Geometrical Figures

- Δ
  - Equilateral Δ
  - Isosceles
  - Scelene
  - Rt. angle Δ
  - Acute angle Δ
- Quadrilateral

(1) Equilateral Δ

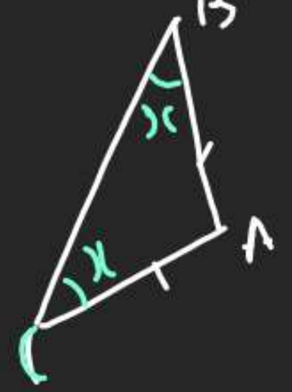
1) $AB = BC = CA$
2) all angle $60°$

(2) Isosceles Δ

2 Sides equal.

$AB = BC \neq CA$

$AB = AC \neq BC$

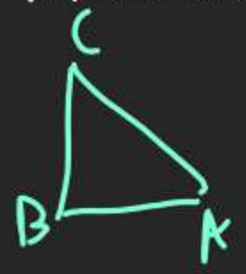


(3) Rt. angle Δ

$AB \perp BC$

Q $AB^2 + BC^2 = CA^2$ is Rt. angled at?

Rt at B

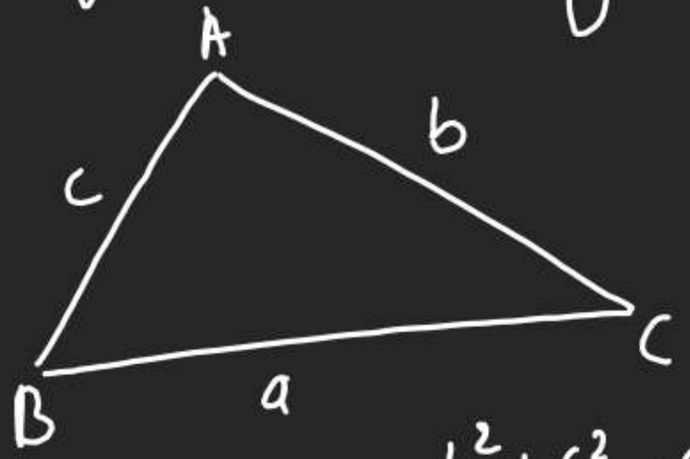


2 Lect.

SOT*

Cosine formula

If Δ is not Rt. angle.



$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos C = \frac{a^2 + b^2 - c^2}{2ab}$$

Nishant Jindal

Q Δ made by $A(0,0)$, $B(\sqrt{3},1)$, $C(0,2)$ is A) Eq^l (B) Iso (C) Rt. angle (D) NOT.

$AB = \sqrt{(\sqrt{3}-0)^2+(1-0)^2} = \sqrt{3+1} = 2$

$BC = \sqrt{(\sqrt{3}-0)^2+(1-2)^2} = \sqrt{3+1} = 2$

$CA = \sqrt{(0-0)^2+(0-2)^2} = \sqrt{4} = 2$

Eq^l Δ.

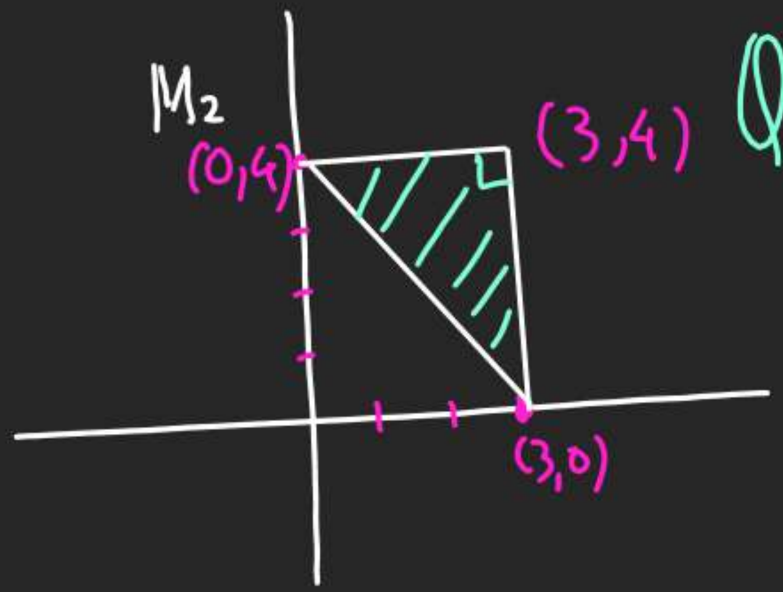
Q Δ made by $A(3,0)$ $B(3,4)$ $C(0,4)$ is?

$AB = \sqrt{(3-3)^2+(0-4)^2} = \sqrt{0+16} = 4$

$BC = \sqrt{(3-0)^2+(4-4)^2} = \sqrt{9+0} = 3$

$CA = \sqrt{(3-0)^2+(0-4)^2} = \sqrt{9+16} = 5$

$AB^2+BC^2 = CA^2 \Rightarrow$ Rt. angle Δ at B.



$AB + BC = AC$

$\Rightarrow$ Collinear Pts

Q3 Δ made by $A(0,0)$ $B(\sqrt{3},1)$ $C(0,1)$ is?

$AB = \sqrt{(\sqrt{3}-0)^2+(1-0)^2} = \sqrt{4} = 2$

$BC = \sqrt{(\sqrt{3}-0)^2+(1-1)^2} = \sqrt{3} = \sqrt{3}$

$CA = \sqrt{(0-0)^2+(0-1)^2} = \sqrt{1} = 1$

$BC^2 + CA^2 = AB^2$ Rt angle Δ at C

$3 + 1 = (2)^2$ ✓

Q $A(4,0)$ $B(-1,-2)$ $C(-11,-6)$ are pts on ..... ?

$AB = \sqrt{(4+1)^2+(0+2)^2} = \sqrt{25+4} = \sqrt{29}$

$BC = \sqrt{(-1+11)^2+(-2+6)^2} = \sqrt{100+16} = 2\sqrt{29}$

$CA = \sqrt{(4+11)^2+(0+6)^2} = \sqrt{225+36} = \sqrt{261} = 3\sqrt{29}$

Nishant Jindal

POINT

Find the distances between the following pairs of points

Q.1 $(2, 3)$ and $(5, 7)$

Q.2 $(4, -7)$ and $(-1, 5)$

POINT

Find the distances between the following pairs of points

Q.3 $(-3,-2)$ and $(-6,7)$, the axes being inclined at 60°.

POINT

Find the distances between the following pairs of points

Q.4 $(a, 0)$ and $(0, b)$

Nishant Jindal

POINT

Find the distances between the following pairs of points

Q.5 $(b + c, c + a)$ and $(c + a, a + b)$

Nishant Jindal

POINT

Find the distances between the following pairs of points

Q.6 $(a\cos\alpha, a\sin\alpha)$ and $(a\cos\beta, a\sin\beta)$

Nishant Jindal

POINT

Find the distances between the following pairs of points

Q.7 $(am_1^2, 2am_1)$ and $(am_2^2, 2am_2)$.

POINT

Q.8 Lay down in a figure the positions of the points $(1,-3)$ and $(-2,1)$, and prove that the distance between them is 5 .

POINT

Q.9 Find the value of x_1 if the distance between the points $(x_1, 2)$ and $(3, 4)$ be 8 .

Distance formula

Based Qs.

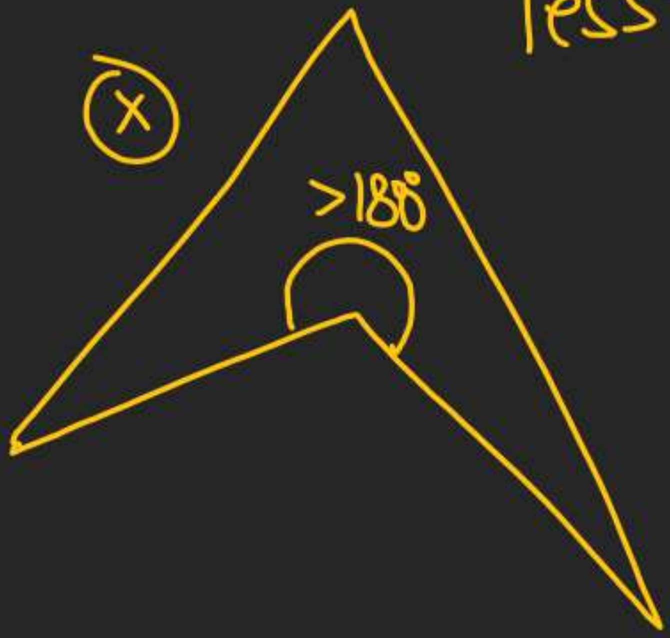
H.W.

Nishant Jindal

(B) Quadrilateral.

Convex Polygon.

all angles of Quad are less than 180°

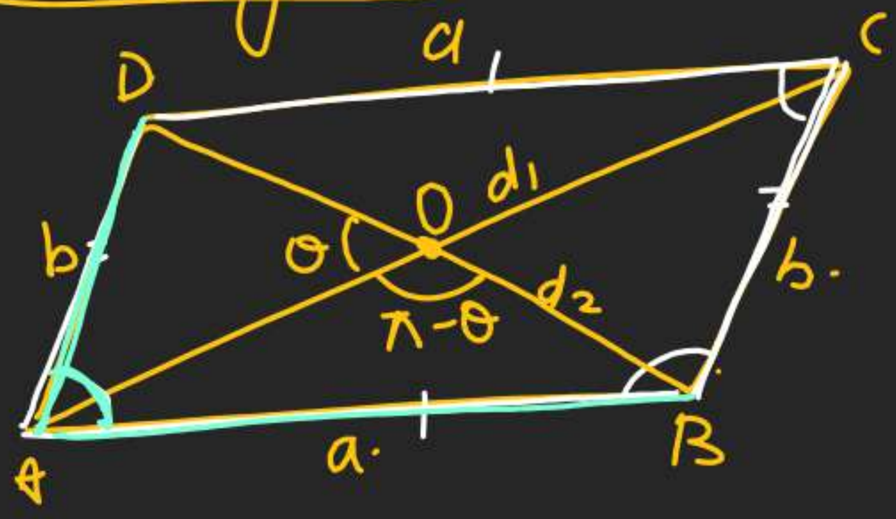


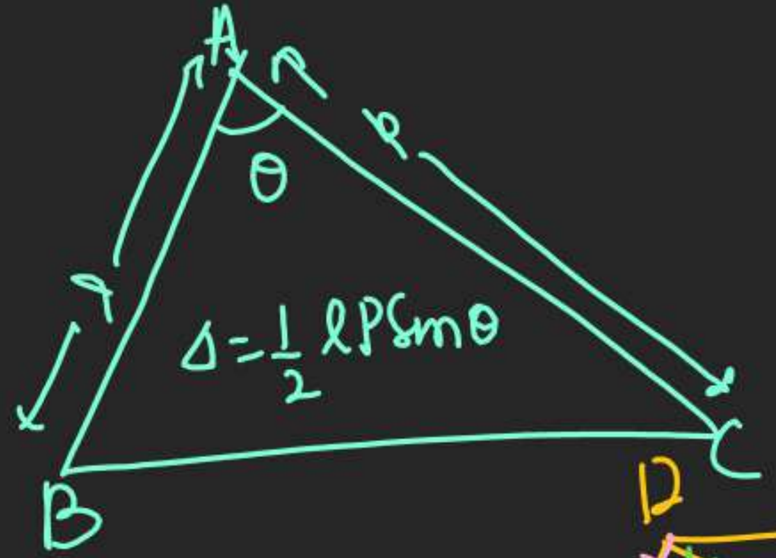
Family of Quad.

- ||gm family
  - ||gm
  - Rectangle
  - Sqr.
  - Rhombos
- Cyclic Quad
- Trapezium
- Kite

Nishant Jindal

Parallelogram.





(1) $a^2+a^2+b^2+b^2=d_1^2+d_2^2$

(2) AD || BC & AB || CD.

(3)** Diagonals Bisect each other.

(4) AB = CD & AD = BC

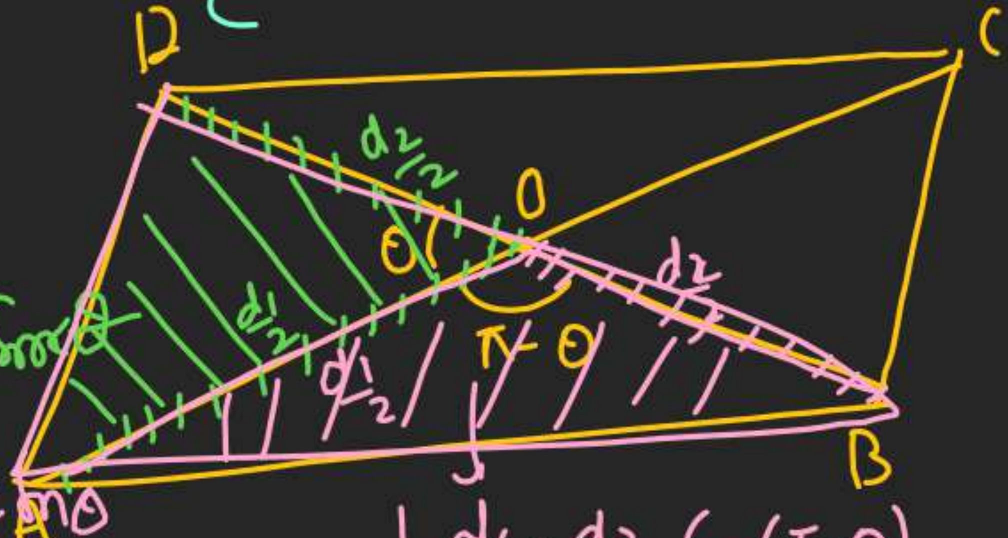
(5) $\angle A+\angle B = \angle B+\angle C = \angle C+\angle D = \angle D+\angle A = \pi$

(6) Area of ||gm = 2 (Area of Δ ABD) $= 2\left(\frac{1}{2} ab \sin A\right)$

$= ab \sin A$

(7) $\frac{1}{2}\frac{d_1}{2}\frac{d_2}{2}\sin\theta$

$= \frac{1}{8} d_1 d_2 \sin\theta$



$\frac{1}{2}\frac{d_1}{2}\times\frac{d_2}{2}.\sin(\pi-\theta)$

$\frac{1}{8} d_1 d_2 \sin\theta$

Area of ||gm when length of diagonal is given (d_1, d_2)

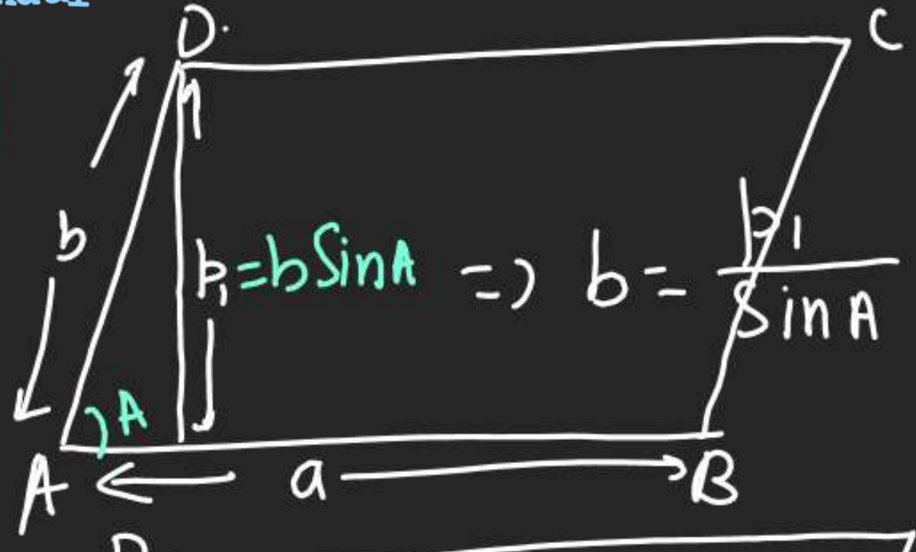
Area of ||gm = 2 (Area of Δ ABD)

$= 2\left(\frac{1}{8} d_1 d_2 \sin\theta + \frac{1}{8} d_1 d_2 \sin\theta\right)$

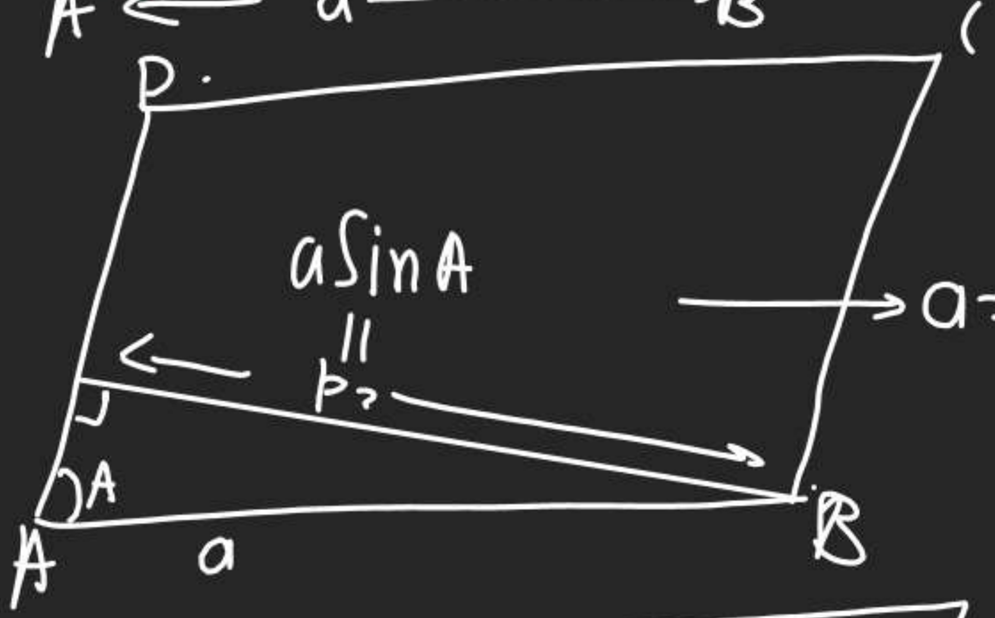
$= \frac{1}{2} d_1 d_2 \sin\theta$

Nishant Jindal

(8)



$p_1 = b\sin A \Rightarrow b = \dfrac{p_1}{\sin A}$



$a\sin A = p_2 \rightarrow a = \dfrac{p_2}{\sin A}$

(6)

$\text{Area} = ab\sin A$

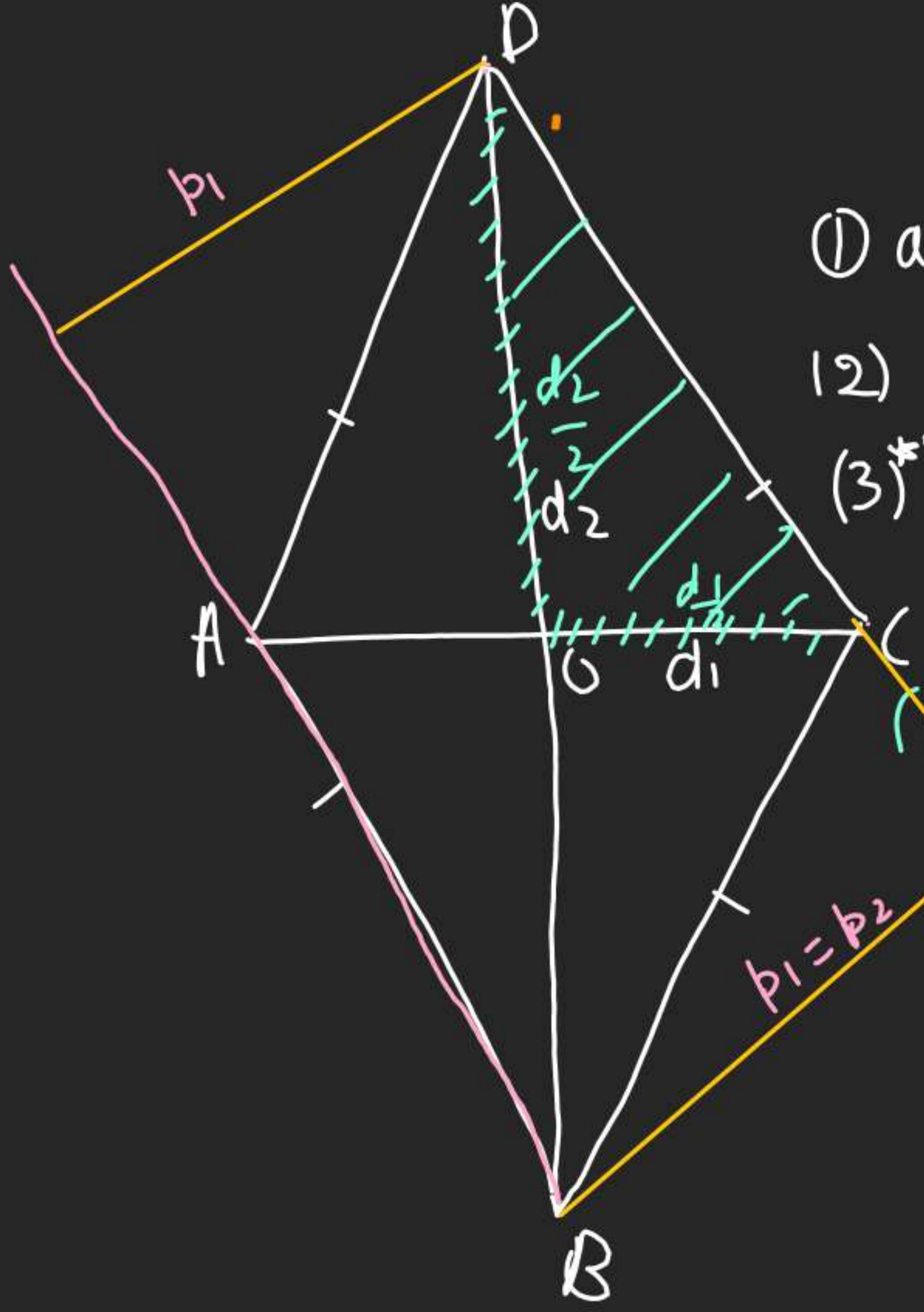
$= \dfrac{p_2}{\sin A} \times \dfrac{p_1}{\cancel{\sin A}} \times \cancel{\sin A}$

$\text{Area} = p_1 p_2 \operatorname{cosec} A$

3 Area's of ||gm.

- $ab\sin A$ (When Adjacent Sides are given)
- $\dfrac{d_1 d_2}{2}\sin\theta$ (When length of diag. is given.)
- $p_1 p_2 \operatorname{cosec} A$ (When $\perp^r$ dist. bet^n $\parallel^{re}$ lines is given.)

(2) Rhombus



(1) all sides eql.

(2) $d_1 \perp d_2$; $d_1 \neq d_2$

(3)** diagonal Bisects each other.

(4) Area of Rhombus

$= 4$ Area of ΔODC

$= 4\left(\frac{1}{2} \times \frac{d_1}{2} \times \frac{d_2}{2} \cdot \sin 90^\circ\right)$

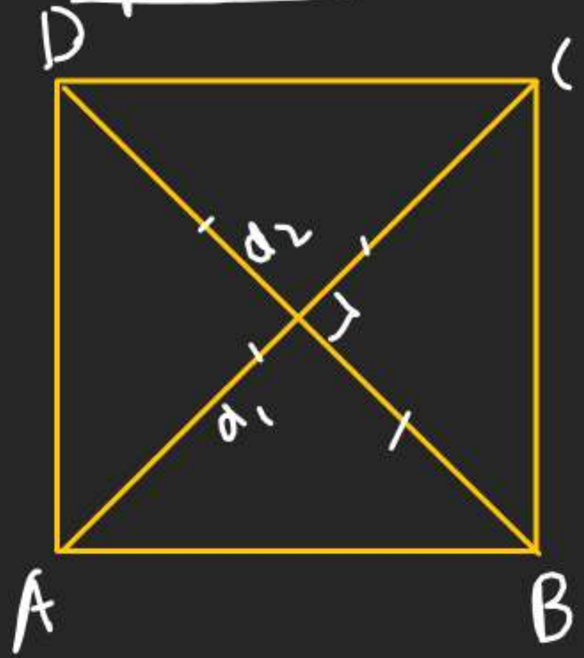
$= \frac{1}{2} d_1 d_2$

(5) Area of Rhombus

$= p_1 \cdot p_1 \operatorname{cosec} A$

$= p_1^2 \cdot \operatorname{cosec} A$

(3) Square



(1) all sides equal

(2) $d_1 = d_2 = d$

(3) $d_1 \perp d_2$

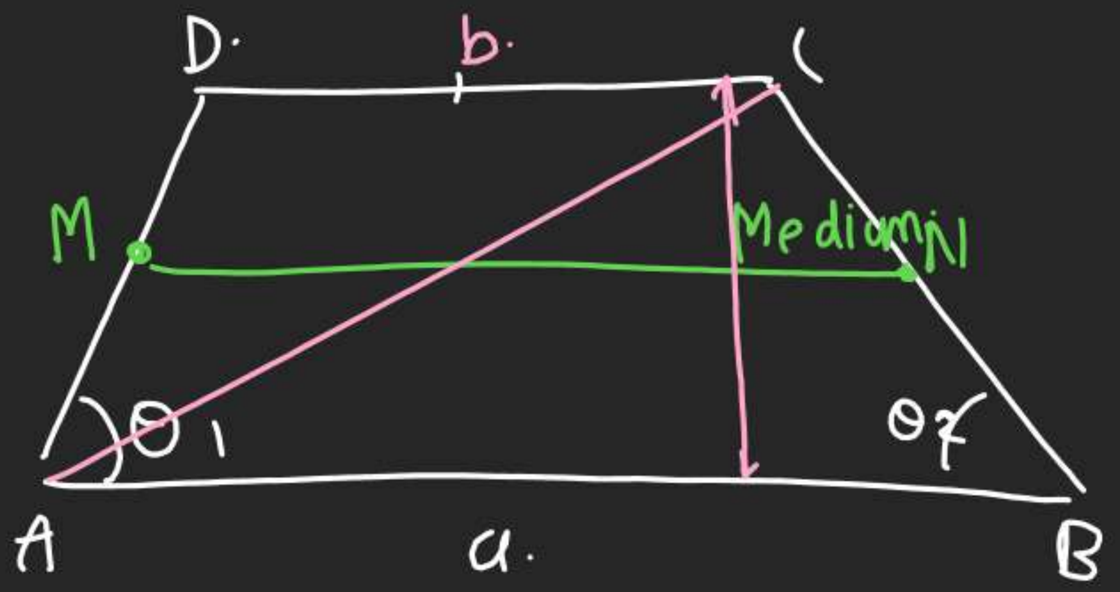
(4) Area $= \frac{d_1 d_2}{2} = \frac{d^2}{2}$

(5) Area $= (\text{Side})^2$

(4) Rectangle

A) It is a llgm having $\perp^r$ Sides & equal diagonal.

5) Trapezium.



① 2 Sides are IIrl. (one pair of opp. Sides are IIrl)

(2) θ_1 & θ_2 are known as Base angles.

(3) line joining the mid Pt of non II^{rl} Sides is called median of Trapezium.

(4) Area of trapezium.

$= \frac{1}{2}(a+b) \times$ distance bet^n II^{rl} Sides

$= \frac{1}{2}(a+b) \times h$.

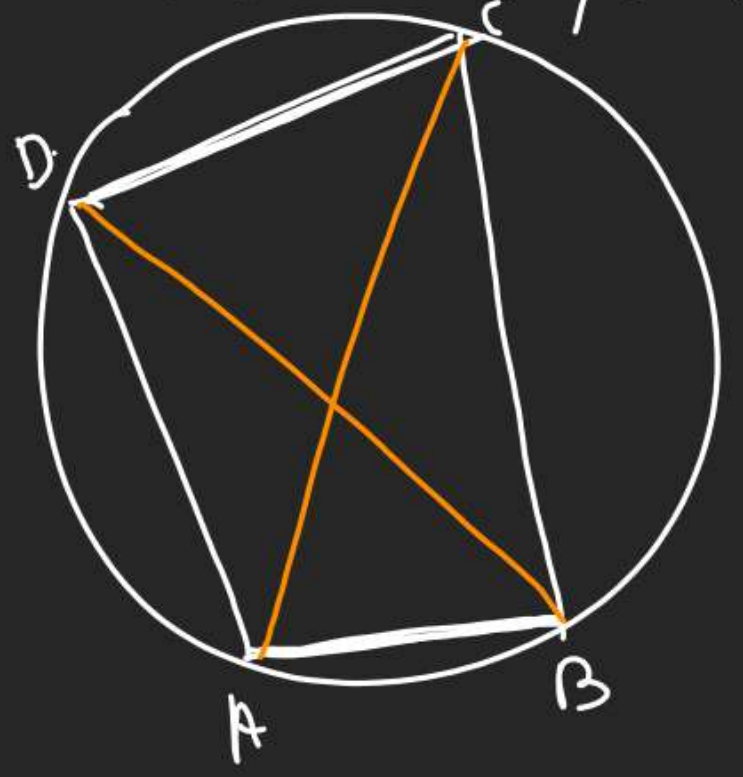
(5) When $\theta_1 = \theta_2$ then it is known as Isosceles trapezium.

(6) Cyclic Quadrilateral

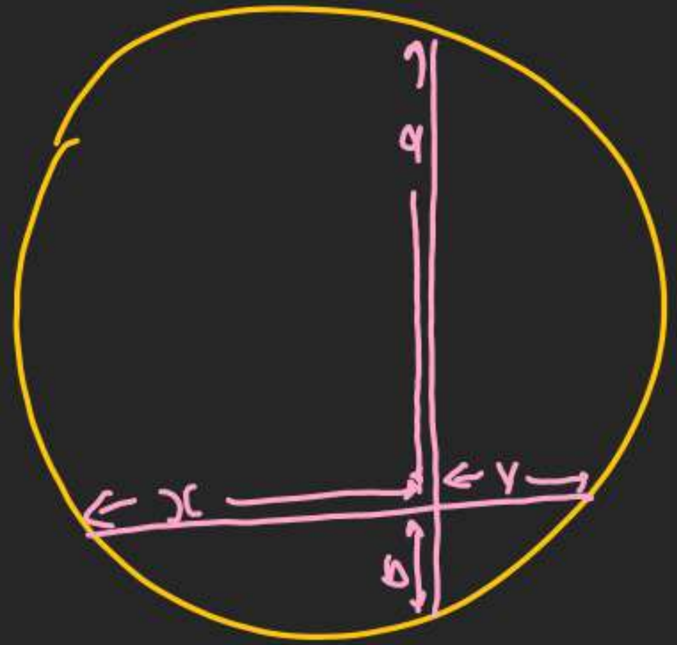
1) When Sum of opp. angle are 180° then Quad is Cyclic Quad.

(2) Sum of opp. angles are supplementry.

How to check Quad is cyclic Quad or not?



Chord Intersecting Theorem.



Prod of opp side + Prod of opp. Side = Prod of diagonal

$AB \times CD + BC \times AD = AC \times BD$

$\Rightarrow ABCD$ is cyclic Quad.

$x \cdot y = a \cdot b$

Nishant Jindal

* Division

Internal

External.

When C lies betⁿ A & B

When C lies outside AB.