




Faculty : Mechanics-Mathematics
Group : EngR-10
Subject : Theoretical Mechanics
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Topic : Center of gravity, centroid

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INTRODUCTION TO THE TOPIC



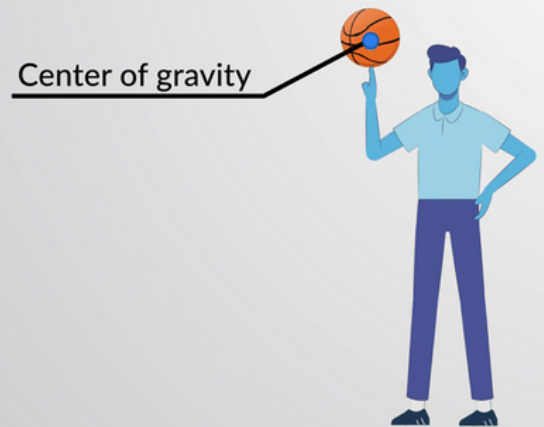
**CENTERS
OF
GRAVITY
FOR
HOMOGENEOUS
BODIES**

CENTROID

**DIFFERENCE
BETWEEN
CENTER OF
GRAVITY
AND
CENTROID**

HOW WE CAN DEFINE CENTERS OF GRAVITY ?

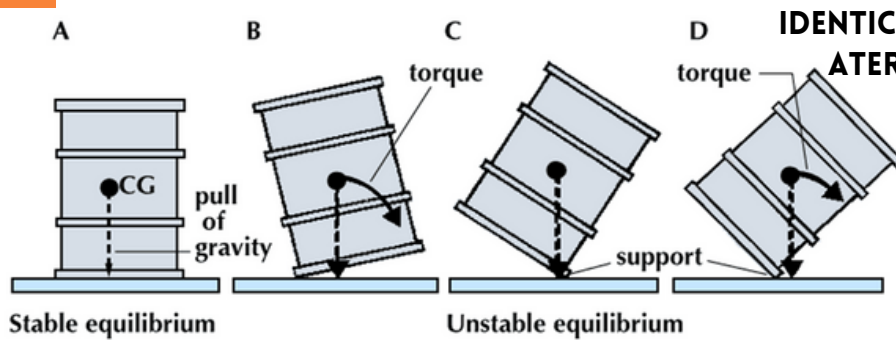
The centre of gravity of a body is the point at which all the mass of the body may be assumed to be concentrated and is the point through which the force of gravity is considered to act vertically downwards, with a force equal to the weight of the body. It is also the point about which the body would balance.



CENTRE OF GRAVITY, IN PHYSICS, AN IMAGINARY POINT IN A BODY OF MATTER WHERE, FOR CONVENIENCE IN CERTAIN CALCULATIONS, THE TOTAL WEIGHT OF THE BODY MAY BE THOUGHT TO BE CONCENTRATED.

THE CONCEPT IS SOMETIMES USEFUL IN DESIGNING STATIC STRUCTURES (E.G., BUILDINGS AND BRIDGES) OR IN PREDICTING THE BEHAVIOUR OF A MOVING BODY WHEN IT IS ACTED ON BY GRAVITY.

IN A UNIFORM GRAVITATIONAL FIELD THE CENTRE OF GRAVITY IS



IDENTICAL TO THE CENTRE OF MASS, A TERM PREFERRED BY PHYSICISTS THE TWO DO NOT ALWAYS COINCIDE, HOWEVER.

WHEN DOING CALCULATIONS WE CAN OFTEN REPLACE AN OBJECT WITH ITS CENTER OF GRAVITY.



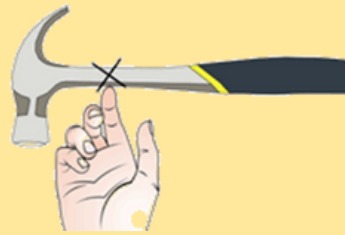
EXAMPLE: YOU DROP A HAMMER!

IT MAY SPIN A LITTLE, BUT ITS CENTER OF GRAVITY WILL FALL STRAIGHT DOWN.

IT ALSO DROPS FASTER AND FASTER DUE TO GRAVITY.

(THE ONLY COMPLICATION IS AIR RESISTANCE, WHICH AFFECTS ITS MOTION MORE AS IT GOES FASTER.)

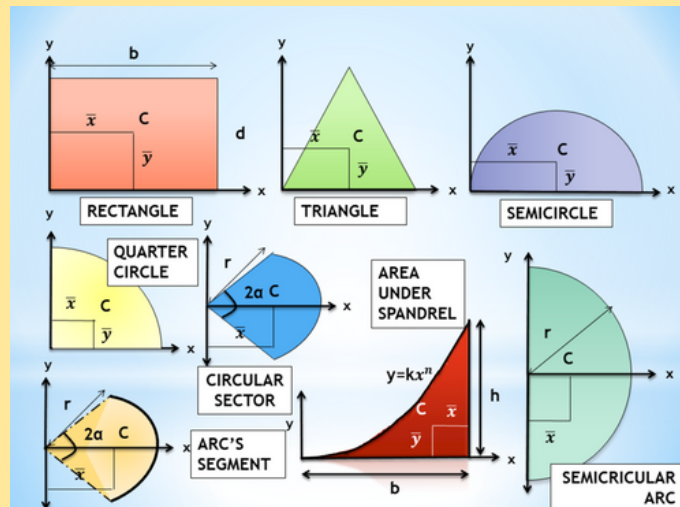
A FORCE THAT GOES THROUGH THE CENTER OF GRAVITY WON'T CAUSE ANY ROTATION. IN FACT YOU CAN BALANCE AN OBJECT BY SUPPORTING IT DIRECTLY BELOW ITS CENTER OF GRAVITY.



CENTROID

THE CENTROID IS THE AVERAGE POSITION OF ALL THE POINTS OF AN OBJECT.
IN MATHEMATICS AND PHYSICS, THE CENTROID, ALSO KNOWN AS GEOMETRIC CENTER,
OR CENTER OF FIGURE,
OF A PLANE FIGURE,
OR SOLID FIGURE IS THE ARITHMETIC
MEAN POSITION OF ALL THE POINTS
IN THE SURFACE OF THE FIGURE.

IT REFERS TO THE CENTRE OF GRAVITY
OF UNIFORM DENSITY OBJECTS,
DENOTED BY C .



DIFFERENCE BETWEEN CENTRE OF GRAVITY AND CENTROID

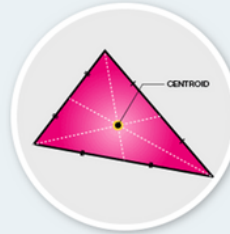
IN AN OBJECT, A CENTRE OF MASS IS REFERRED TO AS THE POINT WHERE THE WHOLE OBJECT'S MASS IS FOCUSED, WHICH MEANS THE POINT'S MASS IS REPRESENTED AS THE WHOLE OBJECT'S MASS. THE CENTRE OF GRAVITY OF ANY OBJECT IS THE POINT WHERE GRAVITY ACTS ON THE BODY.

ON THE OTHER HAND, THE CENTROID IS REFERRED TO AS THE GEOMETRICAL CENTRE OF A UNIFORM DENSITY OBJECT. THIS MEANS THE OBJECT HAS ITS WEIGHT DISTRIBUTED EQUALLY ACROSS ALL BODY PARTS. IF THE BODY IS HOMOGENEOUS (HAVING CONSTANT DENSITY), ITS CENTRE OF GRAVITY IS EQUIVALENT TO THE CENTROID.




CENTRE OF GRAVITY

Centre of gravity of a material body is a point that may be used for a summary description of gravitational interactions. The centre of gravity of any body can also be determined by a simple physical procedure.



CENTROID

The centroid of a plane figure is the arithmetic mean position of all the points in the figure. Informally, it is the point at which a cutout of the shape could be perfectly balanced on the tip of a pin.



**THANKS FOR YOUR ATTENTION!!!
I HOPE MY PRESENTATION WAS
USEFUL AND PROFOUNDLY FOR
YOU.**