

CENTRE OF GRAVITY

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- ✚ The center of gravity of a body is the point through, which the line of the total weight at the body always passes in whatever position the body is held. It is generally denoted by the letter 'G'.
- ✚ Methods for finding out the center of gravity of simple figure.
 - Geometrical Consideration.
 - By the method of moments.

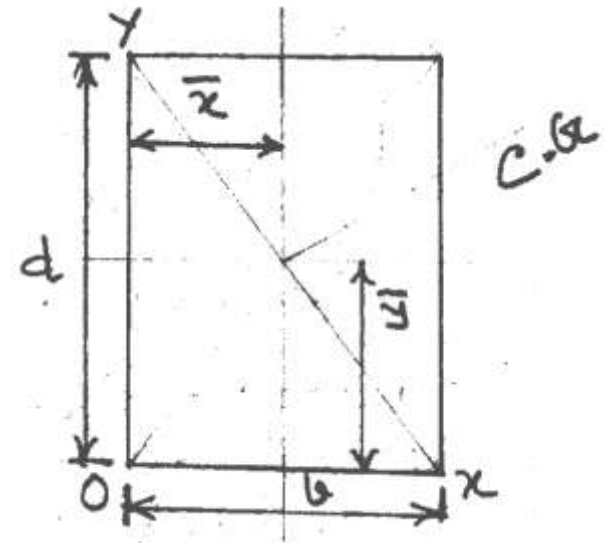
CENTRE OF GRAVITY BY THE GEOMETRICAL CONSIDERATION



The centre of gravity of a uniform thin rod is its middle point.

CENTRE OF GRAVITY BY THE GEOMETRICAL CONSIDERATION

Centre of gravity of a rectangle is at a point where the two diagonals meet each other. It is also the middle point of the length and breadth of the rectangle.



$$\bar{x} = \text{Distance of C.G. from 'y' axis} = \frac{b}{2}$$

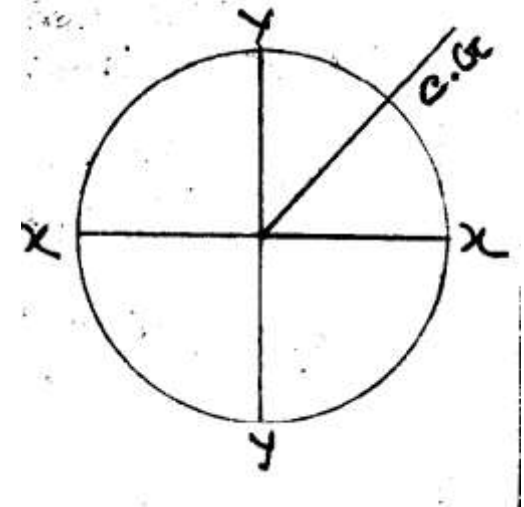
$$\bar{y} = \text{Distance of C.G. from 'x' axis} = \frac{d}{2}$$

CENTRE OF GRAVITY BY THE GEOMETRICAL CONSIDERATION

Centre of gravity of a circular area.

$x = \text{Distance of C.G. from } y \text{ axis} = 0$

$y = \text{Distance of C.G. from } x \text{ axis} = 0$



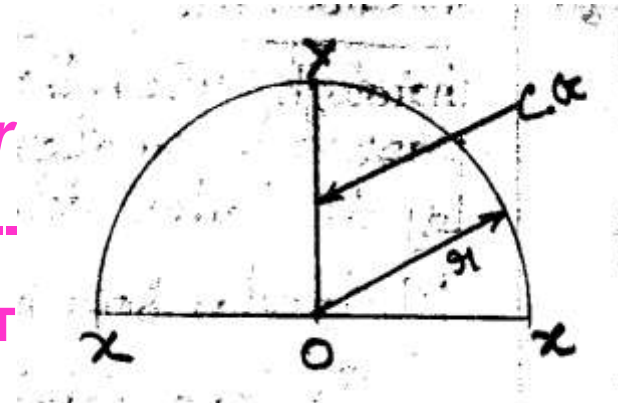
CENTRE OF GRAVITY OF A SEMI CIRCULAR AREA

—
 $x =$ Distance of C.G. from 'y' axis = 0

—
 $y =$ Distance of C.G. from 'x' axis = -----

$4r$

3π



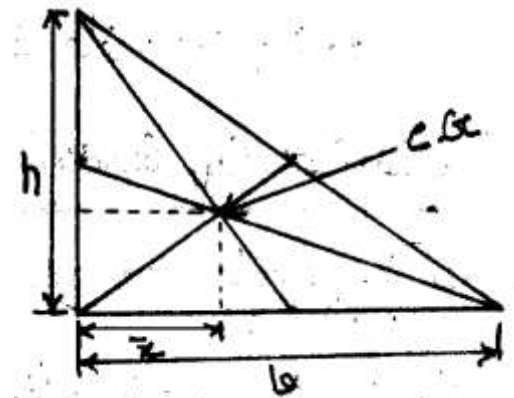
CENTRE OF GRAVITY OF A TRIANGULAR AREA

- The center of gravity of a triangle where the three medians meet.

$$x = \text{Distance of C.G. from 'y' axis} = \frac{1}{3} x b$$

$$y = \text{Distance of C.G. from 'x' axis} = \frac{1}{3} x h$$

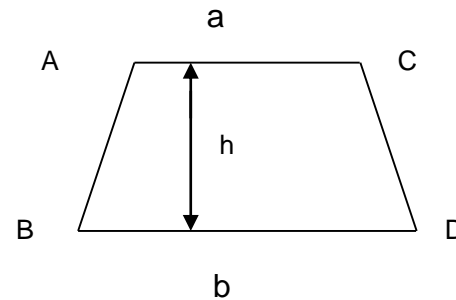
- (b = Base, h = height,)



CENTRE OF GRAVITY OF A TRAPIZODIAL AREA

- The centre of gravity with parallel side A & B is at a distance of h

$$\frac{h}{3} \left(\frac{b + 2a}{b + a} \right)$$



CENTROID

- The plain geometrical figures (like triangle, quadrilaterals, circle etc.) have only areas and no mass. The center of area no mass. The center of area of such figure will coincide with that of the area and is know as centroied.

The centroied of a plain area or that of a body of uniform thickness may be found by the formula.

$$\bar{x} = \frac{a_1 x_1 + a_2 x_2 + a_3 x_3}{a_1 + a_2 + a_3}$$

$$\bar{y} = \frac{a_1 y_1 + a_2 y_2 + a_3 y_3}{a_1 + a_2 + a_3}$$