

<4.6~4.7 >

4.70  $\tan \theta = \frac{60 \text{ mm}}{100 \text{ mm}} = 0.60$

$\theta = \tan^{-1}(0.60) = 30.96^\circ$

$\alpha = 45^\circ - \theta = 45^\circ - 30.96^\circ = 14.04^\circ$

sine  $\frac{\sin \alpha}{130 \text{ N}} = \frac{\sin \theta}{B} = \frac{\sin 135^\circ}{C}$

$\frac{\sin \alpha}{130 \text{ N}} = \frac{\sin \theta}{B}$

$B = \frac{\sin \theta}{\sin \alpha} (130 \text{ N}) = \frac{\sin 30.96^\circ}{\sin 14.04^\circ} (130 \text{ N})$

$= 275.7 \text{ N}$

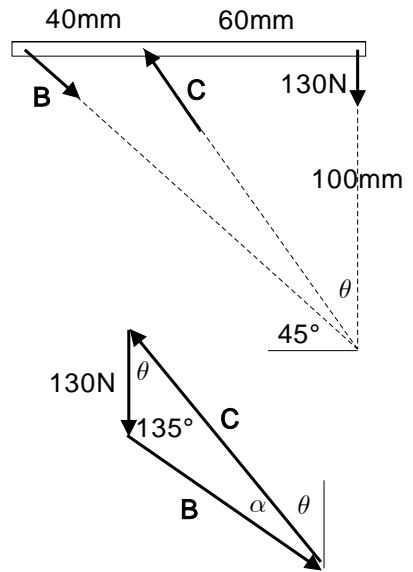
$A = B = 275.7 \text{ N}$

$A = 276 \text{ N } \bar{45}^\circ$

$\frac{\sin \alpha}{130 \text{ N}} = \frac{\sin 135^\circ}{C}$

$C = \frac{\sin 135^\circ}{\sin \alpha} (130 \text{ N}) = \frac{\sin 135^\circ}{\sin 14.04^\circ} (130 \text{ N}) = 378.9 \text{ N}$

$45^\circ + 14.04^\circ = 59.04^\circ$



$C = 379 \text{ N } \underline{59.0}^\circ$

4.77  $W = (120 \text{ kg})(9.81 \text{ m/s}^2) = 1177.2 \text{ N}$

$\overline{BH} = \overline{AF} = (1.2 \text{ m}) \cos 30^\circ = 1.0392 \text{ m}$

$\overline{DF} = (1.2 \text{ m}) \sin 30^\circ = 0.600 \text{ m}$

$\overline{EH} = \overline{BH} \tan 75^\circ = (1.0392 \text{ m}) \tan 75^\circ = 3.8783 \text{ m}$

$\overline{EF} = \overline{EH} - \overline{FH} = (3.8783 \text{ m}) - (0.4 \text{ m}) = 3.4783 \text{ m}$

$\tan \theta = \frac{\overline{EF}}{\overline{AF}} = \frac{3.4783 \text{ m}}{1.0392 \text{ m}} = 3.3471$

$\theta = \tan^{-1}(3.3471) = 73.366^\circ$

$\gamma = 75^\circ - \theta = 75^\circ - 73.366^\circ = 1.634^\circ$

$\alpha = 90^\circ - 75^\circ = 15^\circ$

$\beta = 180^\circ - \alpha - \gamma = 180^\circ - 15^\circ - 1.634^\circ = 163.37^\circ$

sine  $\frac{\sin \gamma}{W} = \frac{\sin \alpha}{A} = \frac{\sin \beta}{B}$

(a)  $\frac{\sin \gamma}{W} = \frac{\sin \beta}{B}$

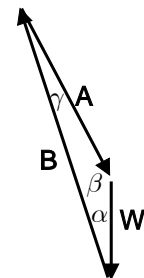
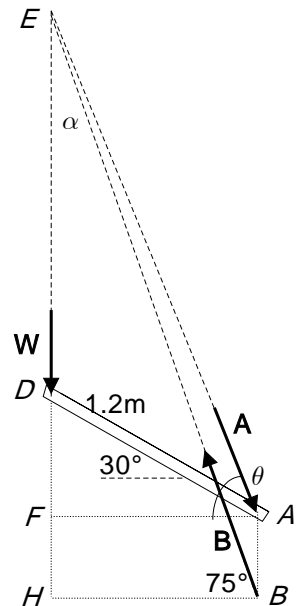
$B = \frac{\sin \beta}{\sin \gamma} W = \frac{\sin 163.37^\circ}{\sin 1.634^\circ} (1177.2 \text{ N}) = 11815 \text{ N}$

$B = 11.82 \text{ kN } \underline{75}^\circ$

(b)  $\frac{\sin \gamma}{W} = \frac{\sin \alpha}{A}$

$A = \frac{\sin \alpha}{\sin \gamma} W = \frac{\sin 15^\circ}{\sin 1.634^\circ} (1177.2 \text{ N}) = 10685 \text{ N}$

$A = 10.68 \text{ kN } \bar{73.4}^\circ$



4.88  $L = 0.20 \text{ m}$ ,  $S = 0.30 \text{ m}$ ,  
 $W = (1.5 \text{ kg})(9.81 \text{ m/s}^2) = 14.715 \text{ N}$

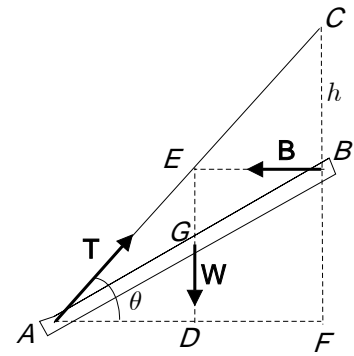
(a)  $\overline{AG} = \overline{GB}$   $ADE = EBC$   
 $\overline{BF} = \overline{ED} = \overline{CB} = h$

$$\overline{AF}^2 + \overline{FC}^2 = \overline{AC}^2$$

$$\overline{AF}^2 + (2h)^2 = S^2 \quad \dots$$

$$\overline{AF}^2 + \overline{FB}^2 = \overline{AB}^2$$

$$\overline{AF}^2 + h^2 = L^2 \quad \dots$$



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$$3 h^2 = S^2 - L^2$$

$$h = \sqrt{\frac{S^2 - L^2}{3}} = \sqrt{\frac{(0.30 \text{ m})^2 - (0.20 \text{ m})^2}{3}} = 0.1291 \text{ m}$$

(b)  $\sin\theta = \frac{2h}{S} = \frac{2(0.1291 \text{ m})}{0.300 \text{ m}} = 0.8607$

$$\theta = \sin^{-1}(0.8607) = 59.39^\circ$$

$$T = \frac{W}{\sin\theta} = \frac{14.715 \text{ N}}{0.8607} = 17.096 \text{ N}$$

$$T = 17.10 \text{ N}$$

(c)  $B = \frac{W}{\tan\theta} = \frac{14.715 \text{ N}}{\tan 59.39^\circ} = 8.706 \text{ N}$

$$\mathbf{B} = 8.71 \text{ N}$$

