Example 3.2

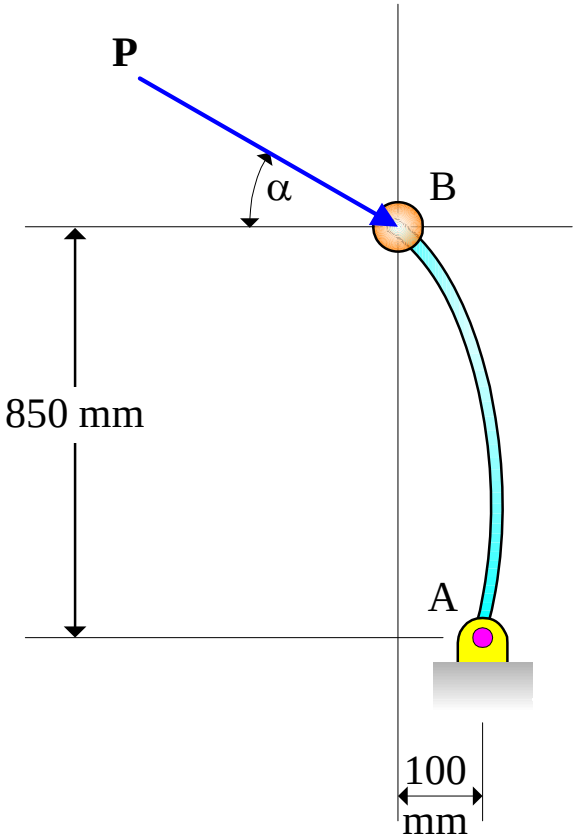
J. Frye

Example 3.2:

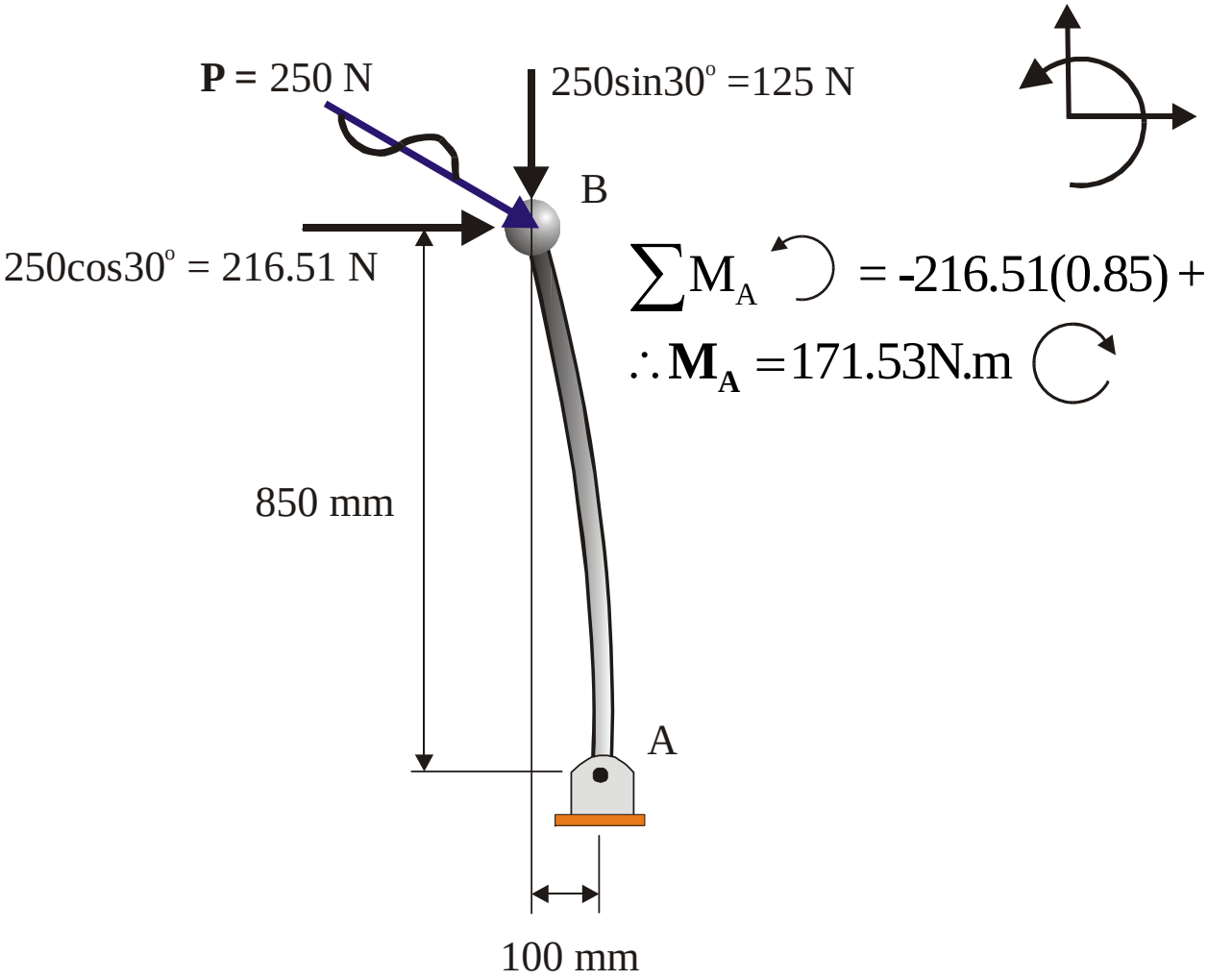
A force **P** is applied at point B of the gear shift.

(a) Determine the moment of **P** about point A when P = 250 N and $\alpha = 30°$.

(b) Find the smallest value P and angle α which has the same moment as in part (a).



a) We resolve force P into its Rectangular Components and take moments about A



$$\sum M_A \circlearrowleft = -216.51(0.85) + 125(0.1) = -171.53 \text{N.m}$$

$$\therefore \mathbf{M_A} = 171.53 \text{N.m} \circlearrowright$$

b) Since M = Fd or F = M/d

F gets smaller as d increases.

The minimum value of force **P** occurs when the perpendicular distance, d from the line of action of the force to the point we are taking moment about is the largest distance.

In this case, d = length of the line BA and **P** is perpendicular to this line

$$d = \sqrt{0.85^2 + 0.1^2} = 0.856\text{m}$$

$$M = Fd$$

$$171.53 = F(0.856)$$

$$F = 200.39\text{N}$$

$$\therefore \mathbf{F} = 200.39\text{N}$$