

# Engineering Calculation Report: Dynamic Problem

November 26, 2025

## 1 Known Variables

Symbol	X (N)	Y (N)	Magnitude (N)	Angle (deg)	Reference
$F_1$	225	389.711	450	60	+x
$F_2$	-676.148	-181.173	700	15	-x

## 2 Unknown Variables

Symbol	X (N)	Y (N)	Magnitude (N)	Angle (deg)	Reference
$F_R$	?	?	?	?	+x

## 3 Equations Used

1.  $F_R^2 = F_1^2 + F_2^2 + 2 \cdot F_1 \cdot F_2 \cdot \cos(\theta)$
2.  $\sin(\varphi)/F_2 = \sin(\theta)/F_R$
3.  $\theta_{F_R} = \theta_{F_1} + \varphi$

## 4 Step-by-Step Solution

Step 1: Solve for  $|F_R|$

Equation:

$$F_R^2 = F_1^2 + F_2^2 + 2 \cdot F_1 \cdot F_2 \cdot \cos(\theta)$$

Substitution:

$$F_R^2 = (450.000)^2 + (700.000)^2 + 2(450.000)(700.000) \cos(45.0^\circ)$$

Result:

$$|F_R| = 497.014 \text{ N}$$

Step 2: Solve for

Equation:

$$\sin(\varphi)/F_2 = \sin(\theta)/F_R$$

Substitution:

$$\sin(\varphi)/700.000 = \sin(45.0^\circ)/497.014$$

Result:

$$\varphi = 95.192^\circ$$

### Step 3: Solve for $\theta_{F_R}$

Equation:

$$\theta_{F_R} = \theta_{F_1} + \varphi$$

Substitution:

$$\theta_{F_R} = 60.0^\circ + (95.192^\circ)$$

Result:

$$\theta_{F_R} = 155.192^\circ$$

## 5 Summary of Results

Symbol	Magnitude (N)	Angle (deg)	F <sub>x</sub> (N)	F <sub>y</sub> (N)
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## Disclaimer

While every effort has been made to ensure the accuracy and reliability of the calculations provided, we do not guarantee that the information is complete, up-to-date, or suitable for any specific purpose. Users must independently verify the results and assume full responsibility for any decisions or actions taken based on its output. Use of this calculator is entirely at your own risk, and we expressly disclaim any liability for errors or omissions in the information provided.

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