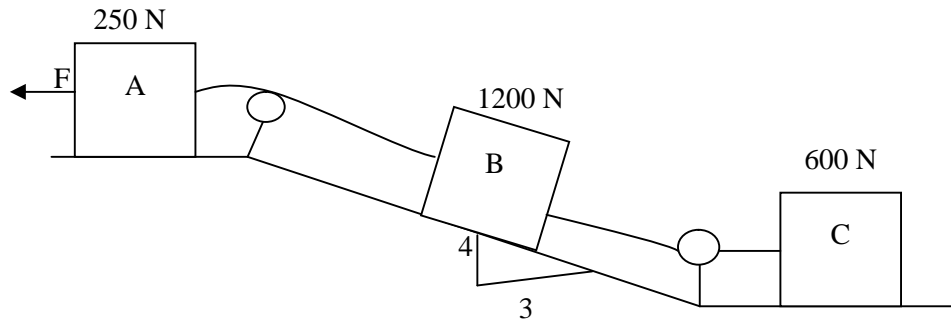




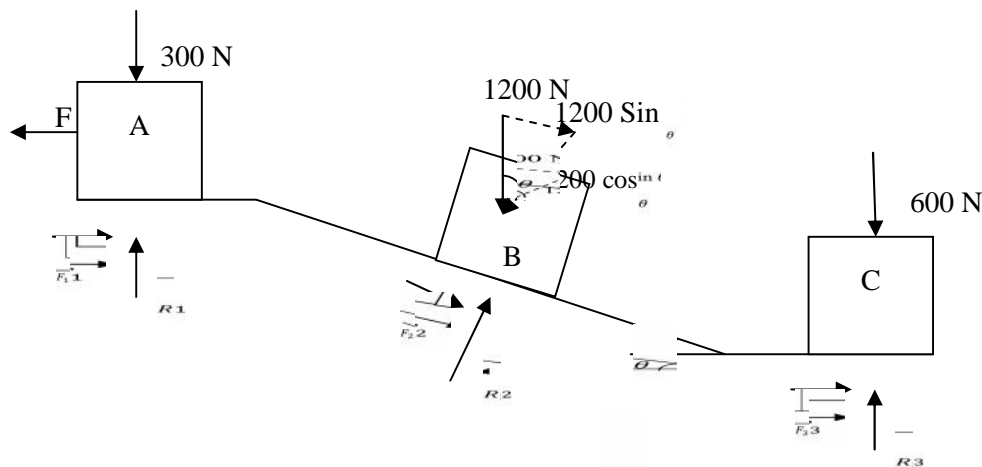
Problem:

Determine the force F that will give the system of bodies shown in figure. A velocity of 3 m/sec after moving 4.5m from rest. Co-efficient of friction between the blocks and the plane is 0.3 pulleys are smooth.



Solution:

FBD of the system



$$\tan \theta = 4/3$$

$$\theta = \tan^{-1}\left(\frac{4}{3}\right)$$

$$\theta = 53.13'$$

Resolving forces vertically



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Block A

$$R_1 = 300N$$

Frictional Forces

$$F_1 = \mu_1 R_1$$

$$= 0.3 \times 300$$

$$F_1 = 90N$$

Block B

$$R_2 = 1200 \cos 53.13$$

$$R_2 = 720 N$$

$$F_2 = \mu R_2$$

$$= 0.3 \times 720$$

$$F_2 = 216 N$$

Block C

$$R_3 = 600N$$

$$F_3 = \mu R_3$$

$$= 0.3 \times 600$$

$$F_3 = 180N$$

Applying work energy equation

$$U_{1-2} = T_1 - T_2$$

$$(-F + F_2 + F_2 + F_2 + 1200 \sin \theta) \times s = \frac{1}{2} (m_1 + m_2 + m_3) (v^2 - u^2)$$

$$(-F + 90 + 216 + 180 + 959.9) \times 4.5 = \frac{1}{2} \left(\frac{300 + 1200 + 600}{9.81} \right) (3^2 - 0)$$

$$-4.5F + 6506.55 = 963.302$$

$$F = 1213.83N$$