Date: _____

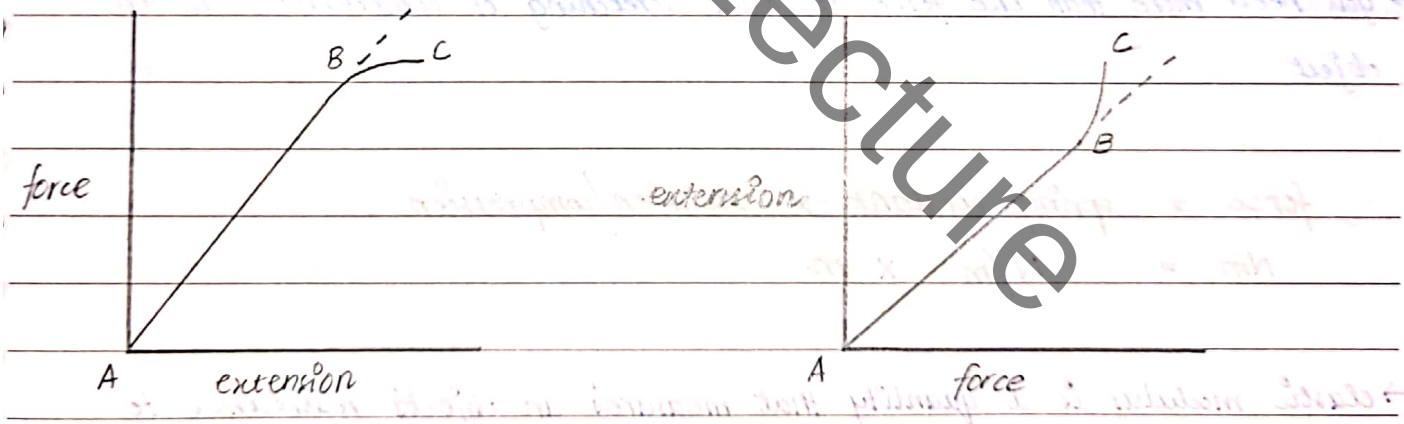
DEFORMATION

elasticity/elastic deformation: when a force is applied then shape of an object can be changed, on releasing the force if the object regains its original shape, then this effect is called ....

elastic limit/limit of proportionality: it's the maximum extension in an elastic object after which it either breaks or deforms permanently (after this limit, the wire becomes easier to extend)

HOOKE'S LAW:

→ within elastic limit, the extension produced in an elastic object is directly proportional to the force applied



Point A = Hooke's law is valid

Point B = Elastic limit or limit of proportionality

Point C = Breaking point

A to B = elastic deformation

B to C = plastic deformation (not returning to original position)

A When a load is attached to 2 or more than 2 identical springs, the load on each spring is divided by the number of springs
(tension in the spring is halved/load is distributed amongst the springs

DEFORMATION

elasticity/elastic deformation: when
can be
object
is call

elastic limit/limit of proportionality: it's the m
after which it either breaks or deforms permanently
(after this limit, the wire becomes easier to extend)

HOOKE'S LAW:

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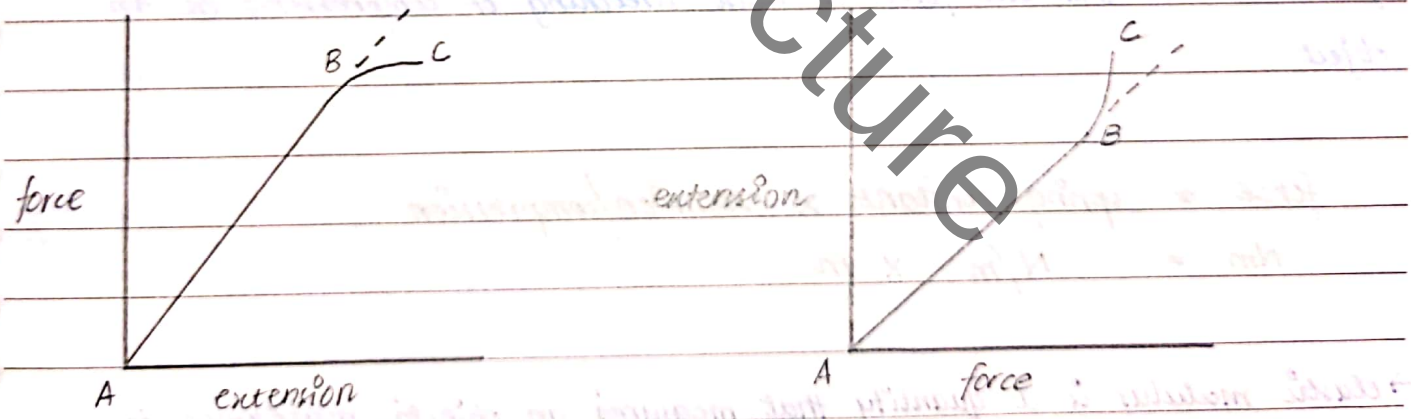

Point A = Hooke's law is valid
Point B = Elastic limit or limit of proportionality
Point C = Breaking point
A to B = elastic deformation
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Date: _____

Experiment to verify Hooke's Law:

→ attach a spring with a stand and measure its original length with ruler

→ attach a load of weight at the end of the spring. measure the stretched length of spring with a ruler

→ similiarly, attach different loads at the end of spring and measure the stretched lengths of spring for each load

→ record the results in the table

→ draw a graph b/w extension & load

If the graph is a straight line passing through the origin, the law is verified

e.g of elastic objects : slinky / rubber gloves / rubber bands

→ you need more than one force to cause stretching or compressing in an object

force = spring constant × extension/compression

N = N/m × m

→ elastic modulus is a quantity that measures an object's resistance to being deformed elastically (non-permanently) when a stress is applied to it — opposite of stretching

→ it can't be changed by heating but drastic change occurs in alloy composition

→ young modulus is ratio of stress to strain

→ bulk modulus is opposite of compression

Date: _____

TURNING EFFECT OF FORCES

→ a force may cause an object to turn about a pivot/hinge/fulcrum

→ it depends on two things:

↳ magnitude of a force applied

↳ the perpendicular distance from the line of action of force to the pivot

moment of force : product of force applied and perpendicular distance from the line of action of the force to the pivot

also known as turning effect

unit is Nm

moment of force = force × distance

→ if the object turns clockwise, then turning effect is called clockwise moments

→ if the object turns anticlockwise, then turning effect is called anticlockwise moments

equilibrium : a body at rest or moving with uniform velocity is said to be in equilibrium

→ the two conditions of equilibrium are:

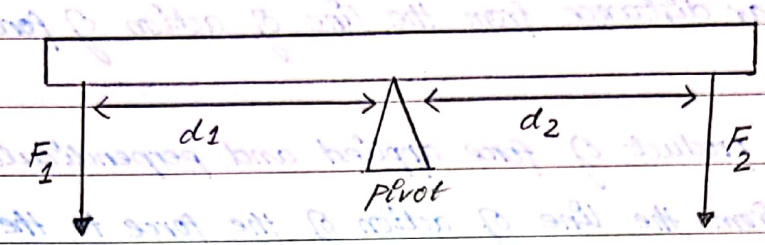
↳ sum of forces in one direction is equal to sum of forces in other direction

↳ sum of clockwise moments is equal to the sum of anti-clockwise moments

Date: _____

principle of moments : for an object in equilibrium, the sum of clockwise moments is equal to sum of anti-clockwise moments

$$F_1 \times d_1 = F_2 \times d_2$$



Experiment to investigate principle of moments

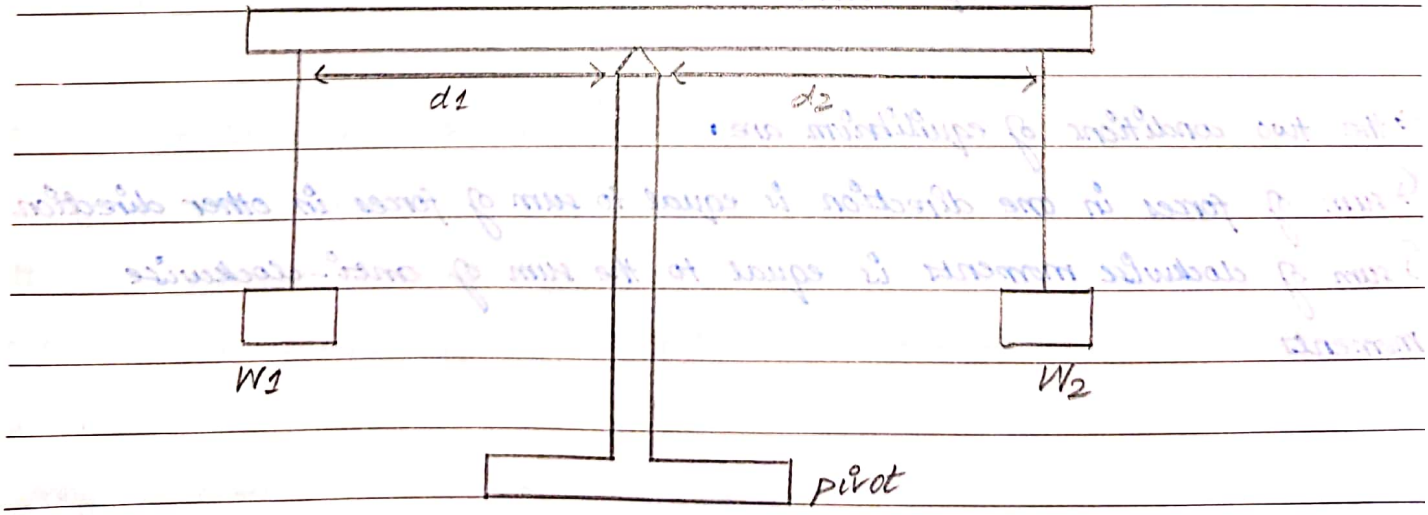
→ set up apparatus as shown in the figure below
(uniform metre rule, load 1, load 2, strings, knife edge, retort stand

→ balance the system by adjusting the distances d_1 & d_2

→ vary d_1 and d_2 so that the system is balanced for 5 sets of d_1 & d_2

→ calculate the clockwise and anti-clockwise moments and tabulate them

→ if they're equal, the principle has been verified



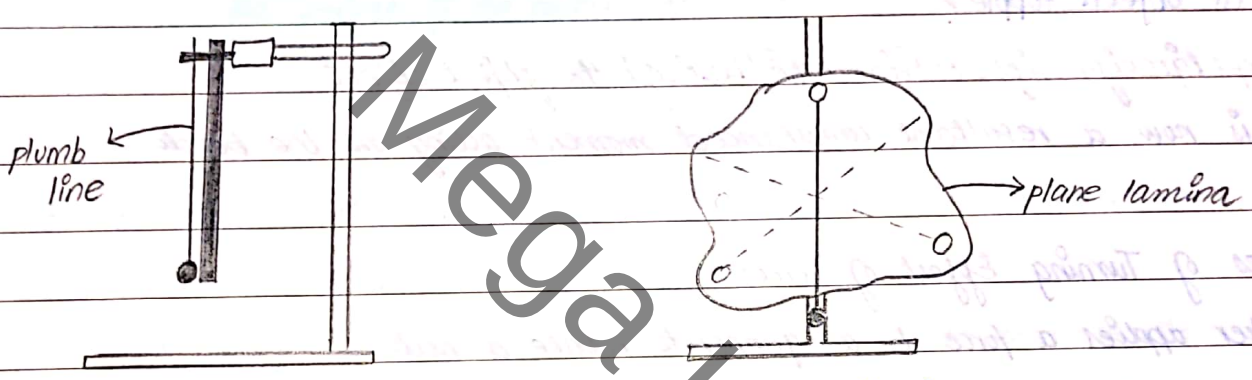
Date: _____

centre of mass / centre of gravity : the point through which whole mass or weight of an object appears to act

Experiment to locate centre of mass of regular objects:

→ balance them on a knife edge or pivot

Experiment to locate centre of mass of irregular shaped objects:



→ make three small holes near the edges of the lamina

→ suspend the lamina through one of these holes using a pin

→ hang a plumb line on the pin on the front of the lamina

→ when the plumb line is steady, draw a line on the lamina along the plumb line

→ repeat the above procedure for the remaining two holes

→ the point of intersection of the three lines on the lamina is the position of centre of mass

* → the lamina should be free to swing about its point of suspension

* → the parallax error must be avoided

Date: _____

Stability: the ability of an object to regain its original position after it has been tilted slightest determines its stability

→ it depends on two things:

↳ the area of the base of the object should be as wide as possible

↳ the centre of gravity should be as low as possible

Q. Why do objects topple?

→ line of action of weight lies outside the base of the object

→ There is now a resultant unbalanced moment acting on the block

Examples of Turning Effect of Forces

* a worker applies a force to a spanner to rotate a nut
* a force applied to a doorknob and the door swings open about its hinge
* a driver can turn a steering wheel by applying a force on its rim

→ centre of gravity is always the same whether it be on the Earth or the moon b/c it is dependant on distribution of mass in the object not gravitational field strength