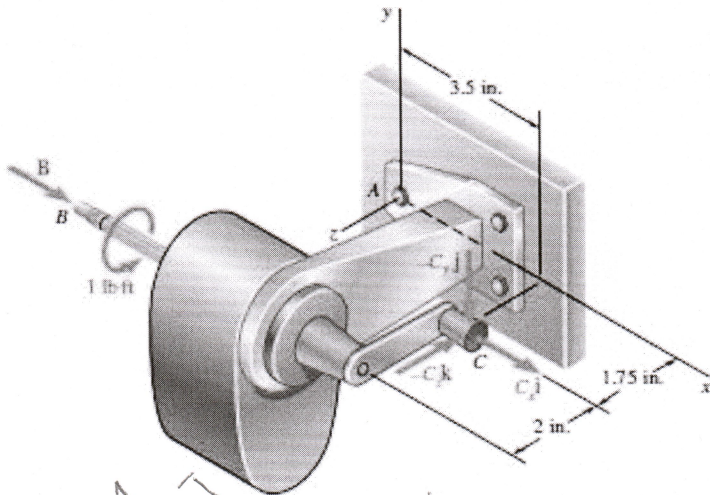
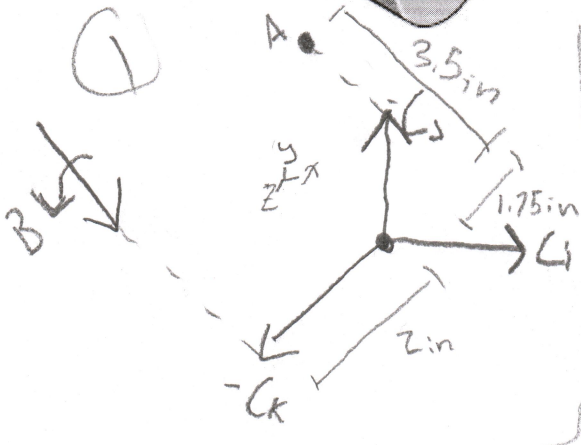


GNG1105F – ENGINEERING MECHANICS  
Assignment 2: Chapter 3 Summary Problem



While using a pencil sharpener, a student applies the forces and couple shown. (a) Determine the forces exerted at B and C knowing that these forces and the couple are equivalent to a force-couple system at A consisting of the force  $\mathbf{R} = (2.6 \text{ lb})\mathbf{i} + R_y\mathbf{j} - (0.7 \text{ lb})\mathbf{k}$  and the couple  $\mathbf{M}_A^R = M_x\mathbf{i} + (1.0 \text{ lb}\cdot\text{ft})\mathbf{j} - (0.72 \text{ lb}\cdot\text{ft})\mathbf{k}$ . (b) Find the corresponding values of  $R_y$  and  $M_x$ .



②  $z_{in} = 0.167F +$   
 $1.75in = 0.146F +$   
 $3.75in = 0.3125F +$

③  $\sum F_x = 0 \rightarrow B_x + C_x = 2.6 \text{ lb}$   
 $\sum F_y = 0 \rightarrow -C_y = R_y$   
 $\sum F_z = 0 \rightarrow -C_z = -0.7 \text{ lb} = C_z = 0.7 \text{ lb}$

④  $\sum M = 0$

$M_A^R = M_x\hat{i} + 1 \text{ lb}\cdot\text{ft}\hat{j} - 0.72 \text{ lb}\cdot\text{ft}\hat{k}$

$M_x = 1 \text{ lb}\cdot\text{ft} + (C_y)(0.146 \text{ ft})$

$M_y = (B)(0.3125 \text{ ft}) + (C_x)(0.146 \text{ ft}) = 1 \text{ lb}\cdot\text{ft}$

$M_z = -C_z(0.3 + 2.5 \text{ ft}) = -0.72 \text{ lb}\cdot\text{ft}$

⑤  $C_y = - \left( \frac{-0.72 \text{ lb}\cdot\text{ft}}{0.3125 \text{ ft}} \right)$   
 $C_y = 2.3 \text{ lb}$   
 $-C_y = R_y$   
 $R_y = -2.3 \text{ lb}$

⑥  $M_x = 1 \text{ lb}\cdot\text{ft} + (C_y)(0.146 \text{ ft})$   
 $M_x = 1 \text{ lb}\cdot\text{ft} + (2.3)(0.146 \text{ ft})$   
 $M_x = 1.34 \text{ lb}\cdot\text{ft}$   
 $\circlearrowleft R_y = -2.3 \text{ lb}$  and  $M_x = 1.36 \text{ lb}\cdot\text{ft}$