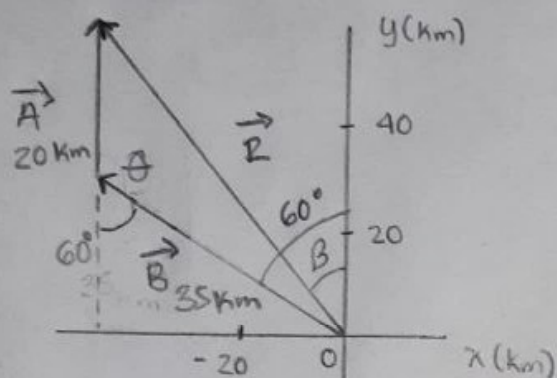


Primer Exámen de Laboratorio.
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Parte 1.

Un automóvil viaja 35.0 km en una dirección 60.0° al noroeste y luego 20 km al norte. Encuentre la magnitud y dirección del desplazamiento resultante del automóvil.



Triángulo oblicuángulo

Ley de Cosenos.

$$|\vec{R}|^2 = |\vec{A}|^2 + |\vec{B}|^2 - 2|\vec{A}||\vec{B}|\cos\theta$$

$$|\vec{R}|^2 = (20 \text{ km})^2 + (35 \text{ km})^2 - 2(20 \text{ km})(35 \text{ km})\cos 120^\circ$$

$$\theta = 180 - 60$$

$$\theta = 120^\circ$$

$$|\vec{R}|^2 = \sqrt{(20 \text{ km})^2 + (35 \text{ km})^2 - 2(20 \text{ km})(35 \text{ km})\cos 120^\circ}$$

$$|\vec{R}|^2 = \sqrt{400 \text{ km}^2 + 1225 \text{ km}^2 - (-700 \text{ km}^2)}$$

$$|\vec{R}|^2 = \sqrt{2325 \text{ km}^2}$$

$$|\vec{R}| = 48.21 \text{ km}$$

$$\sin\beta = \frac{B \sin\theta}{R} \Rightarrow \sin\beta = \frac{35 \text{ km} \sin(120^\circ)}{48.21 \text{ km}}$$

$$\beta = \sin^{-1}(0.63)$$

$$\beta = 38.9^\circ$$

$\vec{R} = 48.21 \text{ km}$ con un ángulo de 38.9° al noroeste.

Parte 2.

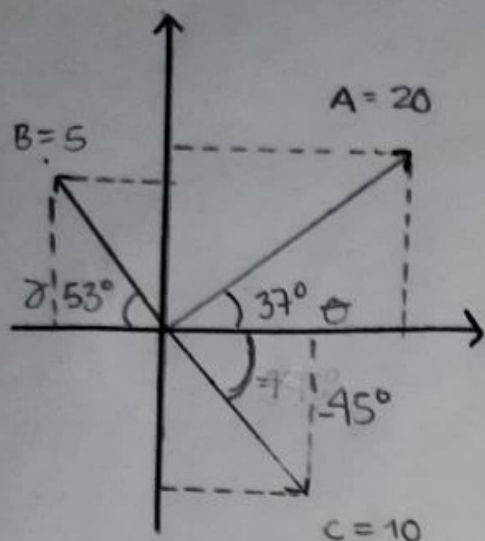
1. Dados los vectores A, B, y C

a) Determine los componentes de cada vector

b) Encuentre el vector resultante

i) expresado en componentes rectangulares.

ii) expresados en magnitud y dirección.



$$A_x = A \cos \theta \Rightarrow 20 \cos 37^\circ$$

$$\boxed{A_x = 15.97 \hat{x}}$$

$$A_y = A \sin \theta \Rightarrow 20 \sin 37^\circ$$

$$\boxed{A_y = 12.03 \hat{y}}$$

$$B_x = B \cos \theta = 5 \cos 127^\circ$$

$$\boxed{B_x = -3.0 \hat{x}}$$

$$B_y = B \sin \theta = 5 \sin 127^\circ$$

$$\boxed{B_y = 3.9 \hat{y}}$$

$$C_x = C \cos \theta = 10 \cos (-45^\circ)$$

$$\boxed{C_x = 7.07 \hat{x}}$$

$$C_y = C \sin \theta = 10 \sin (-45^\circ)$$

$$\boxed{C_y = -7.07 \hat{y}}$$

b.) i) Componentes Rectangulares.

$$\vec{R} = R_x \hat{x} + R_y \hat{y}$$

$$R_x = A_x + B_x + C_x$$

$$R_x = (15.97 \hat{x}) + (-3.0 \hat{x}) + (7.07 \hat{x})$$

$$R_x = 20.04 \hat{x}$$

$$R_y = A_y + B_y + C_y$$

$$R_y = (12.03 \hat{y}) + (3.9 \hat{y}) + (-7.07 \hat{y})$$

$$R_y = 8.86 \hat{y}$$

$$\boxed{\vec{R} = \langle 20.04 \hat{x} + 8.86 \hat{y} \rangle}$$

b) ii) Expresados en magnitud y dirección.

$$|\vec{R}| = \sqrt{(20.04)^2 + (8.86)^2}$$

$$|\vec{R}| = \sqrt{401.60 + 78.50}$$

$$|\vec{R}| = 21.91$$

$$\theta = \tan^{-1} \left(\frac{8.86}{20.04} \right)$$

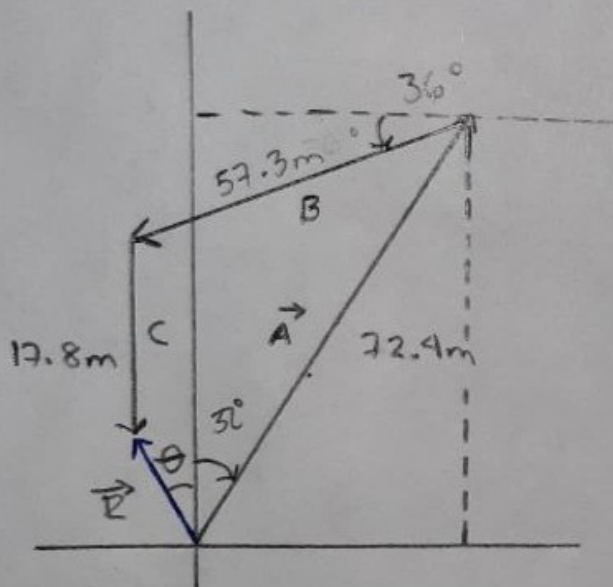
$$\theta = \tan^{-1}(0.44)$$

$$\theta = 24.10^\circ$$

2. Determine el vector resultante de los 3 desplazamientos consecutivos que se muestran.

a. Expresado en sus componentes rectangulares.

b. Expresado en magnitud y dirección.



$$C_x = 17.8 \cos(270)$$

$$C_x = 0m$$

$$C_y = 17.8 \sin(270)$$

$$C_y = -17.8m$$

$$\alpha = 90 - 32 = 58$$

$$A_x = 72.4 \cos(58^\circ)$$

$$A_x = 38.36m$$

$$A_y = 72.4 \sin(58)$$

$$A_y = 61.39m$$

$$\beta = 180 + 36$$

$$\beta = 216^\circ$$

$$B_x = 57.3 \cos(216)$$

$$B_x = -46.35m$$

$$B_y = 57.3 \sin(216)$$

$$B_y = -33.68m$$

$$a) \vec{R}_x = A_x + B_x + C_x$$

$$R_x = (38.36m) + (-46.35m) + (0)m$$

$$R_x = -7.99m$$

$$\vec{R}_y = A_y + B_y + C_y$$

$$R_y = (61.39m) + (-33.68m) + (-17.8m)$$

$$R_y = 9.91m$$

$$\boxed{\vec{R} = \langle -7.99\hat{i} + 9.91\hat{j} \rangle m}$$

b)

$$|\vec{R}| = \sqrt{(-7.99m)^2 + (9.91m)^2}$$

$$|\vec{R}| = \sqrt{63.84m^2 + 98.20m^2}$$

$$|\vec{R}| = \sqrt{162.04m^2}$$

$$\boxed{|\vec{R}| = 12.72m}$$

$$\theta = \tan^{-1} \left(\frac{9.91m}{-7.99m} \right)$$

$$\theta = \tan^{-1}(-1.24)$$

$$\boxed{\theta = -51.12^\circ \text{ Nor Oeste.}}$$