Fundamental Unit

length (L)	meter	m
mass (m)	Kilogram	kg
Time (t)	seconds	S
Current (I)	Ampere	A
Temperature (T)	Kelvin	K
Intensity (i)	candella	~~cd~~ d cd
Amount of substance	mole	ml

Acceleration = $\frac{d\cancel{t}v}{dt}$ $\frac{\text{(difference in velocity)}}{\text{(difference in time)}}$

$= [L^1 m^0 T^{-1}] \div [L^0 m^0 T^1]$

$= [L^1 m^0 T^{-2}]$ ①

Force = mass × acceleration

$= [L^0 m^1 T^0] \times [L^1 m^0 T^{-2}]$

$= [L^1 m^1 T^{-2}]$

$(a^m)^{x n}$

Pressure = Force ÷ Area

$= [L^1 m^1 T^{-2}] \div [L^2 m^0 T^0]$

$= [L^{-1} m^1 T^{-2}]$

Kinetic Energy = $\frac{1}{2} mv^2$

$= m \cdot v^2$

$= [L^0 m^1 T^0] \cdot [L^1 m^0 T^{-1}]^2$

$= [L^0 m^1 T^0] \cdot [L^2 m^0 T^{-2}]$

$= [L^2 m^1 T^{-2}]$

Work = Force · displacement

$= [L^1 m^1 T^{-2}] \cdot [L^1 m^0 T^0]$

$= [L^2 m^1 T^{-2}]$

- Accuracy and Precision
  Accuracy is the degree of the closeness between measured value and the true value.
  Precision is ~~the degree of~~ the independent of accuracy. The closeness of two or more measurements to each other is Precision.

- Error → Error is the difference between the experimental value and real value. classified into 3 parts:
  i systematic error
  ii random error
  iii blunder error
  Systematic errors are due to identified cause is resulting in high value or low value.

Plasticity → It is a property of material to undergo permanent deformation even after removal of external deforming force. The bodies which do not regain their original dimension after removal of deforming forces are called plastic bodies.

Deformation → Most of the bodies can be deformed by the application of external force. the change in shape size or both of a ~~bod~~ body arising due to the external force is called deformation. The force which is responsible for deformation of a body is called deforming force.

deformation ∝ deformation force.

Deformation may be change in length, change in volume and change in area.

Scanned with CamScanner

Stress :- It is defined as the internal elastic restoring force per unit cross-sectional area of the body

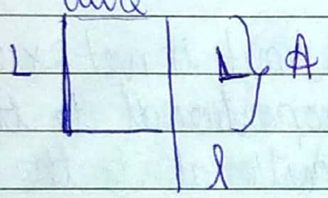
stress = Force / Area

Strain ⇒ It is defined as change in dimension per unit original dimension

strain = change in dimension (l) / ~~change~~ original dimension (L)

Types of stress ⇒ longitudinal stress or tensile stress

wire

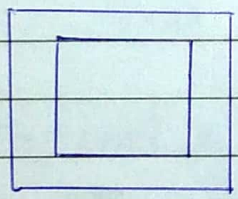


$(F = W)$

$$\text{longitudinal stress} = \frac{F}{A} = \frac{W}{\pi r^2} = \frac{mg}{\pi r^2}$$

(wire is circular)

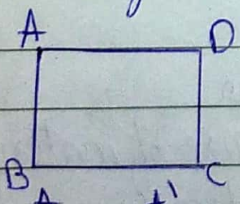
Volume Stress ⇒

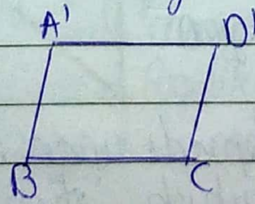


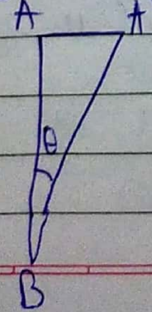
$$\text{stress} = \frac{F}{A} = \frac{dp \cdot \cancel{A}}{\cancel{A}} = dp$$

$$P = F/A$$
$$F = P \cdot A = dp \cdot A$$

Shearing stress ⇒ $\text{shearing stress} = \frac{\text{tangential force}}{\text{Area}} = \frac{F}{A}$



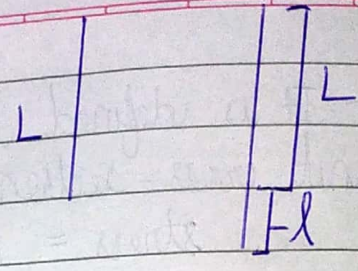




~~$\tan\theta = \frac{A\ opp}{adj} = \frac{AA'}{AB} =$~~

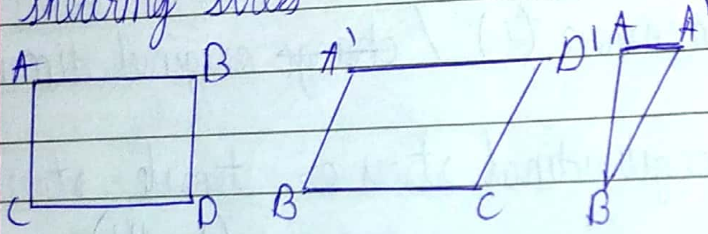
Types of Strain :-

Longitudinal strain $= \dfrac{l}{L}$



Volume strain $= \dfrac{-d \cdot V}{V}$

Shearing stress =



$\tan\theta = \dfrac{opp}{adj} = \dfrac{AA'}{AB}$.

Hooke's Law ⇒ provided the elastic limit is not exceeded the deformation of the material is the proportional to the force applied to it. Stress is directly proportional to the strain.

stress $\propto$ strain

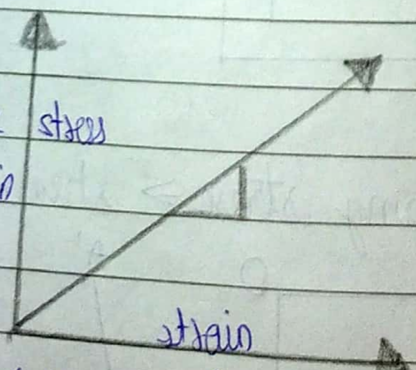
stress $= M \cdot$ strain

$M =$ stress / strain

Slope ⇒

slope = stress / strain $= M$

(M is the modulus of elasticity it is defined as slope of stress and strain curve in elastic deformation region.



The modulus of elasticity depends upon nature of material. Max value of stress up to which stress $\propto$ strain is called elastic

Types of Modulus :-

Young's Modulus ⇒ The modulus of elasticity is related to the length of the body is called Young's Module. Young's Modulus is only for solid

$$M = \frac{stress}{strain} = \frac{Mg/\pi r^2}{l/L} = \frac{MgL}{\pi r^2 l}$$

L = original ~~dia~~ length
l = change in length
F = Force

unit :- N/m^2

Bulk's Modulus (K) ⇒ Bulk modulus measures the ~~R~~ resistance offered by liquid or solid while an attempt is made to change in volume. It is for liquid and solid

$$K = \frac{stress}{strain} = \frac{dp}{-dv/v} = -\frac{v\,dp}{dv}$$ unit : (N/m^2)

Reciprocal of Bulk modulus of elasticity is called as compressibility

Modulus of Rigidity ⇒ unit :- η (eta) → The modulus of elasticity associated with change in a shape of body is called modulus of rigidity. It Modulus of Rigidity measured the resistance offered by solid while attempt is made to change its shape.

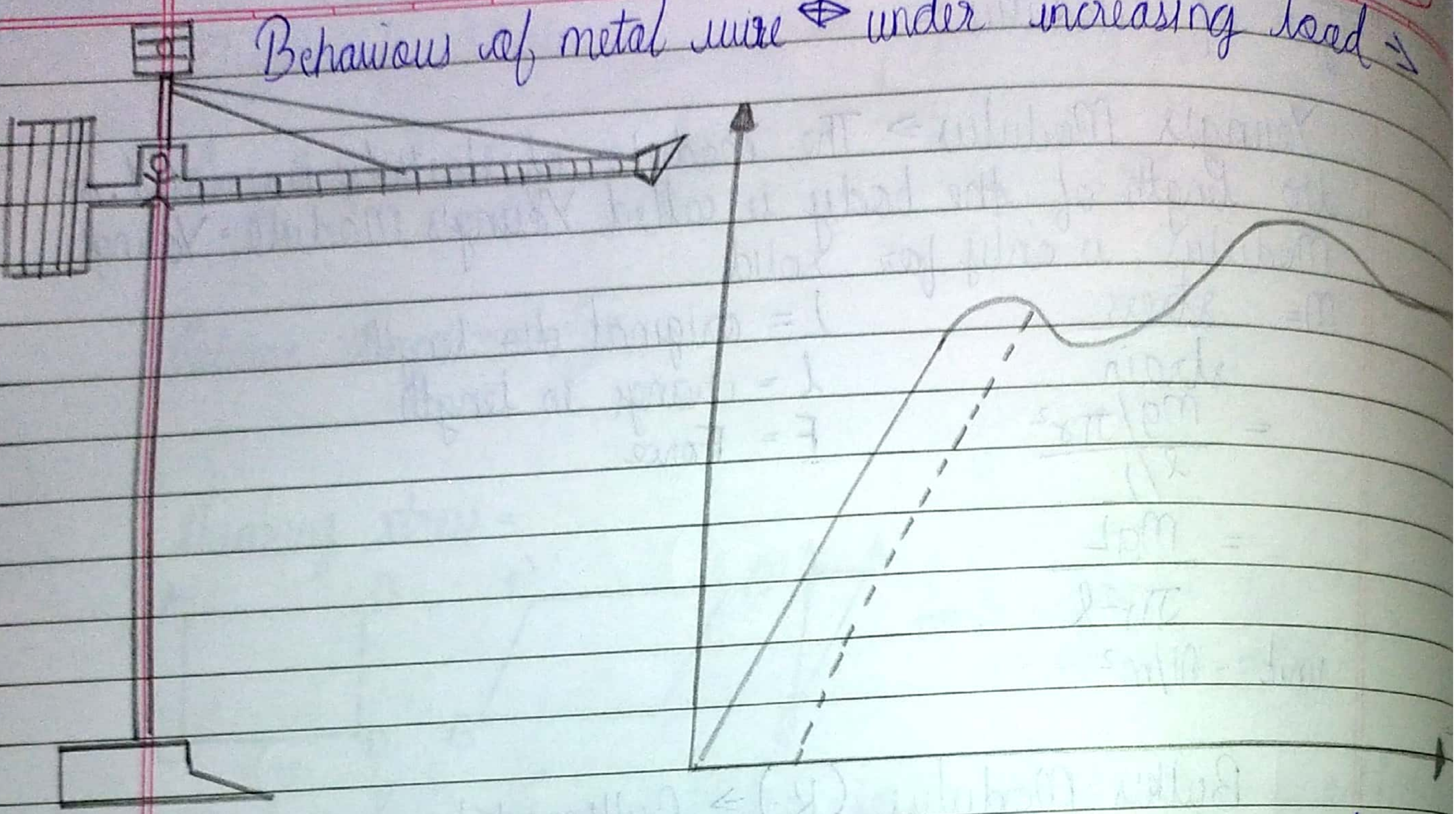
$$\eta = \frac{shearing\ stress}{shearing\ strain}$$

$$\eta = \frac{F/A}{\tan\theta} = \frac{F}{A\cdot\tan\theta}$$

...dded the
...e force
...train.

· Max
elastic limit

Behaviour of metal wire under increasing load ->



Searle's Method -> The elongation in the wire is studied searle's method. If we plot a graph of stress along and strain long

E -> elastic limit E' -> max elastic limit ; OS -> set point
Yp -> yield point, B -> break point ; N -> breaking stress

Initial part OE is a straight line it shows stress ∝ strain E is called elastic limit. If loaded apply on the wire is removed, wire regains its original dimension. If the stress is increased beyond E the graph is no longer remain straight and it doesn't follow Hooke's law. The small increase in a strain, the stress increases faster