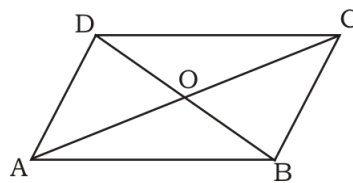**Quadrilateral**: 4 sided polygon

Sum of internal angles = 360
Sum of external angles = 360
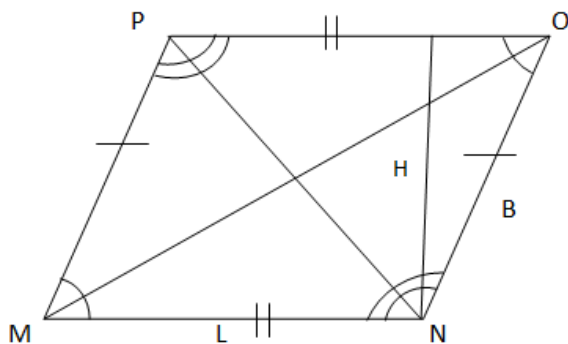Number of diagonals = 2

Parallelogram: Quadrilateral formed by joining mid points of the sides of any quadrilateral.
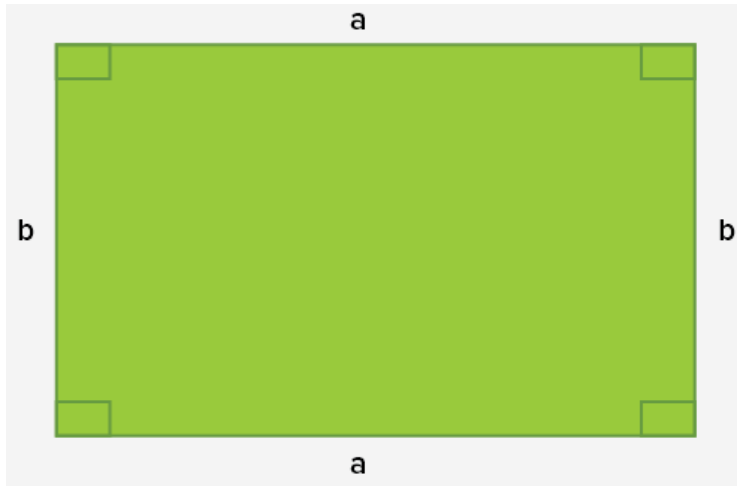

1. Opposite sides are ∥.
2. Opposite sides are equal.
3. Opposite angles are equal.
4. The diagonals bisect each other i.e.
    OA=OC & OB=OD

Area = base ×height
   = ab Sinθ, a & b are sides and θ is any angle

Rectangle: Special parallelogram with
1. Equal angles.
2. Equal diagonals.
3. Maximum area.

$$\text{Area } = \text{Base} \times \text{Height}$$

$$\text{Diagonal} = \sqrt{a^2 + b^2}$$

Problem: There is a rectangular garden with dimensions 14m×16m. There is a path of width 5m all along outside the garden. Find the area of the path?

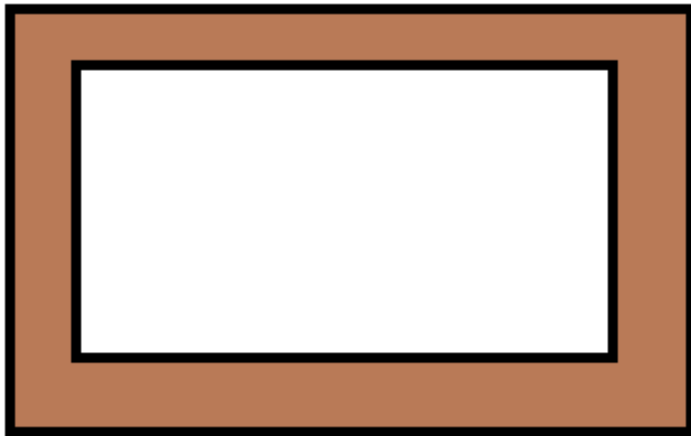**Problem**: There is a rectangular garden with dimensions 14m×16m. There is a path of width 5m all along outside the garden. Find the area of the path?

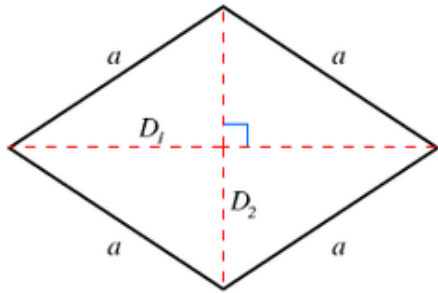Area of path = Area of outer rectangle – Area of inner rectangle

$$= 24×26 - 14× 16$$

$$= 400$$

Rhombus: Special parallelogram with
1. Equal sides.
2. Diagonals bisect at 90°.
3. Diagonals are angle bisectors.
4. 4 smaller triangles are congruent.

$$\text{Area} = \frac{1}{2} \times d_1 \times d_2$$

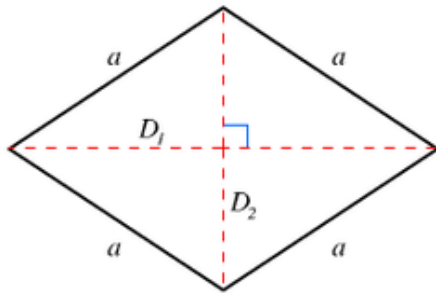Note: In any quadrilateral if diagonals are perpendicular then its area $= \frac{1}{2} \times d_1 \times d_2$

Problem: If diagonals of a Rhombus are 24cm and 32cm then find the perimeter of the Rhombus?

Problem: If diagonals of a Rhombus are 24cm and 32cm then find the perimeter of the Rhombus?
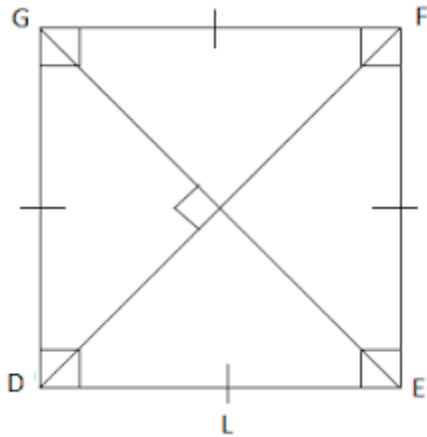
$$\text{Side} = \sqrt{12^2 + 16^2} = 20$$

$$\text{Perimeter} = 4 \times 20 = 80$$

Square: Special Rectangle & Rhombus
1. Equal sides.
2. Diagonals bisect at 90°.
3. Diagonals are angle bisectors.
4. Equal angles.
5. Equal diagonals.

$$\text{Area} = (\text{Side})^2$$
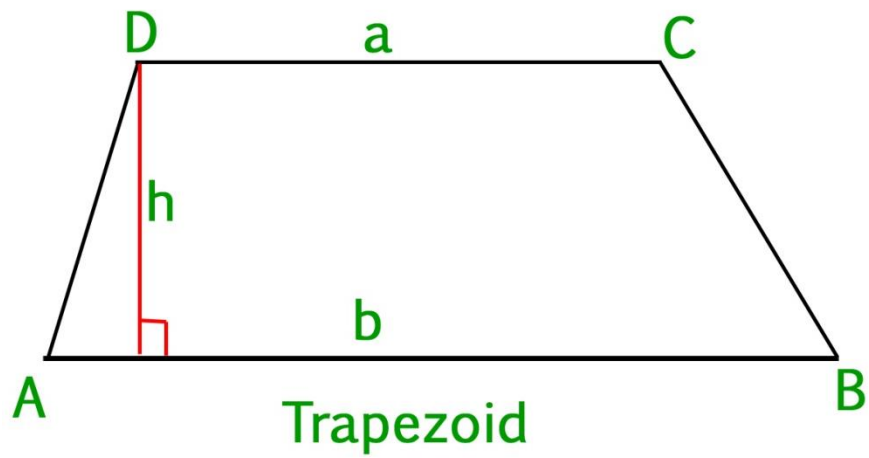$$\text{Diagonal} = \sqrt{2} \times \text{Side}$$

Problem:
Find the ratio of area of square to rhombus if both are having same sides and one angle of rhombus is 30°.

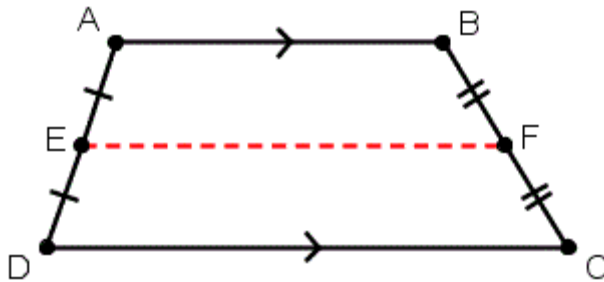Find the ratio of area of square to rhombus if both are having same sides and one angle of rhombus is 30°.

Let a is the side of square as well as rhombus.

$$\frac{\text{Area of square}}{\text{Area of rhombus}} = \frac{a^2}{a^2 \sin 30^0} = \frac{1}{\frac{1}{2}} = 2$$

Trapezium(Trapezoid): 2 sides are ||.

Trapezoid

$$\text{Area} = \frac{1}{2} \times \text{height} \times \text{sum of || sides}$$
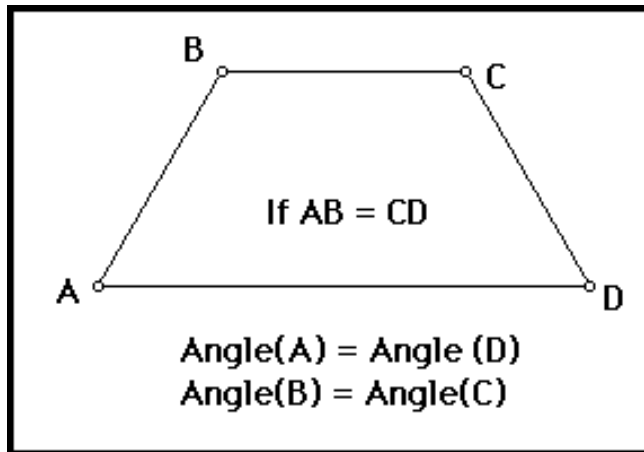

E & F are mid points of AD and BC then

$$EF = \frac{AB + CD}{2}$$

Isosceles Trapezium:
1. Oblique sides (Non-parallel sides) are equal.
2. Diagonals are equal.
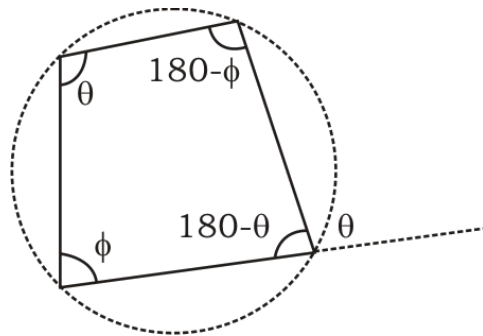3. It is cyclic i.e. sum of opposite angles is 180.

Note: If a trapezium is cyclic then must be an isosceles.

Cyclic quadrilateral:

Sum of opposite angles is 180°.

Or

Quadrilateral inscribed in a circle.

$$\text{Area} = \sqrt{(S-a)(S-b)(S-c)(S-d)}, \; S\text{:Semiperimeter}$$

Problem: Find the area of cyclic parallelogram with sides 5cm & 10cm

Problem: Find the area of cyclic parallelogram with sides 5cm & 10cm

Area $= 5 \times 10$

Note: Cyclic parallelogram is a Rectangle.