

b3
SAMPLE PROBLEM 2/5

5 WAYS TO SOLVE:

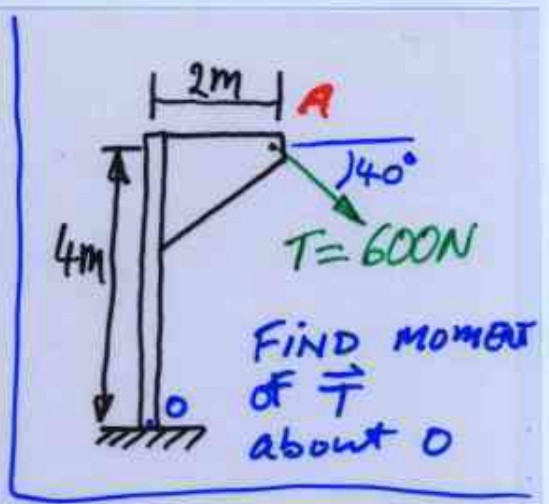
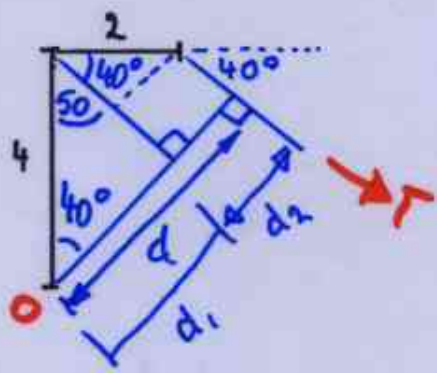
I GEOMETRY

$$d_1 = 4 \cos(40^\circ)$$

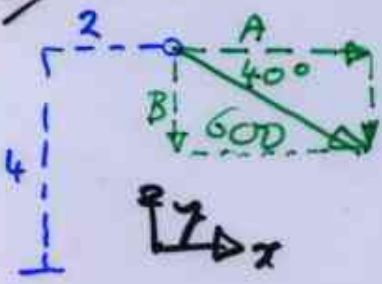
$$d_2 = 2 \sin(40^\circ)$$

$$d = d_1 + d_2 = 4.35 \text{ m}$$

$$\Rightarrow \vec{M}_O = \underline{2610 \text{ Nm}} \text{ CLOCKWISE. OR } \underline{-2610 \text{ Nm}} \text{ (RIGHT HAND RULE)}$$



II COMPONENTS:

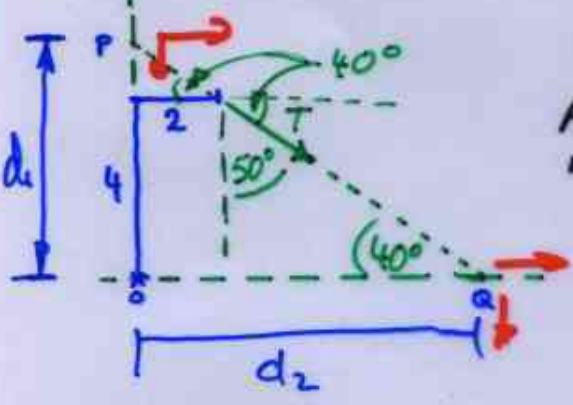


$$\vec{T} = (600)(\cos 40^\circ)\hat{i} + (600)(\sin 40^\circ)\hat{j}$$

$$\vec{T} = \underset{A}{460}\hat{i} + \underset{B}{386}\hat{j}$$

TOTAL MOMENT IS NOW:
 $(460)(4) + (386)(2) = \underline{2610 \text{ Nm}}$ (DIRXN AS BEFORE)

III TRANSMISSIBILITY + COMPONENTS



FORCE \vec{T} CAN BE MOVED ALONG LINE OF ACTION TO P OR Q
 AT P ONLY \hat{i} COMPONENT HAS MOMENT
 " Q " \hat{j} " " " "

At P: $\vec{M} = (460)(d_1)$
 $= (460)(2 \cdot \tan(40^\circ) + 4)$
 $= \underline{2610 \text{ Nm}}$

At Q: $\vec{M} = 460 d_2 = \overset{386}{460}(2 + 4 \tan(50^\circ))$
 $= \underline{2610 \text{ Nm}}$

IV CROSS PRODUCT:

$$\vec{M}_O = \vec{r} \times \vec{F} = (2\hat{i} + 4\hat{j}) \times (\hat{i} \cos 40^\circ + \hat{j} \sin 40^\circ) 600$$

$$\vec{M}_O = \underline{-2610 \hat{k}} \text{ N}\cdot\text{m} \text{ NOTE SIGN}$$