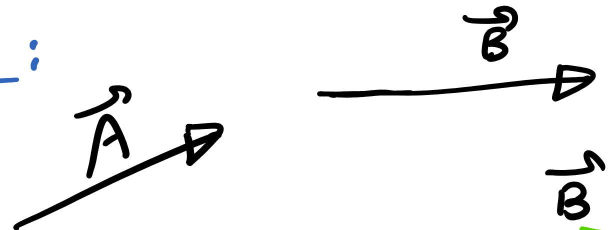
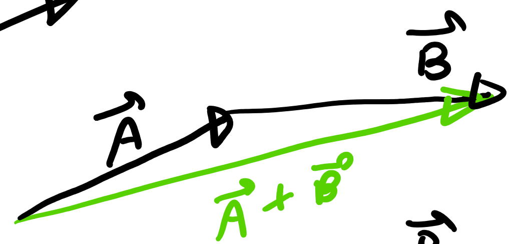
Review

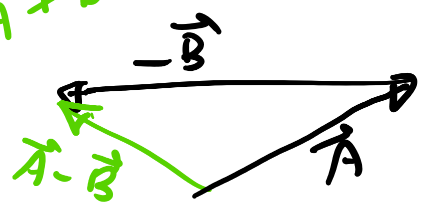
• Vectors :



$\vec{A}+\vec{B}$:

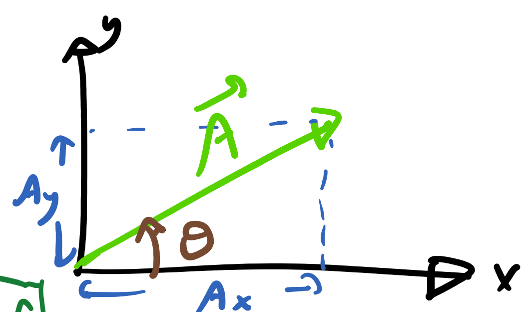


$\vec{A}-\vec{B} = \vec{A}+(-\vec{B})$:



$$(\vec{A}+\vec{B})+\vec{C} = \vec{A}+(\vec{B}+\vec{C})$$

$$\vec{A}+\vec{B} = \vec{B}+\vec{A}$$



$$\boxed{\vec{A} = A_x\hat{i} + A_y\hat{j}}$$

$$\cos\theta = \frac{A_x}{A}$$

$$\Rightarrow A_x = A\cos\theta$$

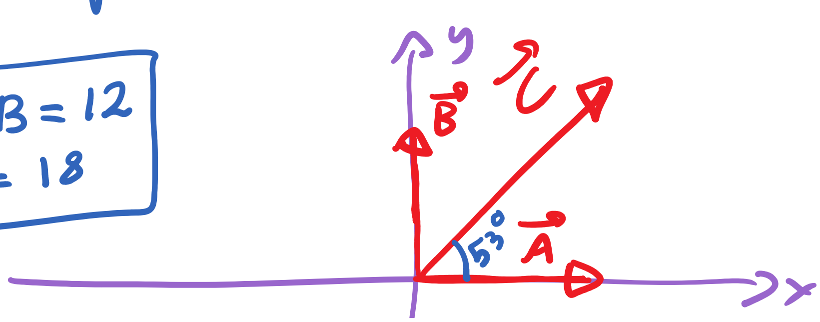
$$\sin\theta = \frac{A_y}{A}$$

$$\Rightarrow A_y = A\sin\theta$$

θ = from +x-axis ccw

$$A = \sqrt{A_x^2 + A_y^2} \quad \Big\} \quad \tan\theta = \frac{A_y}{A_x}$$

$$\boxed{\begin{aligned} A = B &= 12 \\ C &= 18 \end{aligned}}$$

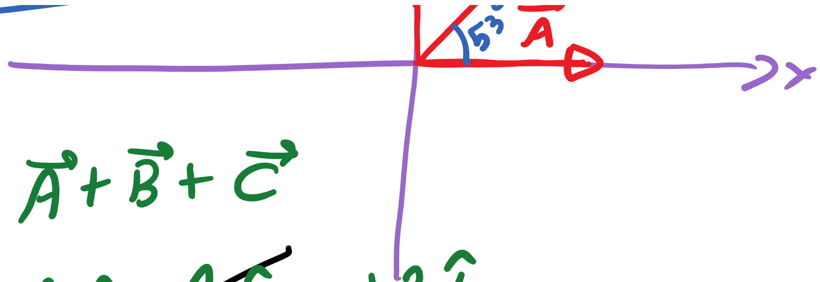


$A_y = 0$ $\quad A_x = 12$

$B_x = 0$ $\quad B_y = 12$

$C_x = C\cos 53^\circ$

$= (18)(0.6)$



$C_x = C\cos 53°$
$= (18)(0.6)$
$= 10.8$

$C_y = C\sin 53°$
$= (18)(0.8)$
$= 14.4$

$\vec{R} = \vec{A} + \vec{B} + \vec{C}$

$\vec{A} = A_x\hat{i} + \cancel{A_y\hat{j}} = 12\hat{i}$

$\vec{B} = \cancel{B_x\hat{i}} + B_y\hat{j} = 12\hat{j}$

$\vec{C} = C_x\hat{i} + C_y\hat{j} = 10.8\hat{i} + 14.4\hat{j}$

$\Rightarrow \vec{R} = (12 + 10.8)\hat{i} + (12 + 14.4\hat{j})$

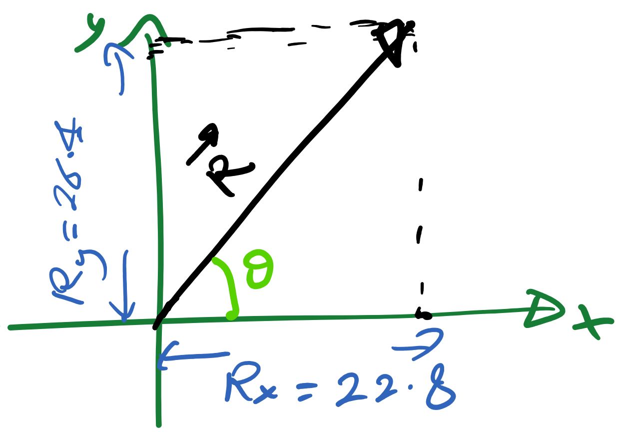
$$\boxed{\vec{R} = 22.8\hat{i} + 26.4\hat{j}}$$

$\tan\theta = \frac{R_y}{R_x}$

$= \frac{26.4}{22.8}$

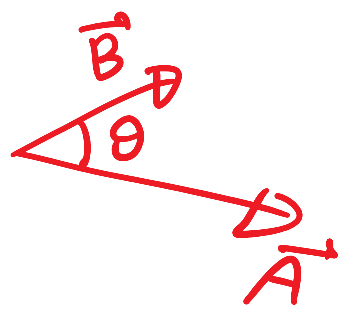
$\Rightarrow \theta = \tan^{-1}(1.15)$

$\Rightarrow \boxed{\theta = 49.2°}$



Scalar (Dot) Product :

$$\boxed{\vec{A}\cdot\vec{B} = AB\cos\theta}$$



$\vec{A} = A_x\hat{i} + A_y\hat{j} + A_z\hat{k}$

$\vec{B} = B_x\hat{i} + B_y\hat{j} + B_z\hat{k}$

$\vec{A}\cdot\vec{B} = A_xB_x + A_yB_y + A_zB_z$

$\vec{A} \cdot \vec{B} = A_x B_x + A_y B_y$

Equations of motion with constant acceleration.

1-D:

$$\left.\begin{aligned} v_{xf} &= v_{xi} + a_x t \\ x_f &= x_i + v_{xi} t + \tfrac{1}{2} a_x t^2 \\ v_{xf}^2 &= v_{xi}^2 + 2 a_x (x_f - x_i) \end{aligned}\right\} \quad \Delta x = x_f - x_i$$

$$\sum \vec{F} = m\vec{a} \rightarrow \begin{cases} \sum F_x = m a_x \\ \sum F_y = m a_y \\ \sum F_z = m a_z \end{cases}$$

$$\boxed{\vec{F}_{12} = -\vec{F}_{21}} \rightarrow \text{Newton's 3rd Law}$$