Engineering Calculation Report: Problem 2-4

2025-12-04

1 Known Variables

Vector	$\lvert\vec{F}\rvert$ (N)	θ (deg)	Reference
$\vec{F_R}$	500.0	0.0	-y

2 Unknown Variables

Vector	$\lvert\vec{F}\rvert$ (N)	θ (deg)	Reference
$\vec{F_{AB}}$	?	?	-y
$\vec{F_{AC}}$	?	?	+x

3 Equations Used

1. $\dfrac{|\vec{F_{AC}}|}{\sin(\angle_{\vec{F_{AC}}})} = \dfrac{|\vec{F_R}|}{\sin(\angle(\vec{F_A B}, \vec{F_A C}))}$
2. $\dfrac{|\vec{F_{AB}}|}{\sin(\angle_{\vec{F_{AB}}})} = \dfrac{|\vec{F_R}|}{\sin(\angle(\vec{F_A B}, \vec{F_A C}))}$

4 Step-by-Step Solution

Step 1: Solve for $|\vec{F_{AC}}|$ using Eq 1

$$\begin{aligned} |\vec{F_{AC}}| &= 500.0 \text{ N} \cdot \frac{\sin(45.0^\circ)}{\sin(75.0^\circ)} \\ &= 366.0 \text{ N} \end{aligned}$$

Step 2: Solve for $|\vec{F_{AB}}|$ using Eq 2

$$\begin{aligned} |\vec{F_{AB}}| &= 500.0 \text{ N} \cdot \frac{\sin(60.0^\circ)}{\sin(75.0^\circ)} \\ &= 448.3 \text{ N} \end{aligned}$$

5 Summary of Results

Vector	$\lvert\vec{F}\rvert$ (N)	θ (deg)	Reference
$\vec{F_{AB}}$	448.3	-45.0	-y
$\vec{F_{AC}}$	366.0	-30.0	+x

Disclaimer

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