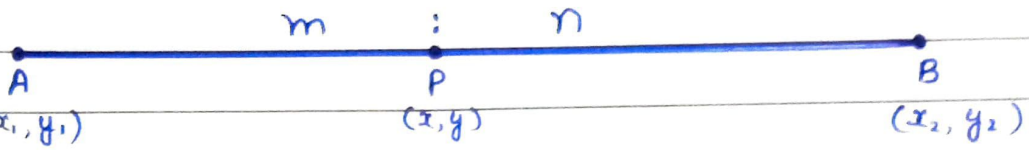
Section Formula



- $x = \frac{mx_2 + nx_1}{m+n}$ $\qquad$ $y = \frac{my_2 + ny_1}{m+n}$

- MID POINT :

$x = \frac{x_1 + x_2}{2}$ $\qquad$ $y = \frac{y_1 + y_2}{2}$

- CENTROID :

$x = \frac{x_1 + x_2 + x_3}{3}$ $\qquad$ $y = \frac{y_1 + y_2 + y_3}{3}$

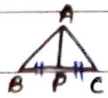
- DISTANCE FORMULA or LENGTH $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- SLOPE (m) $= \frac{y_2 - y_1}{x_2 - x_1}$

- (x, y) — x → ABSCISSA, y → ORDINATE $\Rightarrow$ x, y = COORDINATES

- TRISECT = 3 equal parts $\qquad$ BISECT = 2 equal parts

- MEDIAN :



median through vertex A of ΔABC means AP bisects BC i.e. PB = PC

→ Where 2 sides meet

- MEDIAN through any VERTEX of any Δ is a LINE which BISECTS the OPPOSITE side of the vertex in 2 EQUAL HALFS

PA = PC (through B)

PA = PB (through C)

CONCEPT OF RATIO : Ratio = Relationship = measure

EXAMPLE :

- Mumma Papa have 3 children → Yash, Divya, Yashita
- 1 son & 2 daughters ⇒ total 3
- measure of son (S) = $\frac{1}{3}$, measure of daughter (d) = $\frac{2}{3}$
- $S + d = \frac{1}{3} + \frac{2}{3} = \frac{3}{3} = 1$ (* sum of all the measures will always come out to be 1)
- Ratio of son and daughter

= son : daughter

= $\frac{\text{son}}{\text{daughter}} = \frac{\text{measure of son}}{\text{measure of daughter}} = \frac{S}{d} = \frac{1/3}{2/3} = \frac{1}{3} \times \frac{3}{2} = \frac{1}{2} = 1:2$

CONCLUSION :

- Mumma Papa have 1 son and 2 daughter so ratio of son and daughter is 1 : 2 BUT
- Does it also mean that there are 3 male and 3 female members in my family so the ratio of male and female is 3 : 3 ? NO !!
- Ratio of male and female will be = male : female = $\frac{\text{male}}{\text{female}} = \frac{3}{3} = 1$
- SO, the ratio of male and female members in my family is 1 : 1 (EQUAL)

(* we always find RATIO in SIMPLEST FORM)

NOW, Suppose a line segment is TRISECTED i.e. divided into 3 EQUAL PARTS then the ratio of 3 EQUAL PARTS = 1 : 1 : 1

Eg. • If $k = \frac{5}{2}$, ratio will be 5:2
• If $k = \frac{a}{b}$, ratio will be a:b
• If $k = 7$, ratio will be 7:1

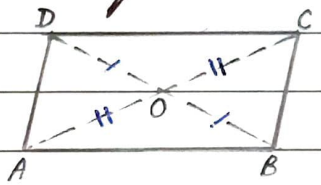
NOTE : • When we are asked to find the ratio and no ratio is given then we assume the ratio as k:1, where the value of k will be the required ratio

• When a line segment intersects / intersected by / divides / divided by x-axis, then the coordinate of y will be 0.

• When a line segment intersects / intersected by / divides / divided by y-axis, then the coordinate of x will be 0.

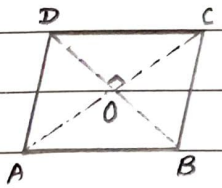
Properties

(i) Parallelogram :



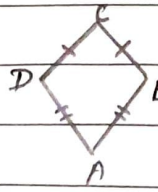
• Opposite sides are parallel and equal
→ AB = CD, AB ∥ CD and AD = BC, AD ∥ BC
• Opposite angles are EQUAL
→ ∠A = ∠C and ∠D = ∠B
• Diagonals bisect each other
→ OA = OC and OB = OD

(ii) Rhombus :



• Every rhombus is a ||gm so it has all the properties of a ||gm. In addition :
• All sides are equal (AB = BC = CD = DA)
• Diagonals intersect at right angle (AC ⊥ BD)
• Diagonals bisect the angles of a rhombus
→ AC bisects ∠A and ∠C, → BD bisects ∠B and ∠D

(iii) Kite :

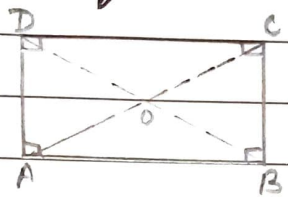


• Two pairs of adjacent sides are equal.
→ AB = AD and BC = CD

(iv) **Trapezium :**

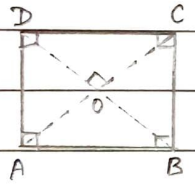
- one pair of opposite sides is parallel and the other is non-parallel.

(v) **Rectangle :**



- All interior angles are 90°
- Opposite sides are ll and equal
- diagonals are equal
- diagonals bisect each other

(vi) **Square :**



- All interior angles are 90°
- All sides are equal
- Diagonals are equal
- Diagonals bisect each other at 90°
- Diagonals bisect the respective angles of the square.

NOTE : SOMETIMES, Eq. of a LINE is given and it is said that a point P(a,b) lies on the line or passes through the line.
HOW TO DEAL WITH SUCH SITUATIONS ??

→ whenever eq. of a line is given, ALWAYS keep in mind that the POINT which LIES on the LINE or PASSES through the line will ALWAYS ~~satisfy~~ the given eq. . WHAT ???

Eg. P(6,4) passes through the line $x - y = 2$
i.e. when we put the coordinates of point P in the given eq., it will satisfy the eq.

So, when we put 6 in place of x and 4 in place of y, ans. will come out to be 2 which satisfies the given eq.

Now, can you tell a point which does not lies on the line $x - y = 2$.

yes, ofc! There are several points

For eg. $P(5, 4)$ in $x - y = 2$

$\longrightarrow 5 - 4 \neq 2$ (∴ does not satisfies the eq. so it does not lies on the given line)