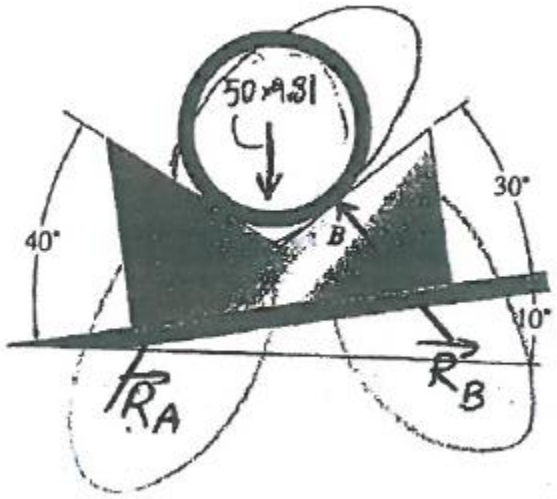
26/11/2020

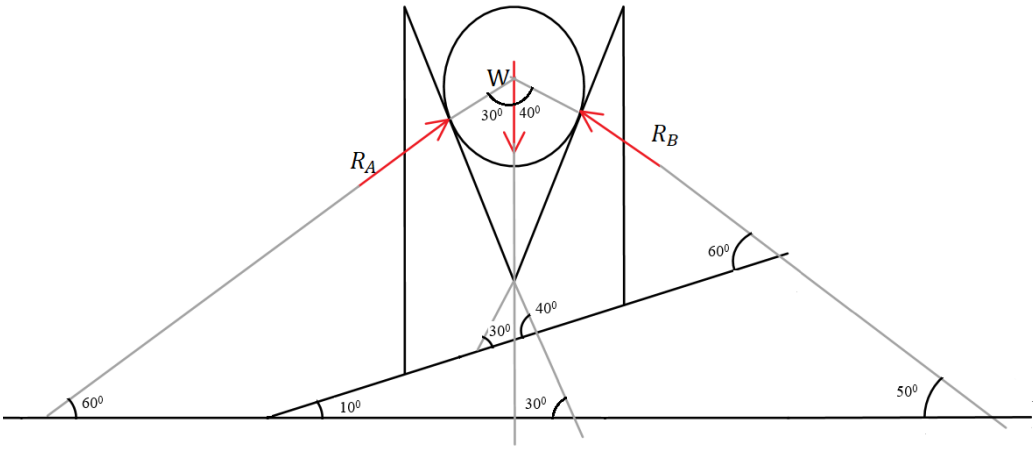
ES 221 MECHANICS I (STATICS) RECITATION VI

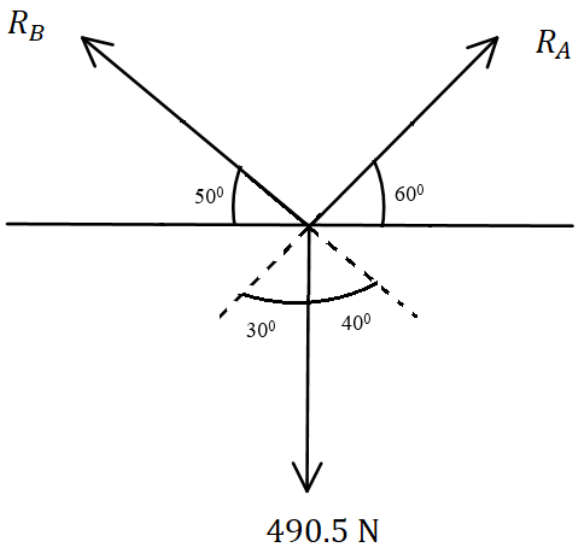
Q1)

Draw the free-body diagram of the 50-kg pipe which is supported by the smooth contacts at A and B. Explain the significance of each force of the diagram.



Answer to Q1





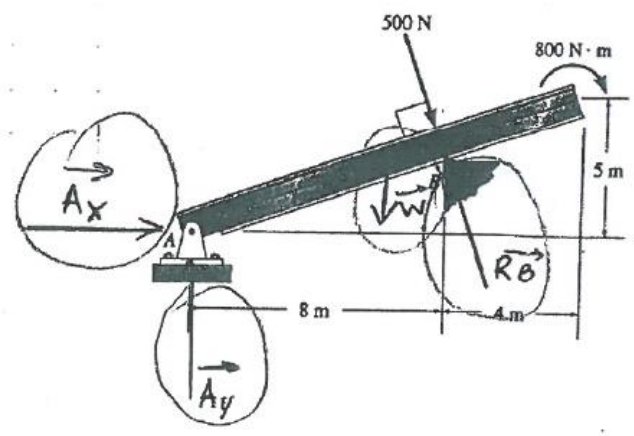
$$\frac{490.5\ N}{\sin 70^0} = \frac{R_A}{sin140^0} = \frac{R_B}{sin150^0}$$

$R_A = 335.5\ N$

$R_B = 261\ N$

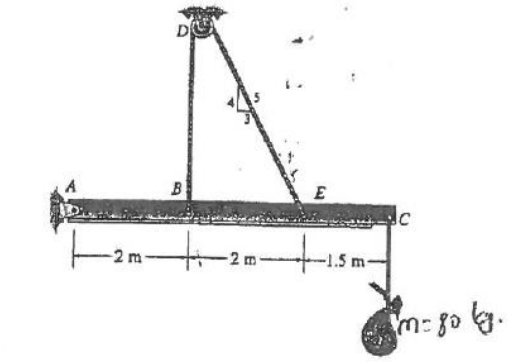
Q2)

Draw the free-body diagram of the beam. The support at B is smooth. Explain the significance of each force on the diagram.

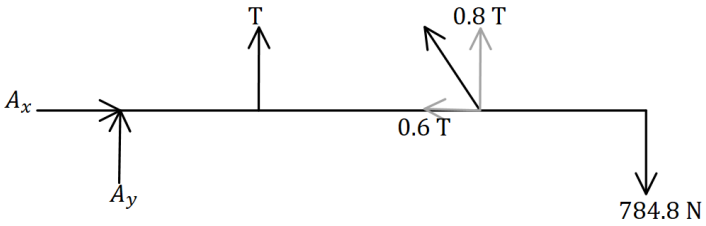


Q3)

Determine the tension in the cord and the reactions at support A of the beam.



Answer to Q3



$$\circlearrowleft + \sum M_A = 0$$

$$2\,T + 0.8\,T \times 4\,m - 784.8\,N \times 5.5\,m = 0$$

$$T = 830\,N$$

$$+\uparrow \sum F_y = 0$$

$$A_y + 1.8\,T - 784.8\,N = 0$$

$$A_y = -709\,N$$

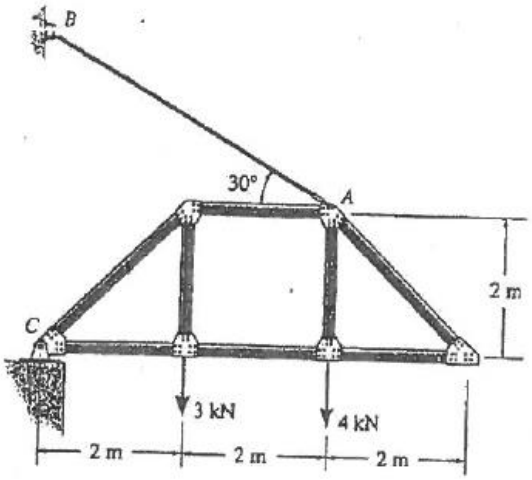
$$A_y = 709\,N \downarrow$$

$$+\rightarrow \sum F_x = 0$$

$$A_x = 498\,N \rightarrow$$

Q4)

Determine the reactions at the supports for the truss.



$$\circlearrowleft + \sum M_C = 0$$

$$T\cos 30^0 \times 2 + 0.5T \times 4 - 3\ kN \times 2\ m - 4\ kN \times 4\ m = 0$$

$$T = 5.89\ kN$$

$$\uparrow \sum F_y = 0$$

$$C_y - 3\ kN - 4\ kN + 0.5 \times 5.89\ kN = 0$$

$$C_y = 4.05\ kN \uparrow$$

$$+\rightarrow \sum F_x = 0$$

$$C_x - T\cos 30^0 = 0$$

$$C_x = 5.11\ kN \rightarrow$$