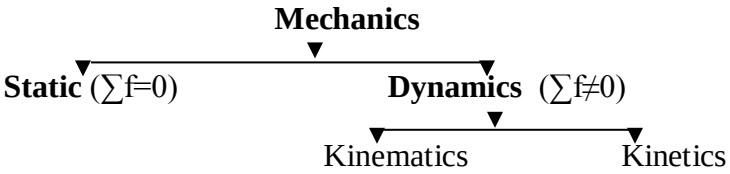
Motion and its analysis Date: 01.04.2020

Mechanics: -



Kinematics is the study of description of motion.

Kinetics is the cause of motion.

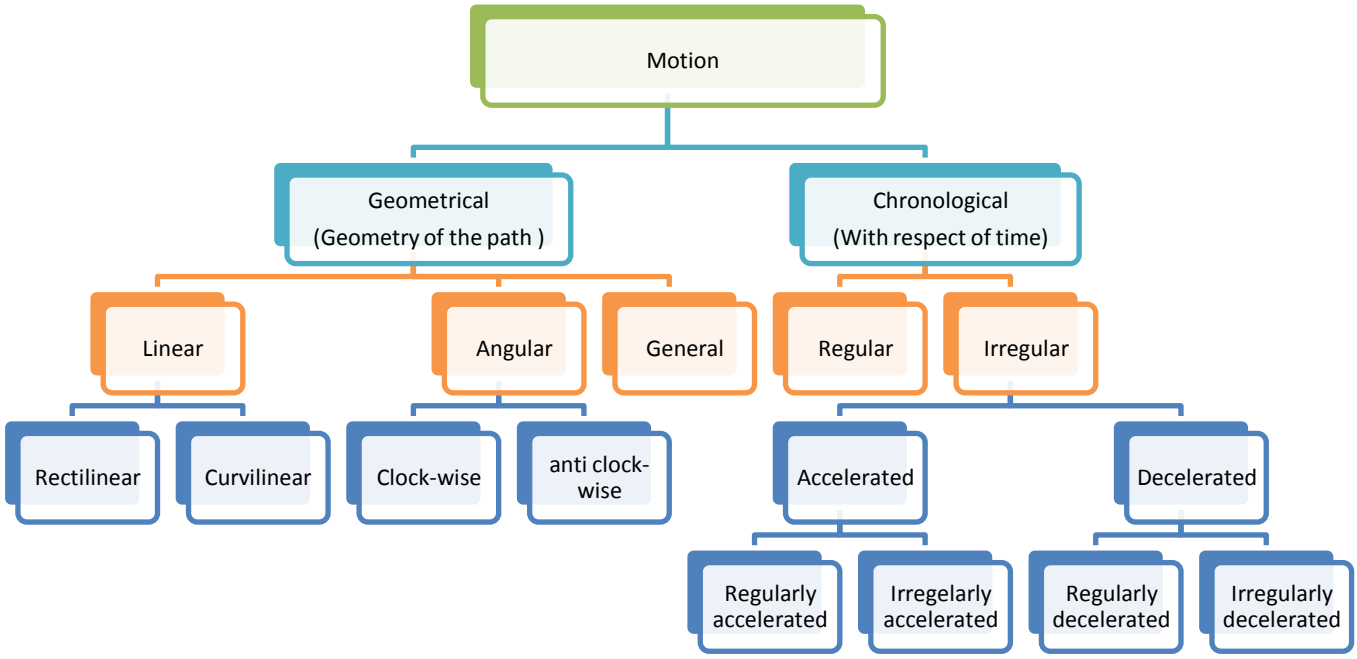
Man is a machine but it has some limitation.

What is Motion?

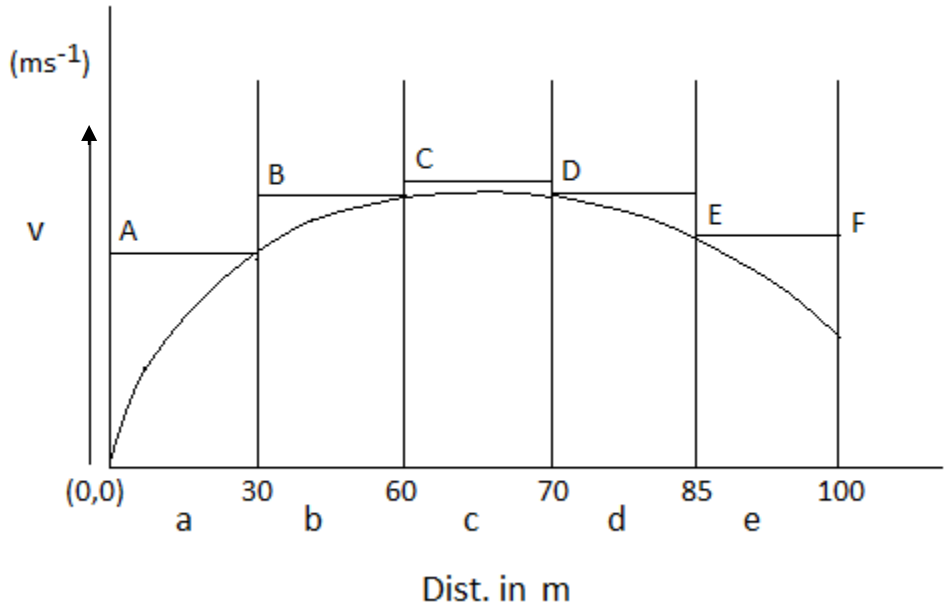
Motion is a state in which the body change of position with respect to time and environment.

Rest and motion is two state of body, when change of position with respect to time is called motion and is not change is called rest.

Classification of Motion :-



For 100m Running ,different phase is shown in the following figure



a) Zone of high acceleration. (A-B)
b) Zone of reduced acceleration. (B-C)
c) Zone of constant acceleration. (C-D)
d) Zone of high deceleration. (D-E)
e) Zone of high rapid deceleration. (E-F)

KINEMATIC PARAMETER :-

	Linear	Angular
1.Q:- How far? --- Distance/ Displacement	(l, d /s)	(ϕ, θ)
1.Q:- How fast? --- Speed /velocity	(u, v / v_1 ,v_2)	(Ψ, ω)
1.Q:- How consistent ? --- $\pm$ Acceleration	(a, f)	(α)
1.Q:- How long ? --- time	(t)	(t)

KINEMATIC PARAMETER :- Equations ----

Equations of uniform / regular motion ;--

t----- sec.----- s

1-----meter---m

v----------s/t or, s = vt-------(i)

Equations of irregular motion ;--

i) $v = u \pm ft$

1------sec----f

t----------ft

$v = u \pm ft$

[final velocity = initial velocity + acceleration X time]

ii) $s = ut \pm 1/2ft^2$ u = initial velocity, V= final velocity

$v = (u + V)/2$

$s = vt$

$= \{(u + V)/2\} \times t$

$= \{(u+u+ft)/2\} \times t$

$= (2ut/2) + (\frac{1}{2} ft^2)$

$= ut + \frac{1}{2} ft^2$

Distance = Initial value X time + {acceleration X $(\text{time})^2$}/2

iii) $v^2 = u^2 \pm 2fs$

$v = u+ft$

$v^2 = (u+ft)^2$

$= u^2 + 2uft + f^2t^2$

[Final velocity^2 = Initial velocity^2 + 2 X acceleration X distance covered]

	Linear method		Angular method
1.	$s = vt$	Regular motion	$\theta = \omega t$
2.	$v = u \pm \frac{1}{2} ft$	Irregular motion	$\omega_2 = \omega_1 \pm \alpha t$
3.	$s = ut \pm \frac{1}{2} ft^2$	,,	$\theta = \omega t_1 \pm \frac{1}{2} \alpha t^2$
4.	$v^2 = u^2 \pm 2fs$	,,	$\omega_2^2 = \omega_1^2 \pm 2 \alpha\theta$