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()
2. F_1_y = —F_1— sin()
3. F_2_x = —F_2— cos()
4. F_2_y = —F_2— sin()
5. F_R_x = F_1_x + F_2_x
6. F_R_y = F_1_y + F_2_y
7. —F_R— = ((F_R_x)² + (F_R_y)²)
8. = tan¹(F_R_y / F_R_x)

4 4. Step-by-Step Solution

Step 1: Solve for F_1_x

Equation:

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

Result:

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

Step 2: Solve for F_1_y

Equation:

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

Result:

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

Step 3: Solve for F_2_x

Equation:

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

Result:

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

Step 4: Solve for F_2_y

Equation:

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

Result:

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

Step 5: Solve for F_R_x

Equation:

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

Result:

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

Step 6: Solve for F_R_y

Equation:

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

Result:

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

Step 7: Solve for —F_R—

Equation:

$$|F_R| = ((F_{R_x} + (F_{R_y}$$

Result:

$$|F_{R|} = 497.014 \text{ N}$$

Step 8: Solve for

Equation:

$$= tan(F_{R_y}/F_{R_x}$$

Result:

$$= 155.192 \text{ }^\circ$$

5 5. Summary of Results

Symbol	Magnitude (N)	Angle (deg)	F_x (N)	F_y (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.

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