

# Engineering Calculation Report: Problem 2-1

November 24, 2025

## Description

Determine the magnitude of the resultant force and its direction, measured counterclockwise from the positive x axis.

### 1 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 2. Unknown Variables (To Calculate)

Symbol	X (N)	Y (N)	Magnitude (N)	Angle (deg)	Reference
$F_R$	-451.148	208.538	?	155.192	+x

### 3 3. Equations Used

1.  $F_{1_x} = |F_1| \cos(\theta_1)$
2.  $F_{1_y} = |F_1| \sin(\theta_1)$
3.  $F_{2_x} = |F_2| \cos(\theta_2)$
4.  $F_{2_y} = |F_2| \sin(\theta_2)$
5.  $F_{R_x} = F_{1_x} + F_{2_x}$
6.  $F_{R_y} = F_{1_y} + F_{2_y}$
7.  $|F_R| = \sqrt{(F_{R_x})^2 + (F_{R_y})^2}$
8.  $\theta_R = \tan^{-1}(F_{R_y} / F_{R_x})$

### 4 4. Step-by-Step Solution

Step 1: Solve for  $F_{1_x}$

Equation:

$$F_{1_x} = |F_1| \cos(\theta_1)$$

Result:

$$F_{1_x} = 225.000 \text{ N}$$

**Step 2: Solve for F<sub>1\_y</sub>**

**Equation:**

$$F_{1_y} = |F_1| \sin(\theta_1)$$

**Result:**

$$F_{1_y} = 389.711 \text{ N}$$

**Step 3: Solve for F<sub>2\_x</sub>**

**Equation:**

$$F_{2_x} = |F_2| \cos(\theta_2)$$

**Result:**

$$F_{2_x} = -676.148 \text{ N}$$

**Step 4: Solve for F<sub>2\_y</sub>**

**Equation:**

$$F_{2_y} = |F_2| \sin(\theta_2)$$

**Result:**

$$F_{2_y} = -181.173 \text{ N}$$

**Step 5: Solve for F<sub>R\_x</sub>**

**Equation:**

$$F_{R_x} = F_{1_x} + F_{2_x}$$

**Result:**

$$F_{R_x} = -451.148 \text{ N}$$

**Step 6: Solve for F<sub>R\_y</sub>**

**Equation:**

$$F_{R_y} = F_{1_y} + F_{2_y}$$

**Result:**

$$F_{R_y} = 208.538 \text{ N}$$

**Step 7: Solve for —F<sub>R</sub>—**

**Equation:**

$$|F_R| = \sqrt{(F_{R_x})^2 + (F_{R_y})^2}$$

**Result:**

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

**Step 8: Solve for**

**Equation:**

$$\theta_R = \tan^{-1}(F_{R_y}/F_{R_x})$$

**Result:**

$$\theta_R = 155.192^\circ$$

## 5 5. Summary of Results

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

### 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.

#### Report Details:

- **Generated Date:** November 24, 2025
- **Generated Using:** Qnty Library
- **Version:** Beta (Independent verification required for production use)

#### Signatures:

Role	Name	Signature	Date
Calculated By	_____	_____	_____
Reviewed By	_____	_____	_____
Approved By	_____	_____	_____

*Report generated using qnty library*