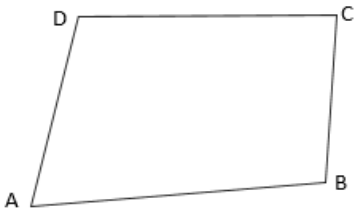
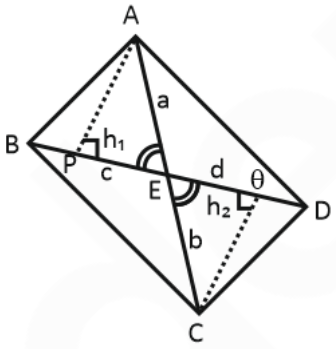
Quadrilateral

Quadrilateral

Definition: A Quadrilateral is a closed shape formed by joining four non-linear points to each other.



Property: The sum of internal angles of a Quadrilateral is always 360°.



Property: If the two diagonals (AC and BD) of a Quadrilateral ABCD meet at a point 'E' and AE = a; EC = b; BE = c and ED = d.

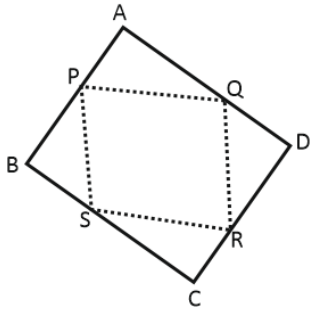
Then,

$$\frac{Area\ of\ \Delta\ ABD}{Area\ of\ \Delta\ CBD} = \frac{a}{b}$$

And

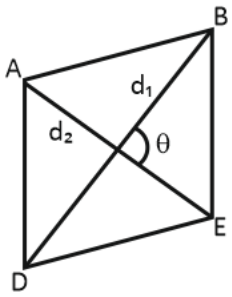
$$\frac{Area\ of\ \Delta\ ABC}{Area\ of\ \Delta\ ADC} = \frac{c}{d}$$

Property:



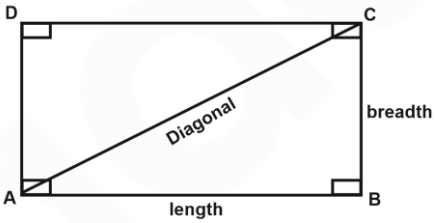
If P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively, then the shape formed by joining the points P, Q, R and S will always be a Parallelogram.

Property:

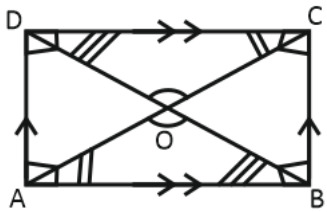


If the angle between the diagonals of a quadrilateral is θ. Than the area of the Quadrilateral = $\mathbf{1/2} \times \boldsymbol{d1} \times \boldsymbol{d2} \times \boldsymbol{sin\ \theta}$

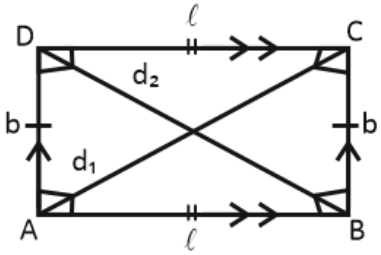
Rectangle



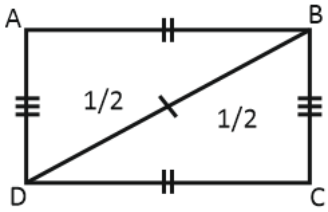
Definition: A four-sided shape that is made up of two pairs of parallel lines and that has four right angles; especially a shape in which one pair of lines is longer than the other pair.



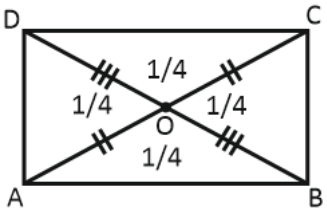
- The diagonals of a rectangle bisect each other and are equal.



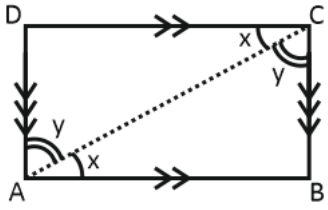
- The diagonals of a rectangle do not intersect each other at Right Angle.



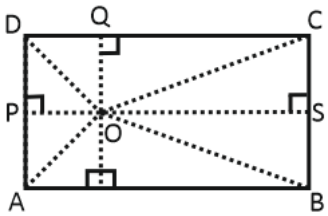
- A Diagonal divides the area of rectangle in two equal parts.

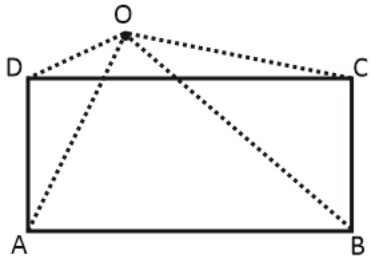


- Both the Diagonals divide the area in four equal parts.
- Perimeter of a Rectangle = 2 × (Length + Breadth) = $2(l + b)$
- Perimeter of rectangle = $\boldsymbol{l(l + \sqrt{d^2 - l^2})}$ if one side (l) and diagonal (d) are given.
- Length of the Diagonal of a rectangle = $\sqrt{Length^2 + Breadth^2}$ = $\sqrt{l^2 + b^2}$
- Area of Rectangle = Length × Breadth = $l \times b$
- Area of rectangle = $\boldsymbol{l \times \sqrt{d^2 - l^2}}$ if one side (l) and diagonal (d) are given.
- Area of rectangle = $\frac{\boldsymbol{P^2}}{\boldsymbol{8}} - \frac{\boldsymbol{d^2}}{\boldsymbol{2}}$ if perimeter (P) and diagonal (d) are given.
- If each diagonal of a rectangle is of length "d" and the area is "A" then Perimeter of the rectangle P = $\boldsymbol{\sqrt{8A + 4d^2}}$
- The diagonals of the rectangle are equal to the length of the diameter of the circumcentre.



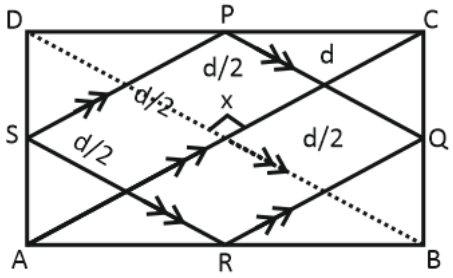
- Diagonals of a rectangle are not angle bisectors.





Property: If 'O' is any point inside or outside a rectangle ABCD then,

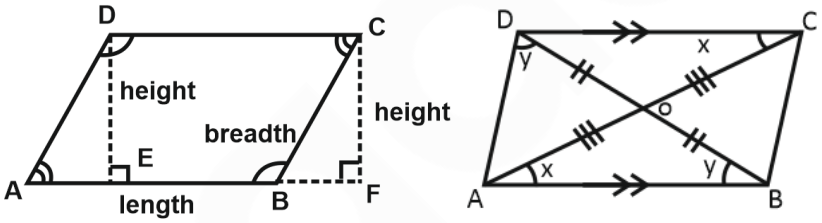
$OA^2+OC^2 = OB^2+OD^2$



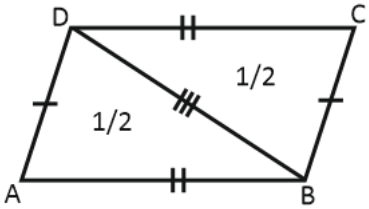
Property: If P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively, then the shape formed by joining the points P, Q, R and S will be a Rhombus.

Parallelogram

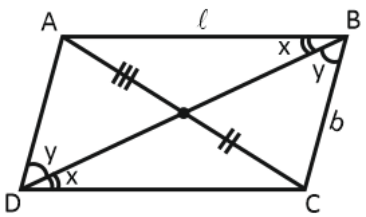
Definition: A quadrilateral in which opposite sides are equal and parallel is called a parallelogram. The diagonals of a parallelogram bisect each other.



- The diagonals of a Parallelogram are not equal in length.
- The Diagonals of a Parallelogram are not perpendicular to each other.



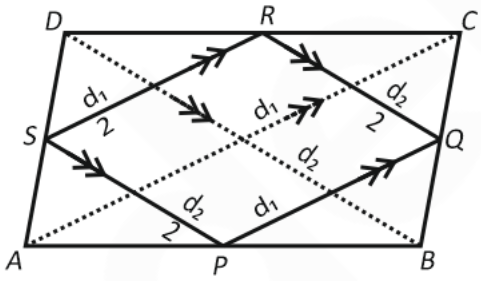
- A Diagonal of a Parallelogram divides the area of Parallelogram in two equal parts.



- A Diagonal of a Parallelogram does not bisect the Angles.
- The opposite angles are equal in a parallelogram.
- Area of a Parallelogram = Length × Height = AB x DE
- Area of a parallelogram $2\sqrt{s(s-a)(s-b)(s-d)}$
  where a and b are adjacent sides, d is the length of the diagonal connecting the ends of the two sides and $s = \frac{a+b+d}{2}$
- Perimeter of a Parallelogram = 2 × (Length + Breadth)
- In a parallelogram,

  the sum of the squares of the diagonals = 2x(the sum of the squares of the two adjacent sides) i.e., $d_1^2 + d_2^2 = 2(a^2 + b^2)$

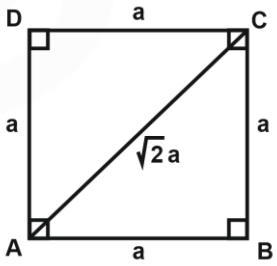
Property:

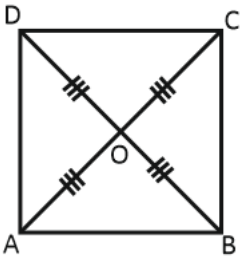


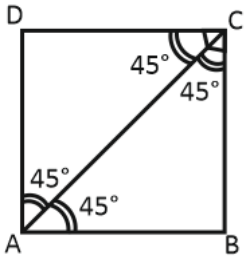
If P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively, then the shape formed by joining the points P, Q, R and S will be a Parallelogram.

Square

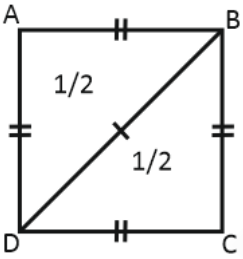
Definition: A four-sided shape that is made up of four straight sides that are the same length and that has four right angles. The diagonals of a square are equal and bisect each other at 90^0.



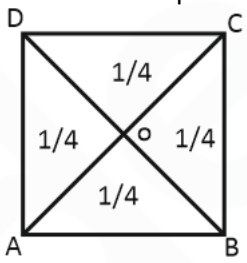




- The Diagonals of a Square are also angle bisectors.



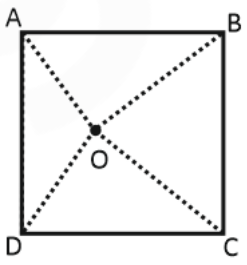
- A Diagonal of a Square divides the area of Square in two equal parts.

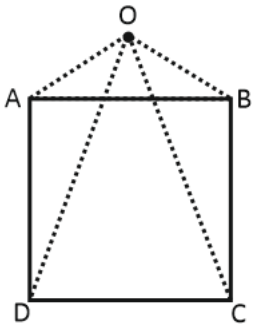


- Diagonals of a Square divide the area of Square in four equal parts.
- Area of a Square = Side × Side = $(\text{Side})^2 = a^2$
- Perimeter of a square = 4 × Side = $4 \times a$
- Length of the Diagonal of a square = $\sqrt{2}$ × Side = $\sqrt{2} \times a$
- The diagonals of the square are equal to the length of the diameter of the circumcentre.

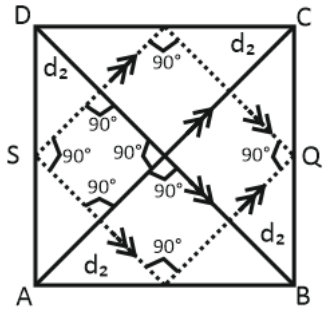
Property: If 'O' is any point inside or outside a Square ABCD then,

$$OA^2+OC^2 = OB^2+OD^2$$



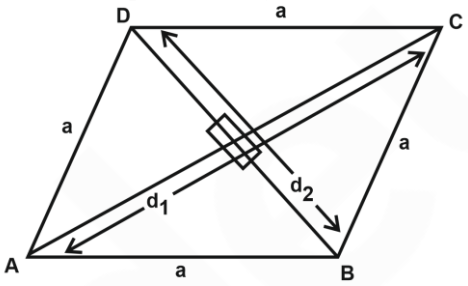


Property: If P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively, then the shape formed by joining the points P, Q, R and S will be a Square.

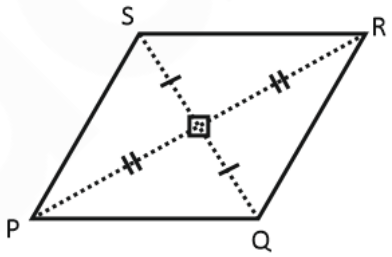


Rhombus

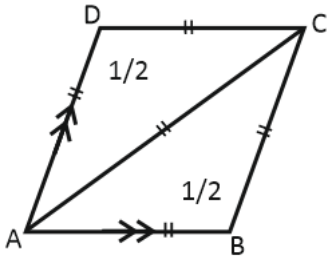
Definition: It is a flat shape with 4 equal straight sides.



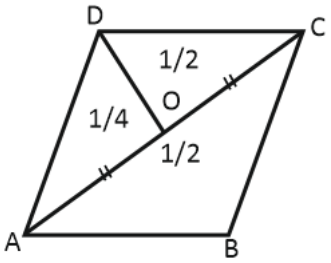
- The diagonals bisect each other and are perpendicular to each other.



- The diagonals also the bisect the angles at vertices.

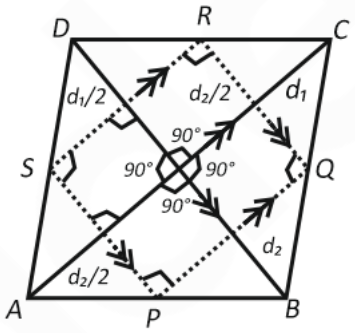


- A Diagonal of a Rhombus divides the area of Rhombus in two equal parts**.**



- Diagonals of a Rhombus divide the area of Rhombus in four equal parts.
- In a Rhombus the t opposite angles are equal and Sum of the adjacent angles is 180°.
- Area of a rhombus = $\frac{1}{2} \times$ **Product of two diagonals** $= \frac{1}{2} \times \mathbf{d_1} \times \mathbf{d_2}$
- Perimeter of a rhombus = $\mathbf{4} \times \mathbf{a}$
- Side of a rhombus = $\frac{1}{2}\sqrt{(d_1^2 + d_2^2)}$ Where d_1 and d_2 are two-diagonals.

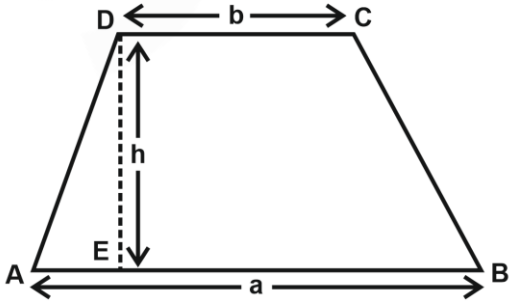
Property:



If P, Q, R and S are mid-points of sides AB, BC, CD and DA respectively, then the shape formed by joining the points P, Q, R and S will be a Rectangle.

Trapezium

Trapezium: A trapezoid is a 2-dimensional geometric figure with four sides, at least one set of which are parallel. The parallel sides are called the bases, while the other sides are called the legs.



- Area of a trapezium =

$\frac{1}{2}$ × sum of parallel sides × distance between parallel sides

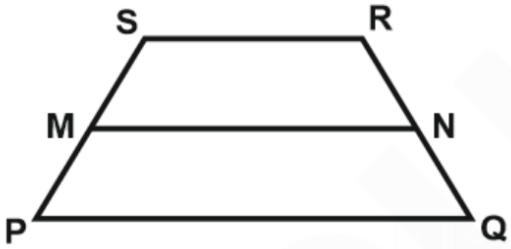
$= \frac{1}{2} \times (AB + CD) \times DE = \frac{1}{2} \times (a + b) \times h$

- In a Trapezium the diagonals cut each other in equal ratios.

$$OA/OC = OB/OD$$

- Perimeter of a Trapezium = Sum of All Sides
- If M and N are midpoints of Sides PS and QR respectively then the length of

$$MN = \frac{1}{2}(PQ + SR)$$



- If M and N are midpoints of diagonals PS and QR respectively then the length of MN $= \frac{1}{2}(PQ - SR)$