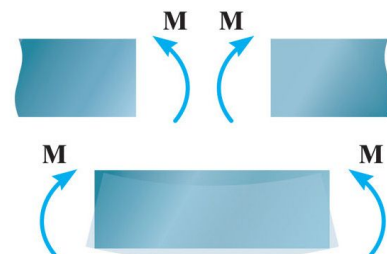
If the slider block  $C$  is moving at  $v_C = 3$  m/s, determine the angular velocities of bar  $BC$  and of the crank  $AB$  at the instant shown. (20 pts)



Positive normal force



Positive shear



Positive moment