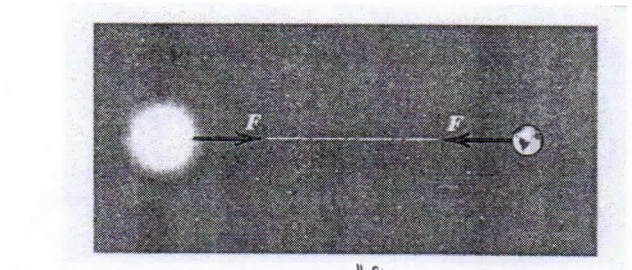
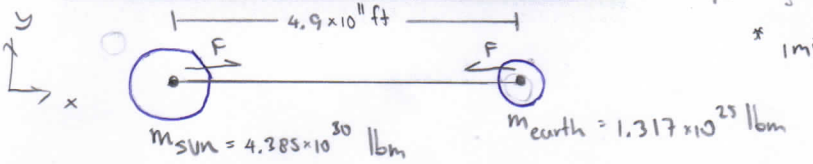
นำไปใส่กล่องใต้ตึกฮันส์ บันตลิ ก่อนเวลา 14:00 ของวันที่กำหนดส่ง

ชื่อ-นามสกุล.....เลขประจำตัว.....Sec:.....

HW 1 Compute the magnitude F of the force which the sun exerts on the earth. Perform the calculation first in pounds and then convert your result to newtons. Refer to Table D/2 for necessary physical properties.





$G = 3.439\times10^{-8}\ ft/lbf\,s^4$

$m_{sun} = 333000\, m_{earth}$

$m_{earth} = 4.095\times10^{23}\ lbf\,s^2/ft$

$r = 92.96\times10^6\ mi$

* $1\,mi = 5280\ ft$

$$F = \frac{G m_{sun} m_{earth}}{r^2}$$

$$= \frac{3.439\times10^{-8} \times (333000\times4.095\times10^{23}) \times (4.095\times10^{23})}{5280 \times 92.96\times10^6}$$

$$= 7.97\times10^{21}\ lb \quad \text{Ans}$$

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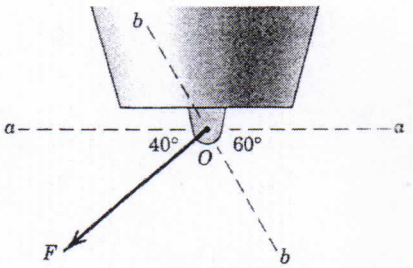
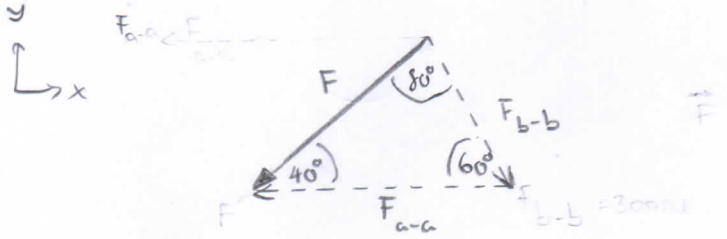
HW 2 The force F applied at O has two components, one along a-a and the other along b-b. If the component along b-b has a magnitude of 300 N, calculate the component along a-a and the value of F.





From law of sines

$$\frac{F}{\sin 60^\circ} = \frac{F_{a-a}}{\sin 80^\circ} = \frac{F_{b-b}}{\sin 40^\circ}$$

$$\frac{F}{\sin 60^\circ} = \frac{F_{b-b}}{\sin 40^\circ}$$

$$F = \frac{F_{b-b}}{\sin 40^\circ}(\sin 60^\circ)$$

$$= \frac{300}{\sin 40^\circ} \times \sin 60^\circ$$

$$= 4.0419 \times 10^2 \text{ N}$$

$$= 404.19 \text{ N}$$

$$\frac{F_{a-a}}{\sin 80^\circ} = \frac{F_{b-b}}{\sin 40^\circ}$$

$$F_{a-a} = \frac{F_{b-b}}{\sin 40^\circ} \times \sin 80^\circ$$

$$= \frac{300}{\sin 40^\circ} \times \sin 80^\circ$$

$$= 4.5963 \times 10^2 \text{ N}$$

$$= 459.63 \text{ N}$$

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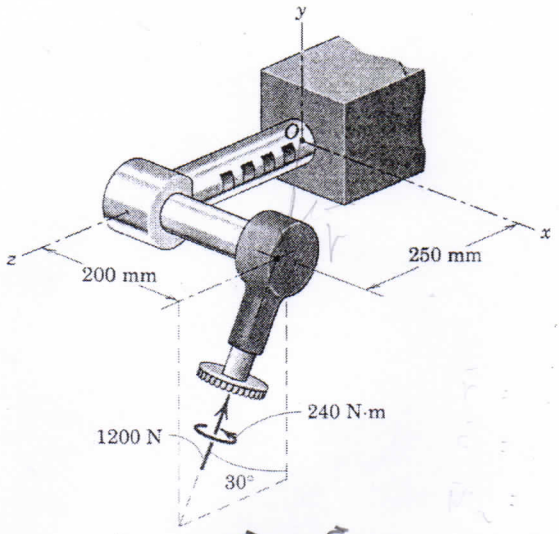
HW 3 The special-purpose milling cutter is subjected to the force of 1200 N and a couple of 240 N.m as shown. Determine the moment of this system about point O.



$\vec{r} = 0.2\hat{i} + 0.25\hat{k}$ m

$\vec{F} = 1200(\cos 30^\circ \hat{j} - \sin 30^\circ \hat{k})$ N

$\vec{M}_a = 240(\cos 30^\circ \hat{j} - \sin 30^\circ \hat{k})$ Nm.

$\vec{M}_o = \vec{r} \times \vec{F} + \vec{M}_a$

$= (0.2\hat{i} + 0.25\hat{k})\text{m} \times (1200\text{N})(\cos 30^\circ \hat{j} - \sin 30^\circ \hat{k}) + 240\text{Nm}(\cos 30^\circ \hat{j} - \sin 30^\circ \hat{k})$

$= (-259.8\hat{i} + 120\hat{j} + 207.8\hat{k})\text{Nm} + (207.85\hat{j} - 120\hat{k})\text{Nm}$

$= -259.8\hat{i} + 327.85\hat{j} + 87.8\hat{k}$ Nm Ans

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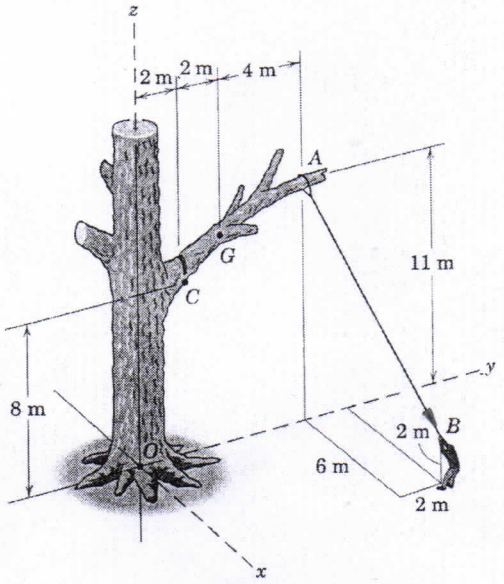
ชื่อ-นามสกุล.....เลขประจำตัว.....Sec:.....

HW 4 In an attempt to pull down a nearly sawn-through branch, the tree surgeon exerts a 400 N pull on the line which is looped around the branch at A. Determine the moment about point C of the force exerted on the branch and state the magnitude of this moment.



$\vec{F}_{AB} = 400\left(\frac{6}{11}\hat{i} + \frac{2}{11}\hat{j} - \frac{9}{11}\hat{k}\right) = 218.18\hat{i} + 72.73\hat{j} - 327.27\hat{k}$ N.

$\vec{r}_{CA} = (6\hat{j} + 3\hat{k})$ m.

$\vec{m}_C = \vec{r}_{CA} \times \vec{F}_{AB}$

$\vec{m}_C = (6\hat{j} + 3\hat{k}) \times (218.18\hat{i} + 72.73\hat{j} - 327.27\hat{k})$ Nm.

$= -2181.8\hat{i} + 654.54\hat{j} - 1309\hat{k}$ Nm

$|m_C| = 2627.2$ Nm.

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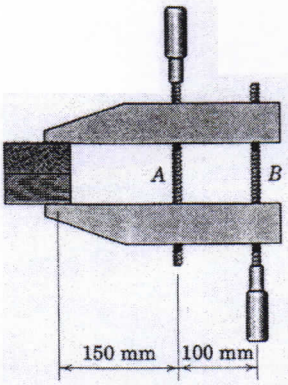
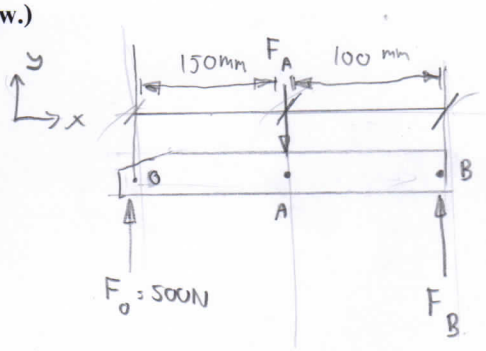
HW 5-If the screw B of the wood clamp is tightened so that the two blocks are under a compression of 500 N, determine the force in screw A. (Note: The force supported by each screw may be taken in the direction of the screw.)





$\circlearrowleft + \left[\Sigma M_B = 0\right]$

$OB \times F_O + AB \times F_A = 0$

$(0.25m)(-500N) + (0.1m)(F_A) = 0$

$F_A = 1250\ N$ Ans

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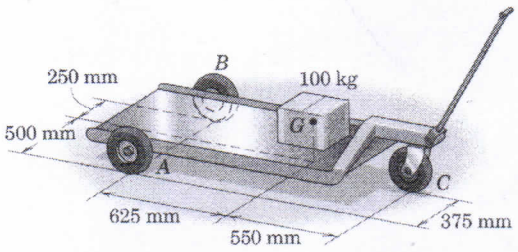
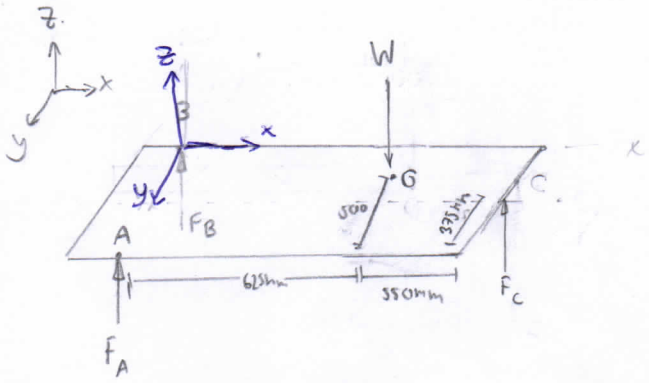
ชื่อ-นามสกุล.....เลขประจำตัว.....Sec:.....

HW 6-The three-wheel truck is used to carry the 100-kg box as shown. Calculate the changes in the normal force reactions at the three wheels due to the weight of the box.





$[\Sigma F_z = 0]$ $F_{A_z} + F_{B_z} + F_{C_z} - W_{box} = 0$

$F_A + F_B + F_C = (100\,kg)(9.81\,m/s^2) =$

$F_A + F_B + F_C = 98.1\,N$

$[\Sigma M_{AB} = 0]$ $-(W_{box})(0.625\,m) + F_C(1.175\,m) = 0$

$-(98.1\,N)(0.625m) + F_C(1.175m) = 0$

$F_C = 5,218\,N.$

$[\Sigma M_{B_x} = 0]$

So $F_A = 66.025\,N$

$F_B = 392.695\,N.$ Ans