2/1

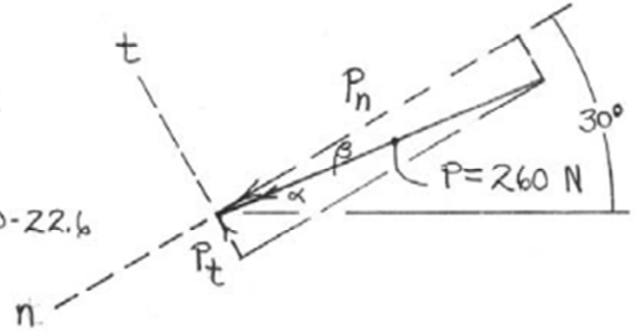
$$\begin{cases} F_x = -800 \sin 35^\circ = \underline{-459\ \text{N}} \\ F_y = 800 \cos 35^\circ = \underline{655\ \text{N}} \end{cases}$$

$$\underline{F} = -459\,\underline{i} + 655\,\underline{j}\ \text{N}$$

2/10

$$\alpha = \tan^{-1}\frac{5}{12} = 22.6^\circ$$

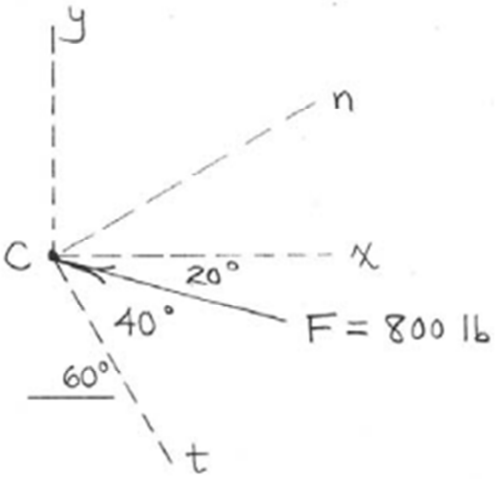
$$\beta = 30 - \alpha = 30 - 22.6 = 7.38^\circ$$



$$P_n = P\cos\beta = 260\cos 7.38^\circ = \underline{258\ \text{N}}$$

$$P_t = P\sin\beta = 260\sin 7.38^\circ = \underline{33.4\ \text{N}}$$

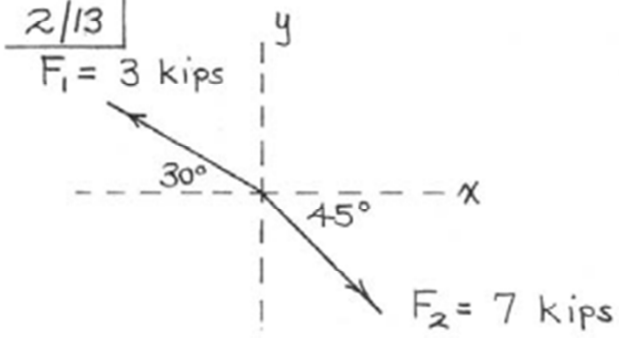
2/12



$$\begin{cases} F_x = -800 \cos 20^\circ = \underline{-752 \text{ lb}} \\ F_y = 800 \sin 20^\circ = \underline{274 \text{ lb}} \end{cases}$$

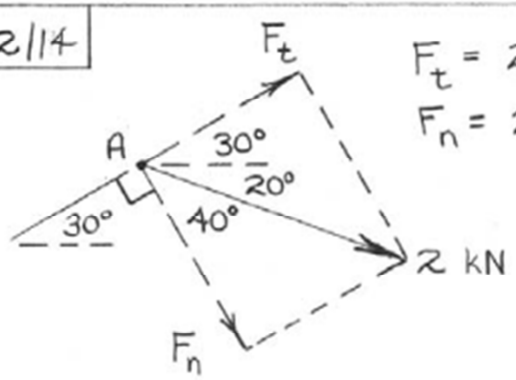
$$\begin{cases} F_n = -800 \sin 40^\circ = \underline{-514 \text{ lb}} \\ F_t = -800 \cos 40^\circ = \underline{-613 \text{ lb}} \end{cases}$$

2/13



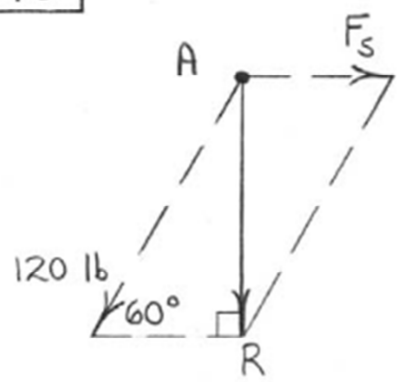
$$R_x = \Sigma F_x = -3\cos 30° + 7\cos 45° = 2.35 \text{ kips}$$
$$R_y = \Sigma F_y = 3\sin 30° - 7\sin 45° = -3.45 \text{ kips}$$
$$\underline{R} = 2.35\,\underline{i} - 3.45\,\underline{j} \text{ kips}$$

2/14



$$F_t = 2\cos 50° = 1.286 \text{ kN}$$
$$F_n = 2\sin 50° = 1.532 \text{ kN}$$

2/15



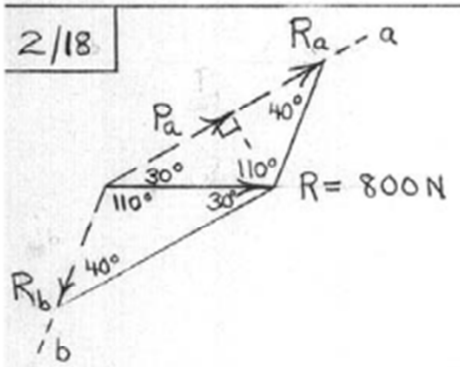
$$\cos 60^\circ = \frac{F_s}{120}$$

$$F_s = 60 \text{ lb}$$

$$\sin 60^\circ = \frac{R}{120}$$

$$R = 103.9 \text{ lb}$$

2/18



Law of sines :

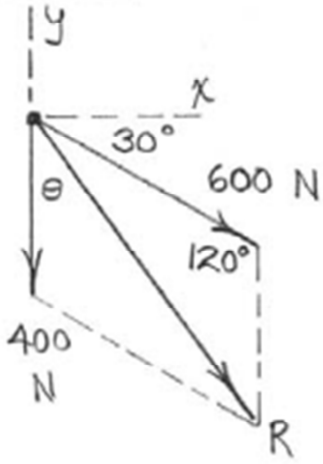
$$\frac{800}{\sin 40^\circ} = \frac{R_a}{\sin 110^\circ} = \frac{R_b}{\sin 30^\circ}$$

$$R_a = 1170 \text{ N}$$

$$R_b = 622 \text{ N}$$

Projection $P_a = R\cos 30^\circ = 800 \cos 30^\circ = 693$ N

2/19 Law of Cosines:



$$R^2 = 400^2 + 600^2 - 2(400)(600)\cos 120^\circ$$

$$\underline{R = 872 \text{ N}}$$

Law of sines:

$$\frac{600}{\sin\theta} = \frac{872}{\sin 120^\circ}, \quad \underline{\theta = 36.6^\circ}$$

$$R_x = \Sigma F_x = 600\cos 30^\circ = 520 \text{ N}$$

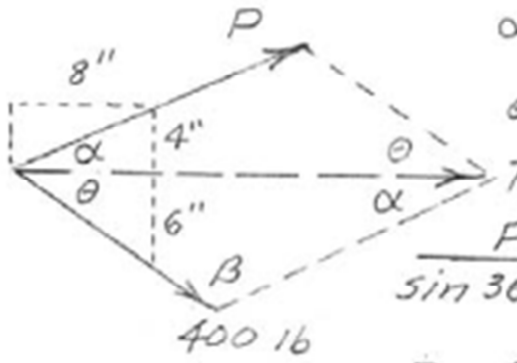
$$R_y = \Sigma F_y = -600\sin 30^\circ - 400 = -700 \text{ N}$$

So $\underline{\mathbf{R} = 520\,\mathbf{i} - 700\,\mathbf{j} \text{ N}}$

(Check: $R = \sqrt{520^2 + 700^2} = 872$ N ✓

$\theta = \tan^{-1}\frac{520}{700} = 36.6^\circ$ ✓)

2/20



$\alpha = \tan^{-1}\frac{4}{8} = 26.57°$

$\theta = \tan^{-1}\frac{6}{8} = 36.87°$

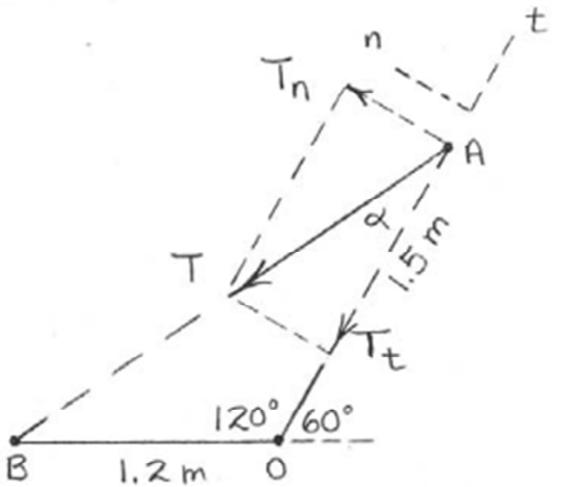
$\beta = 180 - (\alpha + \theta) = 116.57°$

$$\frac{P}{\sin 36.87°} = \frac{400}{\sin 26.57°}$$

$$P = 400\,\frac{0.6}{0.4472} = \underline{537\ lb}$$

$$\frac{T}{\sin 116.56°} = \frac{400}{\sin 26.57°}, \quad T = 400\,\frac{0.8944}{0.4472} = \underline{800\ lb}$$

2/24



$\overline{AB}^2 = 1.2^2 + 1.5^2 - 2(1.2)(1.5)\cos 120°$

$\overline{AB} = 2.34\ m$

$\frac{\sin\alpha}{1.2} = \frac{\sin 120°}{2.34}$) $\quad \alpha = 26.3°$

$T_n = T\sin\alpha = 750\sin 26.3° = \underline{333\ N}$

$T_t = -T\cos\alpha = -750\cos 26.3° = \underline{-672\ N}$