

<4.6~4.7 >

4.67 [,]

$$B = 150 \text{ N}$$

(a) $\alpha = 90^\circ$

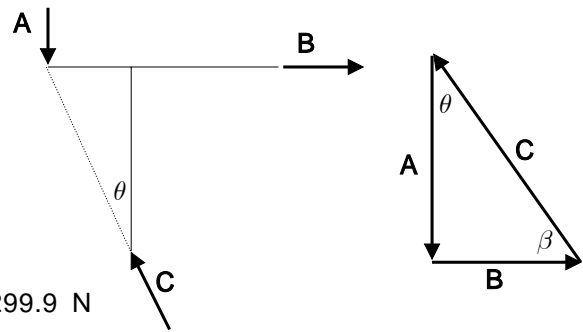
$$\theta = \tan^{-1} \frac{15}{30} = 26.57^\circ$$

$$\beta = 90^\circ - 26.57^\circ = 63.43^\circ$$

$$\text{sine } \frac{\sin \beta}{A} = \frac{\sin \theta}{B} = \frac{\sin 90^\circ}{C}$$

$$A = B \frac{\sin \beta}{\sin \theta} = (150 \text{ N}) \frac{\sin 63.43^\circ}{\sin 26.57^\circ} = 299.9 \text{ N}$$

$$C = \frac{B}{\sin \theta} = \frac{150 \text{ N}}{\sin 26.57^\circ} = 335.4 \text{ N}$$



$$A = 300 \text{ N} , C = 335 \text{ N } \underline{63.4^\circ}$$

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(b) $\alpha = 45^\circ$

$$\theta = \tan^{-1} \frac{15}{30+40} = 12.09^\circ$$

$$\beta = 90^\circ - \theta - \alpha$$

$$= 90^\circ - 12.094^\circ - 45^\circ = 32.9^\circ$$

$$\gamma = 90^\circ + \alpha = 90^\circ + 45^\circ = 135^\circ$$

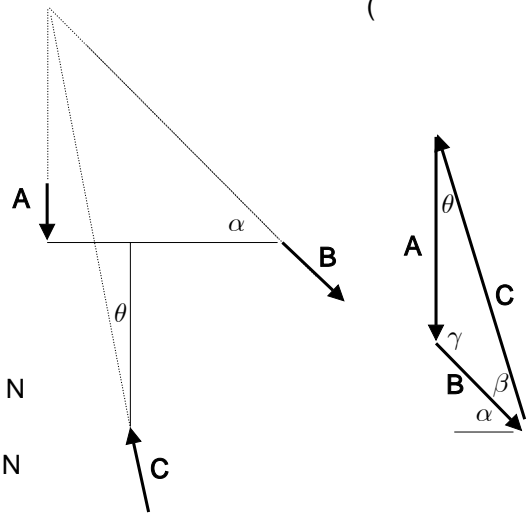
$$\text{sine } \frac{\sin \beta}{A} = \frac{\sin \theta}{B} = \frac{\sin \gamma}{C}$$

$$A = B \frac{\sin \beta}{\sin \theta} = (150 \text{ N}) \frac{\sin 32.9^\circ}{\sin 12.09^\circ} = 389.0 \text{ N}$$

$$C = B \frac{\sin \gamma}{\sin \theta} = (150 \text{ N}) \frac{\sin 135^\circ}{\sin 12.09^\circ} = 506.4 \text{ N}$$

$$\alpha + \beta = 45^\circ + 32.9^\circ = 77.9^\circ$$

$$A = 389 \text{ N} , C = 506 \text{ N } \underline{77.9^\circ}$$



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4.77 [,]

$$B_y = 80 \text{ N}, \quad y_{AB} = 7 \text{ cm},$$

(a) $y_{AD} = (10 \text{ cm}) \tan 78^\circ = 47.046 \text{ cm}$

$$y_{BD} = y_{AD} - y_{AB} = (47.046 \text{ cm}) - (7 \text{ cm}) = 40.046 \text{ cm}$$

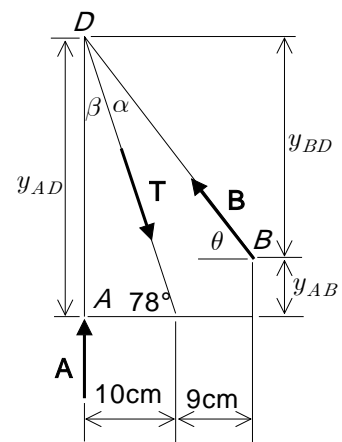
$$\tan \theta = \frac{y_{BD}}{19 \text{ cm}} = \frac{40.046}{19} = 2.108$$

$$\theta = \tan^{-1}(2.108) = 64.618^\circ$$

$$B_y = B \sin \theta$$

$$B = \frac{B_y}{\sin \theta} = \frac{80 \text{ N}}{\sin 64.618^\circ} = 88.54 \text{ N}$$

$$B = 88.5 \text{ N } \underline{64.6^\circ}$$



(b) $\beta = 90^\circ - 78^\circ = 12^\circ$

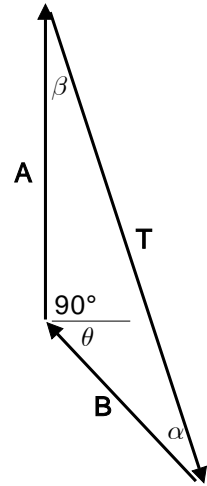
$\alpha = 90^\circ - \theta - \beta = 90^\circ - 64.6^\circ - 12^\circ = 13.4^\circ$

sine $\frac{\sin\alpha}{A} = \frac{\sin\beta}{B} = \frac{\sin(90^\circ + \theta)}{T}$

$\frac{\sin\alpha}{A} = \frac{\sin\beta}{B}$

$A = B \frac{\sin\alpha}{\sin\beta} = (88.54 \text{ N}) \frac{\sin 13.4^\circ}{\sin 12^\circ} = 98.69 \text{ N}$

$A = 98.7 \text{ N}$



(c) $\frac{\sin\beta}{B} = \frac{\sin(90^\circ + \theta)}{T}$

$T = B \frac{\sin(90^\circ + \theta)}{\sin\beta} = (88.54 \text{ N}) \frac{\sin(90^\circ + 64.6^\circ)}{\sin 12^\circ} = 182.7 \text{ N}$

4.79 [$P = 110 \text{ N}$, $d_{AC} = 0.4 \text{ m}$, $d_{BC} = 0.3 \text{ m}$]

< 1 > $\sum M_C = 0$

(a) $\uparrow M_C = 0$;

$(T - P) d_{AC} - T d_{BC} = 0$

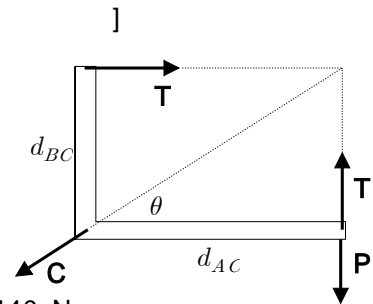
$T = P \frac{d_{AC}}{d_{AC} - d_{BC}} = (110 \text{ N}) \frac{0.4 \text{ m}}{(0.4 \text{ m}) - (0.3 \text{ m})} = 440 \text{ N}$

(b) $F_x = 0$;

$T - \frac{4}{5} C = 0$

$C = \frac{5}{4} T = \frac{5}{4} (440 \text{ N}) = 550 \text{ N}$

$\theta = \tan^{-1} \frac{3}{4} = 36.9^\circ$ $C = 550 \text{ N} \text{ } ^{-} 36.9^\circ$



< 2 >

(a) $\frac{T - P}{T} = \frac{3}{4}$

$4 T - 4 P = 3 T$

$T = 4 P = 4 (110 \text{ N}) = 440 \text{ N}$

(b) $\frac{C}{T} = \frac{5}{4}$

$C = \frac{5}{4} T = \frac{5}{4} (440 \text{ N}) = 550 \text{ N}$

$\theta = \tan^{-1} \frac{3}{4} = 36.9^\circ$ $C = 550 \text{ N} \text{ } ^{-} 36.9^\circ$

