PHYSICISTS MAKE MEASUREMENTS & THUS THEY ARE REQUIRED TO MAKE MEASUREMENTS AS SHOWN BELOW:

QUANTITY	UNIT-MKS
LENGTH	METERS - m
TIME	SECONDS - SEC
MASS	KILOGRAMS - kg
TEMP	°C - °C

LENGTH - THE DISTANCE between 2 MARKS ON A Pt-IR BAR AT THE BUREAU OF STANDARDS in PARIS

MODERN STD 1,650,763.73 λ's of ORANGE Red light emitted by KRYPTON 86 ATOMS in A VACUUM
$1 A° = 10^{-10} m$

TIME - SECONDS 1 DAY = 24 HOURS $\times \frac{60 \text{ min}}{HR} \times \frac{60 \text{ SEC}}{\text{min}} = 86,400$ SEC

1 pico 10^{-12} Sec
1 nano 10^{-9} Sec 1 SEC = 0.0000115741 DAYS

MODERN STD. 1 SEC IS THE TIME TAKEN BY 9,192,631,770 VIBRATIONS of LIGHT emitted BY A Cs 133 ATOM

MASS - kg THE STD kg IS THE MASS of A Pt-IR CYLINDER AT THE INTERNATIONAL BUREAU OF STDS. in PARIS

CONVERSION OF UNITS EXAMPLE 20 miles INTO kilometers (km

$$20 \text{ miles} \times \frac{5280 \text{ FT}}{\text{mile}} \times \frac{12 \text{ inch}}{\text{FT}} \times \frac{2.54 \text{ CM}}{\text{inch}} \times \frac{1 \text{ METER}}{100 \text{ CM}} \times \frac{1 \text{ km}}{1000 \text{ meters}}$$

1 mile = 1.609 km

EXAMPLE A PERSON ON A DIET LOSES 2.3 kg PER WEEK

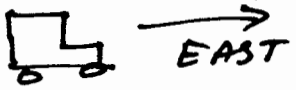
EXPRESS THE WEIGHT LOSS RATE IN milligrams/Sec

$$2.3\ \frac{kg}{WK} \times \frac{1\ WEEK}{7\ DAYS} \times \frac{1\ DAY}{24\ HRS} \times \frac{1\ HR}{60\ MIN} \times \frac{1\ MIN}{60\ Sec} \times \frac{1000\ GMS}{1\ kg} \times 1000\ \frac{milligrams}{gm}$$

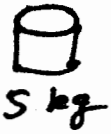
$$= \frac{2.3\,(1000)(1000)}{(7)(24)(60)(60)} = 3.80\ \frac{mg}{Sec}$$

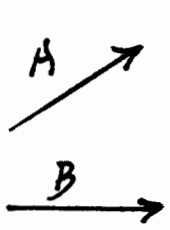
VECTORS & SCALERS

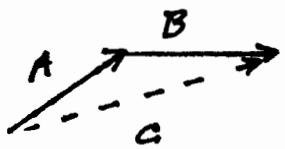
NUMBER + DIRECTION { VECTORS HAVE BOTH MAGNITUDE & DIRECTION i.e. DISPLACEMENT – VELOCITY – ACCELERATION



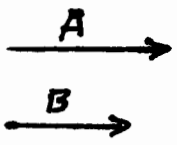
NUMBER { SCALERS HAVE MAGNITUDE BUT NO DIRECTION
TEMPERATURE, PRESSURE, TIME, SPEED, MASS

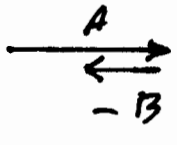


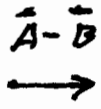


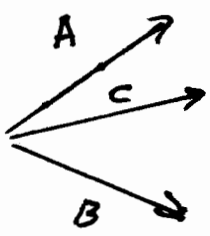


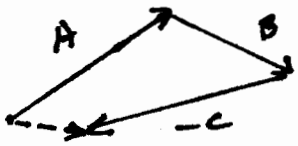
$$\vec{C} = \vec{A} + \vec{B}$$





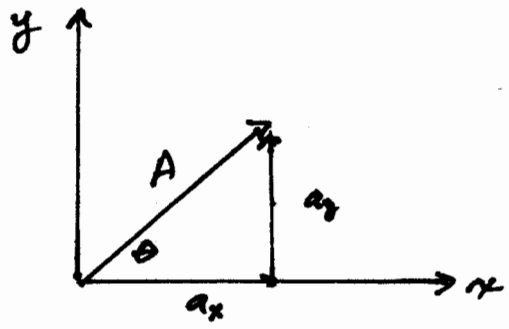






$$\vec{D} = \vec{A} + \vec{B} - \vec{C}$$

VECTORS & COMPONENTS



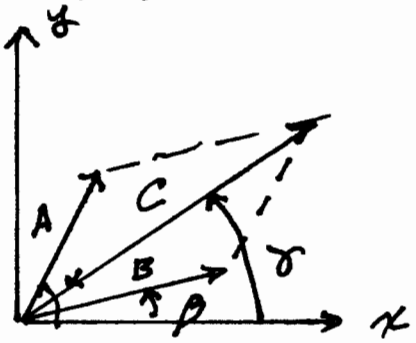
$a_x = A\cos\theta$

$a_y = A\sin\theta$

$\tan\theta = \frac{a_y}{a_x}$

$A = \sqrt{a_x^2 + a_y^2}$

MULTIPLE VECTORS



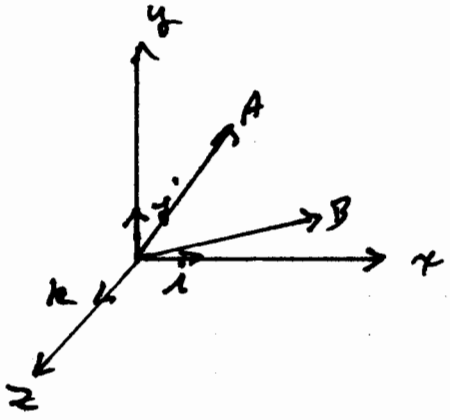
$C_x = a_x + b_x = A\cos\alpha + B\cos\beta$

$C_y = a_y + b_y = A\sin\alpha + B\sin\beta$

$|C| = \sqrt{C_x^2 + C_y^2}$

$\tan\gamma = \frac{C_y}{C_x}$

UNIT VECTOR APPROACH

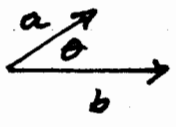


$\vec{C} = \vec{A} + \vec{B} = \underbrace{(a_x + b_x)}_{C_x} i + \underbrace{(a_y + b_y)}_{C_y} j$

MULTIPLYING VECTORS

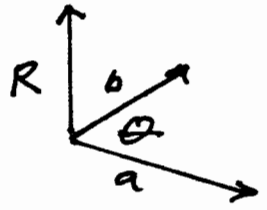
SCALER PRODUCT

$\vec{a} \cdot \vec{b} = ab\cos\theta$



VECTOR PRODUCT

$\vec{a} \times \vec{b} = ab\sin\theta = R$



WORK = FORCE × DISPLACEMENT IN THE DIRECTION OF FORCE

$W = \vec{a} \cdot \vec{b} = Fd$

EXAMPLE $\vec{B}+\vec{A} = 6i + j$ $\quad -\vec{B}+\vec{A} = -4i + 7j$

find the VECTORS $\vec{A}$ & $\vec{B}$

ADDING TOGETHER THE GIVEN VECTORS

$\vec{B}+\vec{A} = 6i + j$

$-\vec{B}+\vec{A} = -4i + 7j$

$2\vec{A} = 2i + 8j$

$\vec{A} = i + 4j$

SUBTRACTING THE VECTORS

$\vec{B}+\vec{A} = 6i + j$

$\vec{B}-\vec{A} = 4i - 7j$

$2B = 10i - 6j$

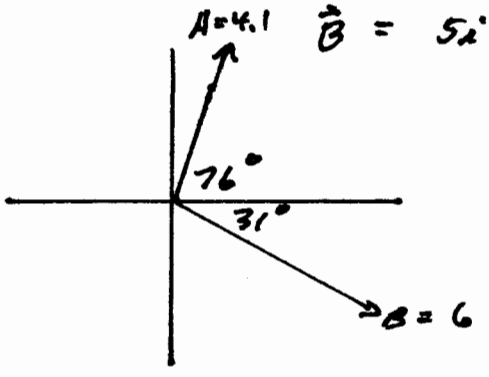
$\vec{B} = 5i - 3j$

$A = \sqrt{1^2+4^2} = \sqrt{17} = 4.1$

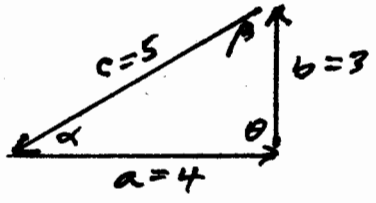
TAN $\alpha = \frac{4}{1}$ $\quad \alpha = 76^\circ$

$B = \sqrt{5^2+3^2} = 6$

TAN $\beta = \frac{-3}{5}$ $\quad \beta = -31^\circ$



EXAMPLE

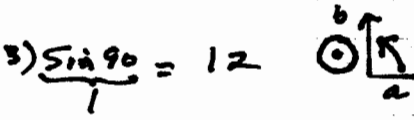


TAN $\alpha = \frac{3}{4}$ $\quad \alpha = 36.8$

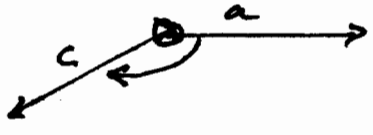
TAN $\beta = \frac{4}{3}$ $\quad \beta = 53.1$

CALCULATE

a) $a \times b = ab \sin\theta = 4(3)\underbrace{\sin 90}_{1} = 12$ ⊙



b) $a \times c = ac \sin\alpha = 4(5)\underbrace{\sin 36.8}_{.599} = 12$ ⊗



c) $b \times c = bc \sin\beta = 3(5)\overbrace{\sin 53.1}^{.800} = 12$ ⊙