Phys 203 - H. MAKSE

LECTURE 1

Feb 2, 2021

## CHAPTER 1

UNIT [SI]

[time] = s

[Length] = m

mm = $10^{-3}$ m

m

km = $10^{3}$ m

[L] = m

[mass] = kg

g = $10^{-3}$ kg

[Force] =

[v] = $\frac{m}{s}$

CH 4 : F = ma → [Force] = kg · $\frac{m}{s^2}$ = N (Newton)

[a] = $\frac{m}{s^2}$

Consistency check

$x = v t$ → CH 2.

$v = 2\ m/s \qquad t = 5\ s$

$x = 2\ m/s \times 5\ s = 10\ m$ ✓

$v = 2\ km/h \qquad t = 5\ s$

$1\ h = 3600\ sec$

$x = \frac{2\ km}{h} \times 5\ s =$

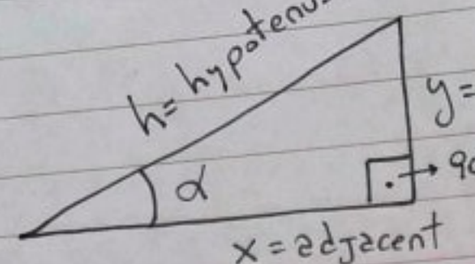
$= \frac{2\ km}{3600\ s} \times 5\ s = 2.7 \times 10^{-3}\ km =$

$x = 2.7\ m$ ✓

$v = 2\ \frac{km}{h} \longrightarrow \quad m/s$

$v = 2\ \frac{10^3\ m}{3600\ s} = 0.55\ m/s$

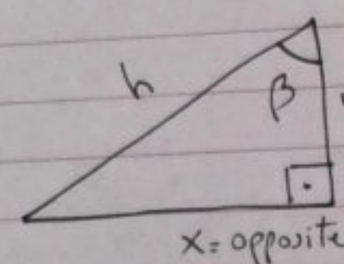
# Trigonometry




$$\sin\alpha = \frac{y}{h}$$

$$\cos\alpha = \frac{x}{h}$$

$$tg\alpha = \frac{\sin\alpha}{\cos\alpha} = y/x$$




$$\sin\beta = \frac{x}{h}$$

$$\cos\beta = \frac{y}{h}$$

In general ~~cos α~~

any $\delta$

$$\cos\delta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

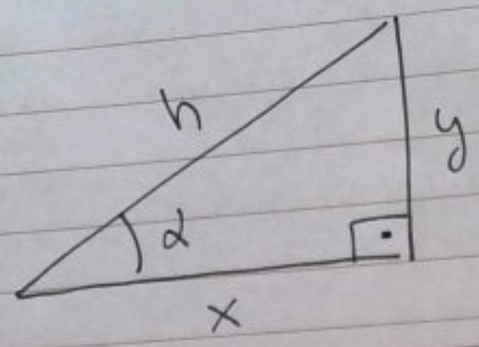
$$\sin\delta = \frac{\text{opposite}}{\text{hypotenuse}}.$$

$\cos\alpha = \frac{x}{h}$ ⟶ given $x, h$ → find $\alpha$

$\alpha = \cos^{-1}[x/h]$ → degrees / radians

$\pi = 3.14159\ldots = 180°$

Pythagorean theorem.




$$x^2 + y^2 = h^2 \rightarrow h = \pm\sqrt{x^2 + y^2}$$

$$x^2 = h^2 - y^2 \Rightarrow x = \pm\sqrt{h^2 - y^2}$$

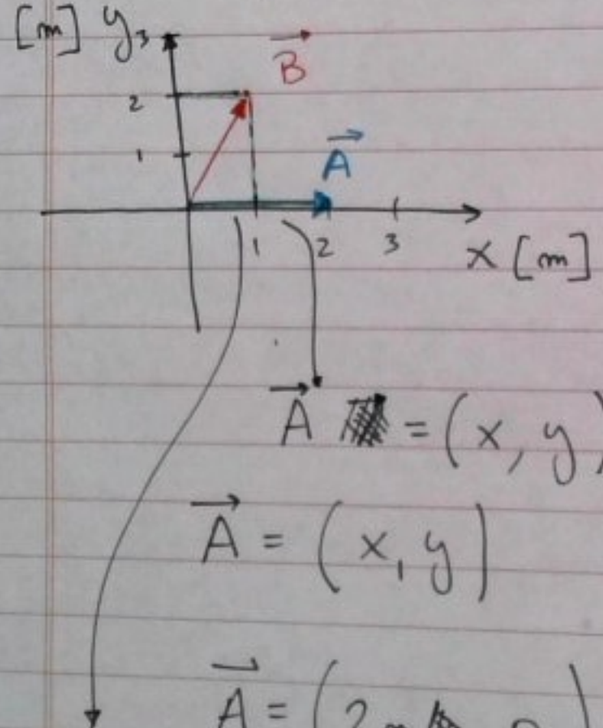
$$(\cos\alpha)^2 + (\sin\alpha)^2 = 1$$

$$x^2 = 4 \begin{cases} x = +2 \\ x = -2 \end{cases}$$

# SCALAR AND VECTORS

- SCALAR → number
  - T = temperature
- VECTORS → velocity
  - speed = 100 km/h
  - direction

Vector → 2D




$\vec{A} = (x, y)$

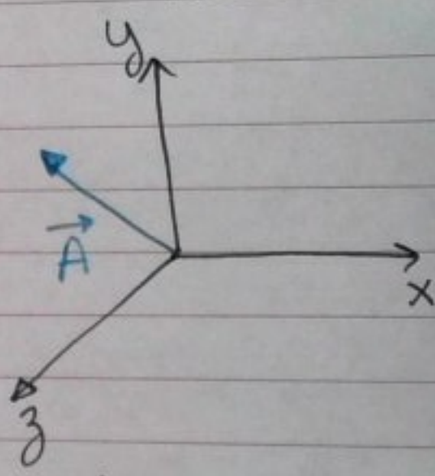
$\vec{A} = (x, y)$

$\vec{A} = (2\,m, 0)$

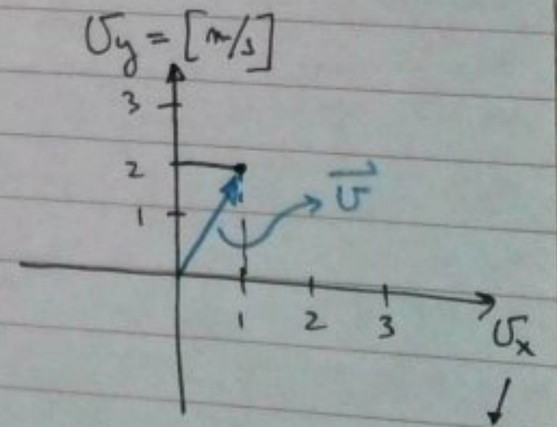
$\vec{B} = (1\,m, 2\,m)$

$\vec{v} = (v_x, v_y)$

3D




$\vec{A} = (x, y, 3)$




$\vec{v} = (1\,m/s, 2\,m/s)$