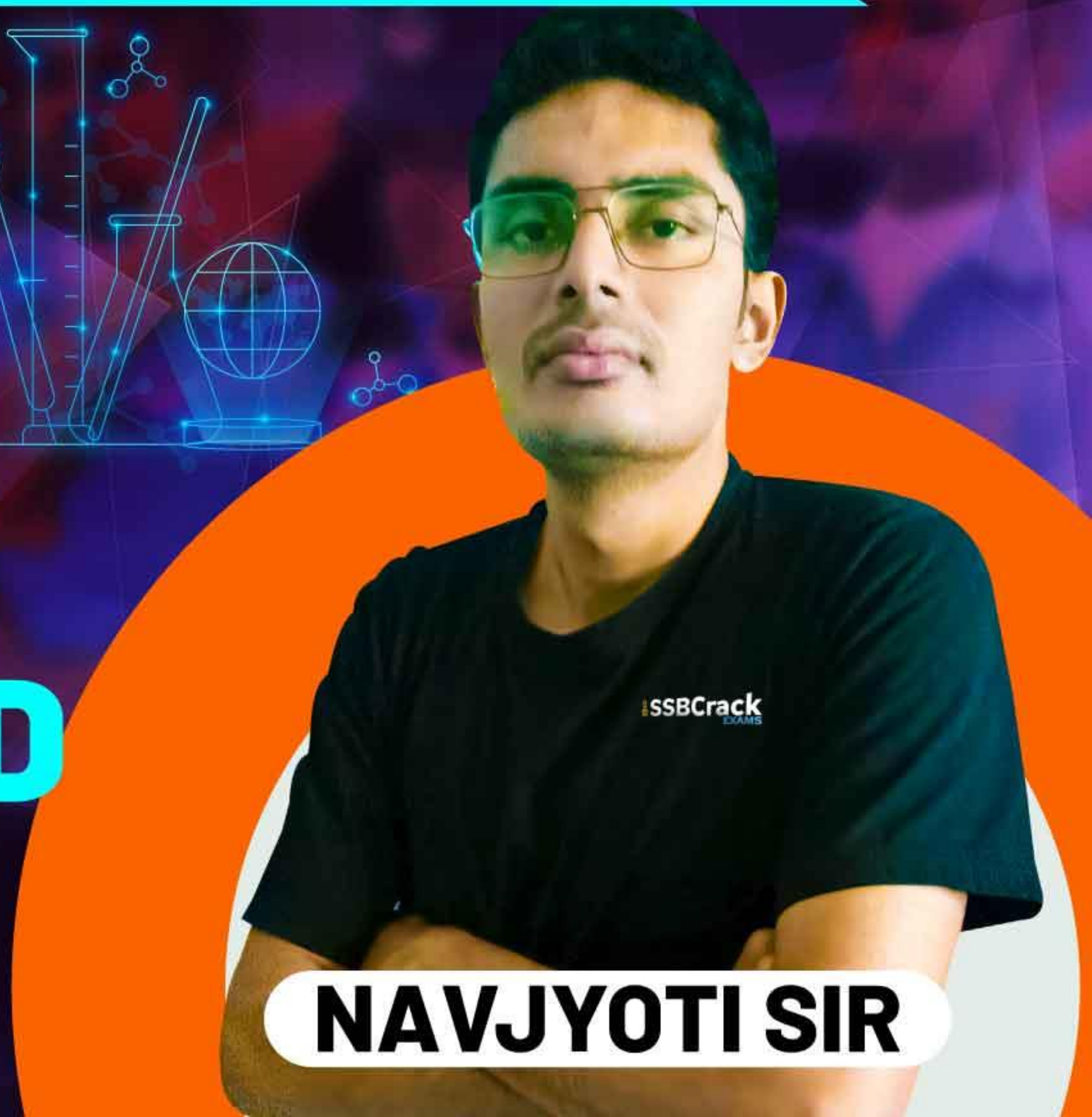
CDS-AFCAT 1 2025

LIVE ●

MATHS

MENSURATION 2D

CLASS 1



NAVJYOTI SIR

25 Oct 2024 Live Classes Schedule

8:00AM	25 OCTOBER 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	25 OCTOBER 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

NDA 1 2025 LIVE CLASSES

11:30AM	GK - POLITY - EMERGENCY	RUBY MA'AM
1:00PM	CHEMISTRY - ISOLATION TECHNIQUES	SHIVANGI MA'AM
4:00PM	MATHS - ANALYTICAL GEOMETRY 2D - CLASS 5	NAVJYOTI SIR
5:30PM	ENGLISH - USE OF PHRASAL VERBS - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - POLITY - EMERGENCY	RUBY MA'AM
1:00PM	CHEMISTRY - ISOLATION TECHNIQUES	SHIVANGI MA'AM
5:30PM	ENGLISH - USE OF PHRASAL VERBS - CLASS 2	ANURADHA MA'AM
7:00PM	MATHS - MENSURATION 2D - CLASS 1	NAVJYOTI SIR

AFCAT 1 2025 LIVE CLASSES

4:00PM	STATIC GK - POLITY - CLASS 1	DIVYANSHU SIR
7:00PM	MATHS - MENSURATION 2D - CLASS 1	NAVJYOTI SIR

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Q) Every prime number of the form $3k + 1$ can be represented in the form $6m + 1$ (where, k and m are integers), when

(a) k is odd
(b) k is even ✓
(c) k can be both odd and even
(d) No such form is possible

$k = 2m+1$ (k is odd)

$3(2m+1)+1$

$\underline{6m+4}$ ✗

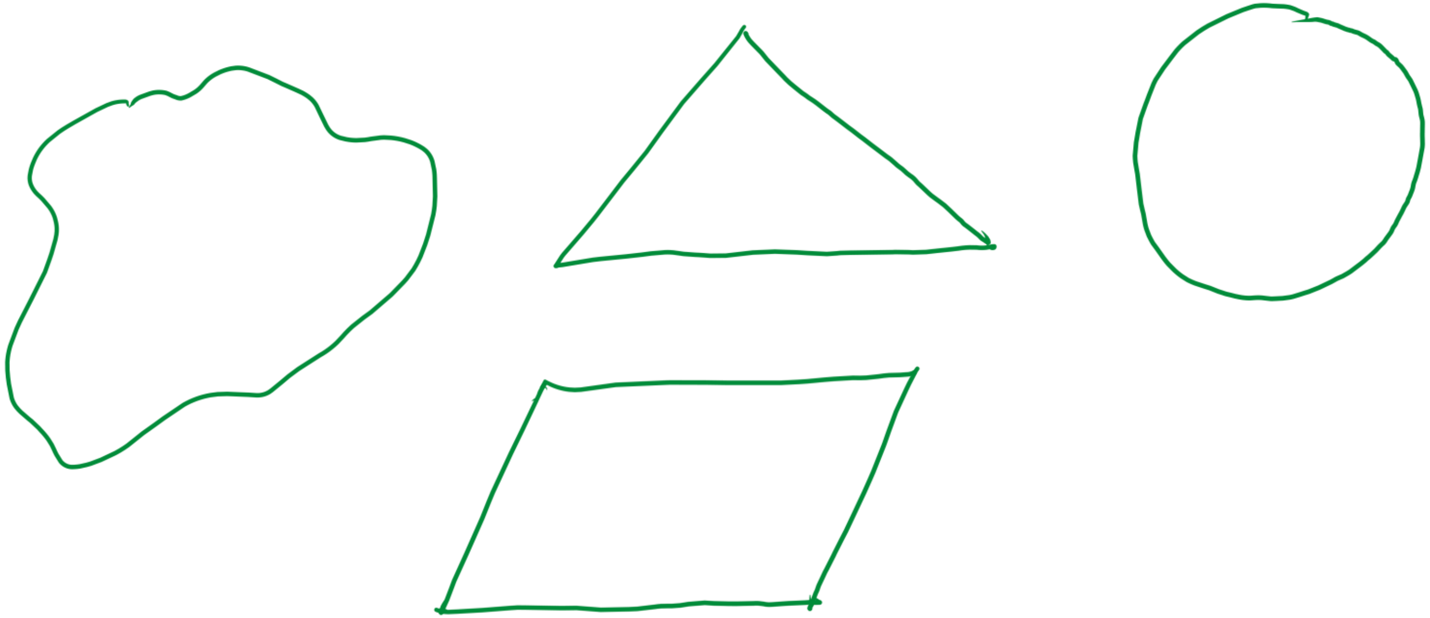
$K = 2m$ (even)

$3(2m)+1$

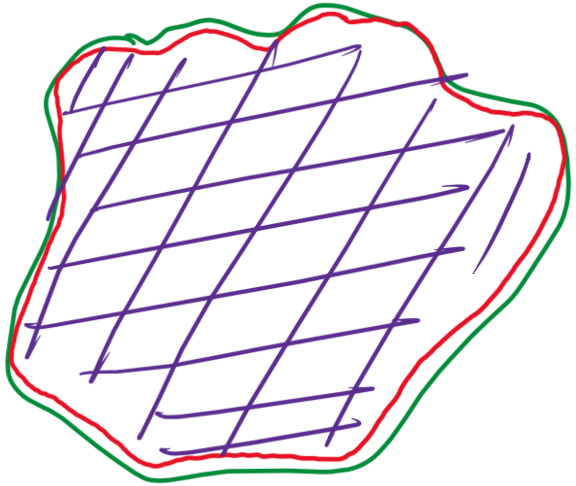
$6m+1$ ✓

2D FIGURES

length and width but no thickness



PERIMETER AND AREA



✓✓ Perimeter – Length of boundary

✓✓ Area – space enclosed inside figure.

UNITS AND CONVERSION

$$\begin{tikzcd}
\text{kilo} \arrow[d, bend left, "\times 10"] \\
\text{hecto} \\
\text{deca} \\
\text{metre} \\
\text{deci} \\
\text{centi} \\
\text{milli} \arrow[u, bend right, "\div 10"']
\end{tikzcd}$$

$$1\ \underline{km} = \underline{1000}\ m$$

$$1\ cm = \underline{10}\ mm$$

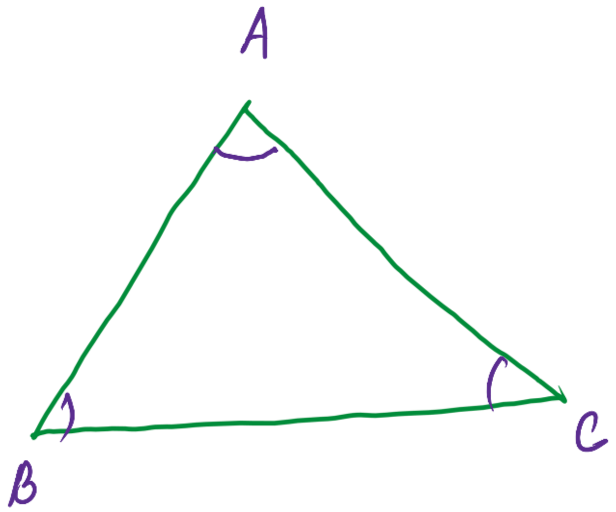
$$1\ m = \underline{100}\ cm$$

$$\text{Area} = (\text{length})^2$$

$$1\ km^2 = \underline{1000 \times 1000}\ \underline{m}^2$$

$$1\ m^2 = \underline{100 \times 100}\ cm^2$$

TRIANGLE

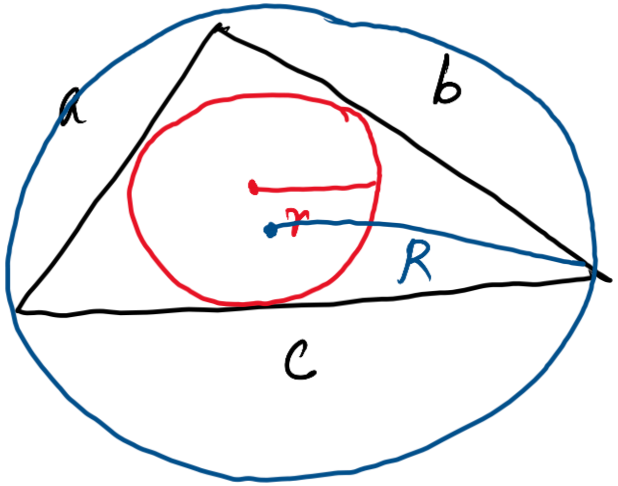


→ 3 sides

→ 3 angles

SCALENE TRIANGLE

→ all the three sides are of different lengths.



perimeter = a + b + c

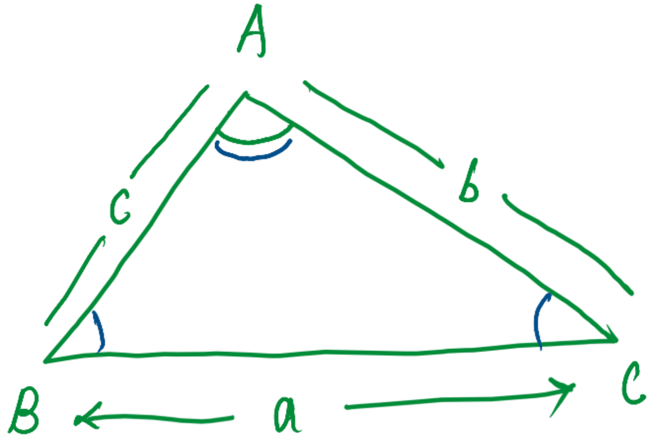
$$\text{Area} \overset{*}{=} \sqrt{s(s-a)(s-b)(s-c)}$$

$$s = \frac{a+b+c}{2}$$ (s - semi perimeter)

$$* = r \times s$$ (r - inradius)

$$* = \frac{abc}{4R}$$ (R - circumradius)

CDS & AFCAT 1 2024 LIVE CLASS - MATHS - PART 1



$a = BC$

$b = AC$

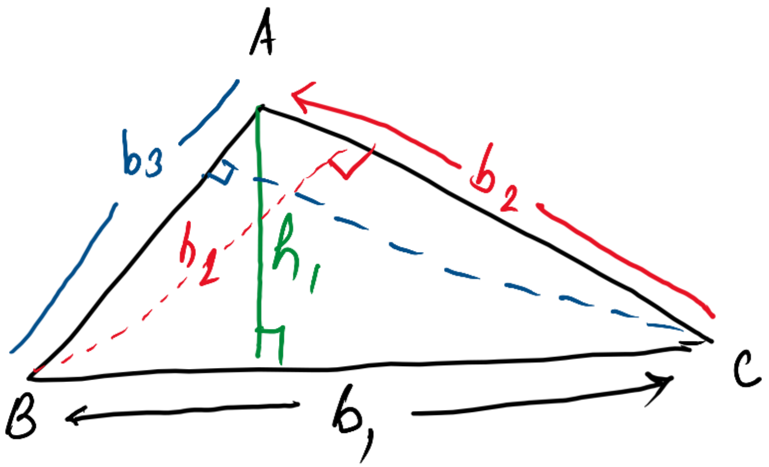
$c = AB$

$\angle A, \angle B, \angle C$

(A, B, C)

$$\text{Area} = \begin{cases} \frac{1}{2} bc \sin A \\ \frac{1}{2} ca \sin B \end{cases}$$

$$\frac{1}{2} ab \sin C$$



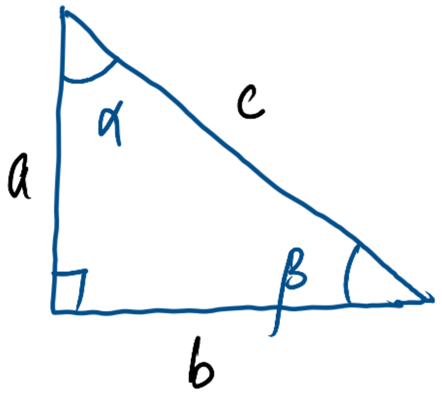
$$\frac{1}{2} \times \text{base} \times \text{corresponding height}$$

$$\left\{\begin{array}{l} \underline{\frac{1}{2} \times b_1 \times h_1} \\ \frac{1}{2} \times b_2 \times h_2 \\ \frac{1}{2} \times b_3 \times h_3 \end{array}\right\} \text{Area}$$

$$b_1 h_1 : b_2 h_2 : b_3 h_3 = 1 : 1 : 1$$

$$b_1 : b_2 : b_3 = \frac{2A}{h_1} : \frac{2A}{h_2} : \frac{2A}{h_3} \Rightarrow \frac{1}{h_1} : \frac{1}{h_2} : \frac{1}{h_3} \, //$$

RIGHT ANGLED TRIANGLE



→ opposite side to 90° → Hypotenuse

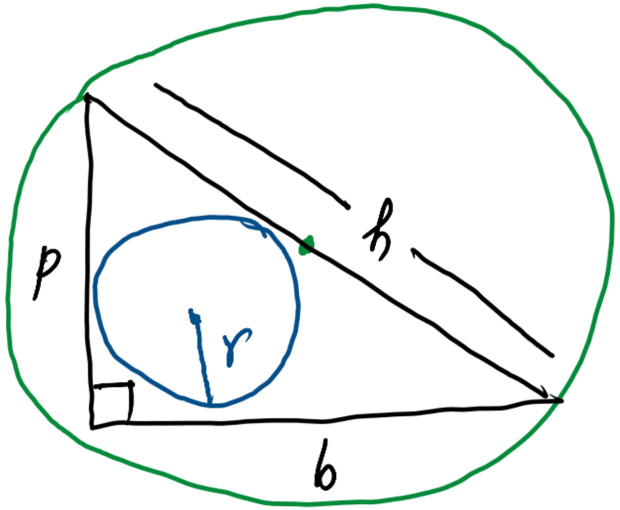
→ sum of other two angles = 90°

$(\alpha + \beta = 180^\circ - 90^\circ = 90^\circ)$

$$\underline{c^2 = a^2 + b^2}$$

perimeter = $a + b + c$

Area = $\frac{1}{2} \times b \times a$



$$R = \frac{h}{2}$$

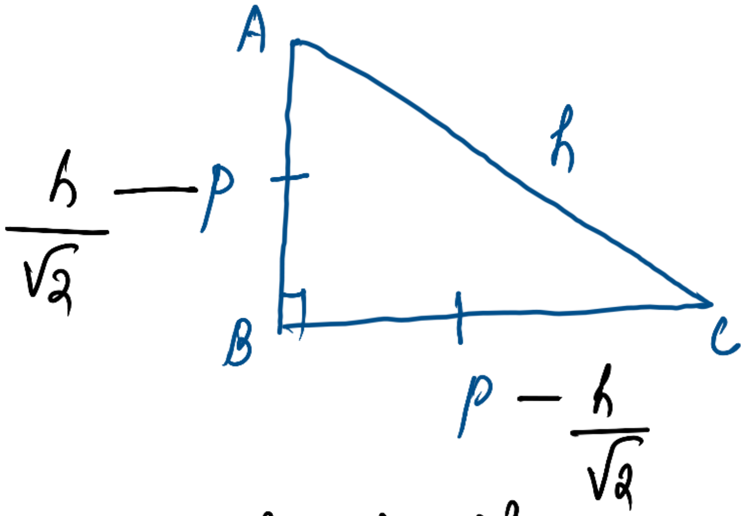
$$r = \frac{p+b-h}{2}$$

RIGHT ANGLED TRIANGLE

$$\text{Inradius (r)} = \frac{P + B - H}{2}$$

$$\text{Circumradius (R)} = \frac{\text{Hypotenuse}}{2} = \frac{H}{2}$$

RIGHT ANGLED ISOSCELES TRIANGLE



$$p^2 + p^2 = h^2$$

$$2p^2 = h^2$$

$$h = \sqrt{2}p$$

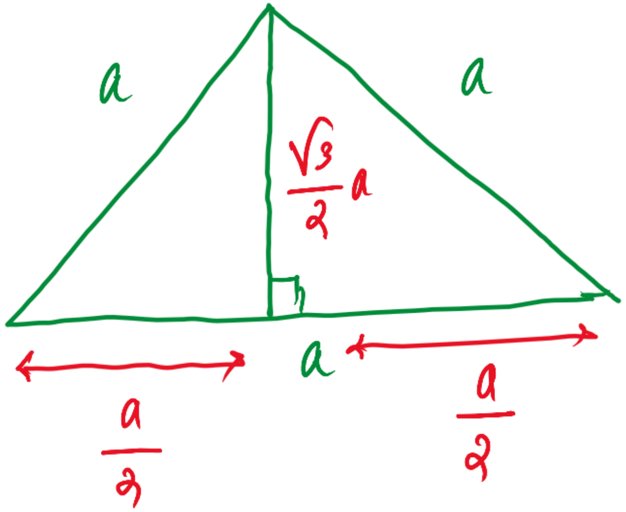
$$\frac{h}{\sqrt{2}}$$

$$\text{perimeter} = 2p + h = \frac{2h}{\sqrt{2}} + h$$

$$= \underline{h(\sqrt{2}+1)}$$

$$\text{Area} = \frac{p^2}{2} = \underline{\frac{h^2}{4}}$$

EQUILATERAL TRIANGLE



→ All 3 sides are equal.

perimeter = 3a

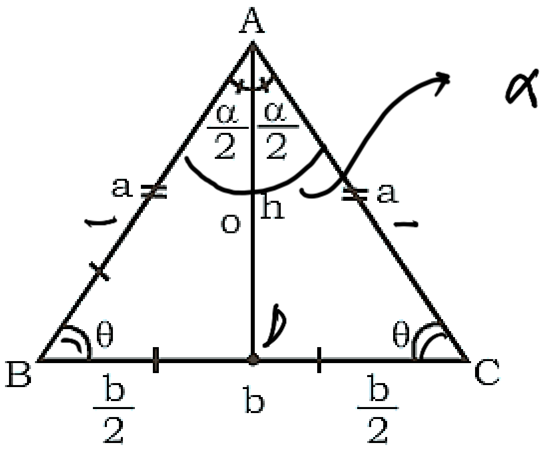
Area $= \frac{\sqrt{3}}{4} a^2$

Height (h) $= \frac{\sqrt{3}}{2} a$

inradius $= \frac{h}{3} = \frac{a}{2\sqrt{3}}$ //

circumradius $= \frac{2h}{3} = \frac{a}{\sqrt{3}}$ //

ISOSCELES TRIANGLE



$\Delta ABD \cong \Delta ACD$

b → non-equal side

$$h = \frac{\sqrt{4a^2 - b^2}}{2}$$

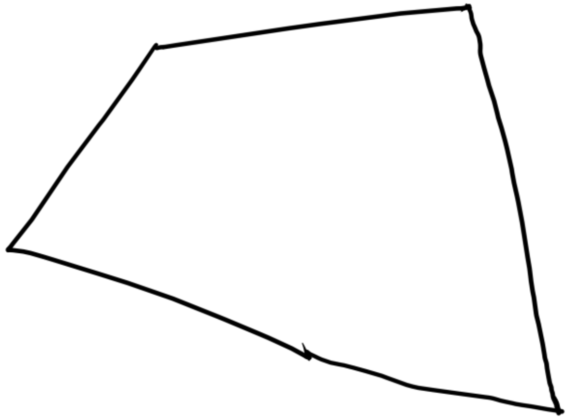
$$\text{Area} = \frac{b}{4}\sqrt{4a^2 - b^2}$$

$$\text{Area} = \underline{\frac{1}{2}a^2 \cdot \sin\alpha}$$

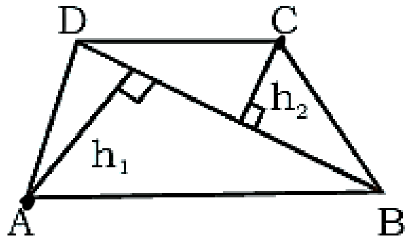
QUADRILATERAL

→ 4 sides

→ Total angle sum = 360°



QUADRILATERAL



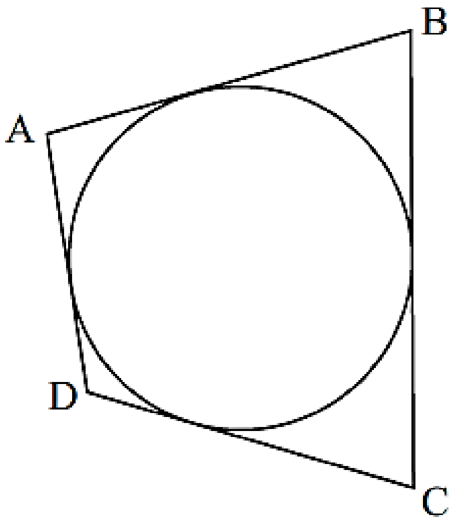
$$\text{Area} = \underline{\frac{1}{2} \times BD \times (h_1 + h_2)}$$

QUADRILATERAL

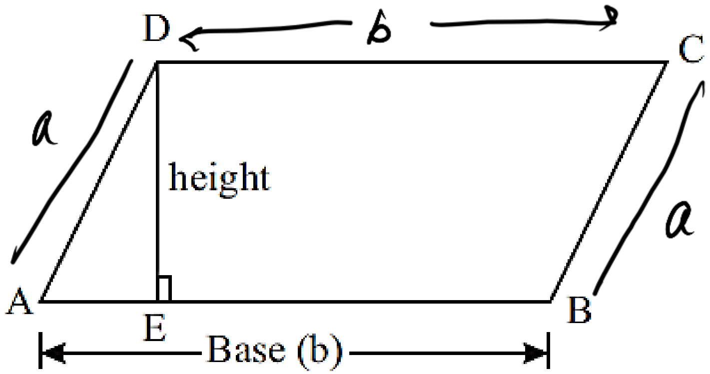
Area of circumscribed quadrilateral

$$= \sqrt{(s-a)\underline{(s-b)(s-c)(s-d)}}$$

where $s = \dfrac{a+b+c+d}{2}$ ✓ and a, b, c, d are length of sides of quadrilateral $ABCD$.



PARALLELOGRAM



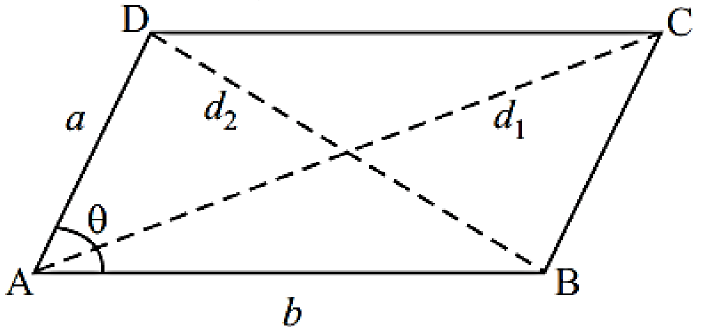
Area of parallelogram = Base × Corresponding height

$$A = b \times h \checkmark$$

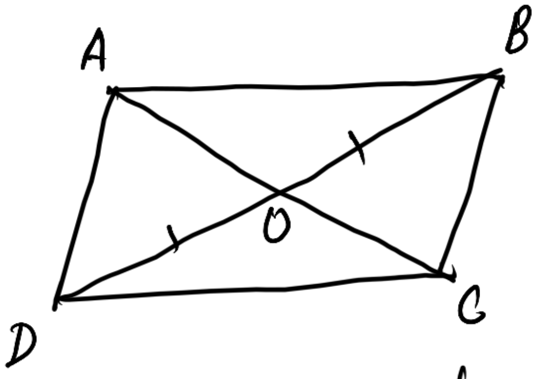
Perimeter of a parallelogram = $2\underline{(a + b)}$, where a and b are length of adjacent sides.

If θ be the angle between any two adjacent sides of a parallelogram whose length are a and b, then

Area of parallelogram = $\underline{ab}\ \underline{\sin \theta}$



opposite sides are parallel and equal.

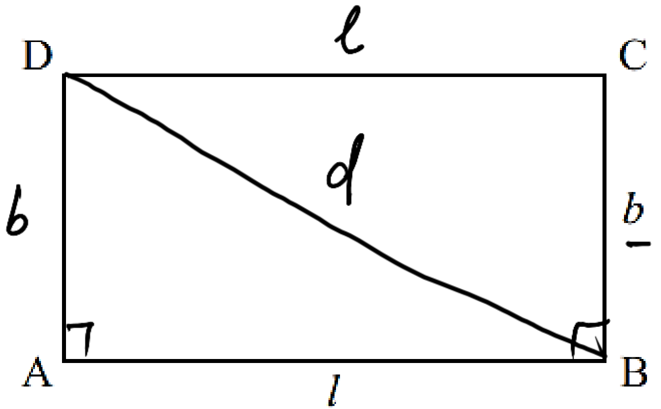


OB = OD,

OA = OC

Diagonals bisect each other

RECTANGLE



$$d^2 = l^2 + b^2$$

$$d = \sqrt{l^2 + b^2}$$

Area of a rectangle = Length × Breadth = $l \times b$ ✓

[If any one side and diagonal is given]

Perimeter of a rectangle = $2(l + b)$

diagonals are equal.

SQUARE

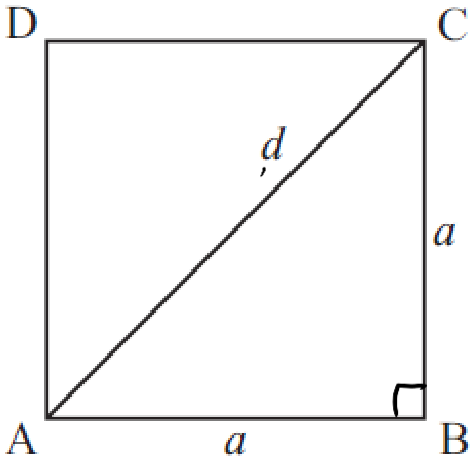
- **Area of square** = side × side = $a \times a = a^2$ ✓
- **Length of diagonal** $\underbrace{(d) = a\sqrt{2}}$ (by Pythagoras theoram)

Hence, **area of the square** = $\left(\frac{d}{\underbrace{\sqrt{2}}}\right)^2 = \frac{d^2}{2}$ ✓

Perimeter of square = 4 × side = 4 × a ✓

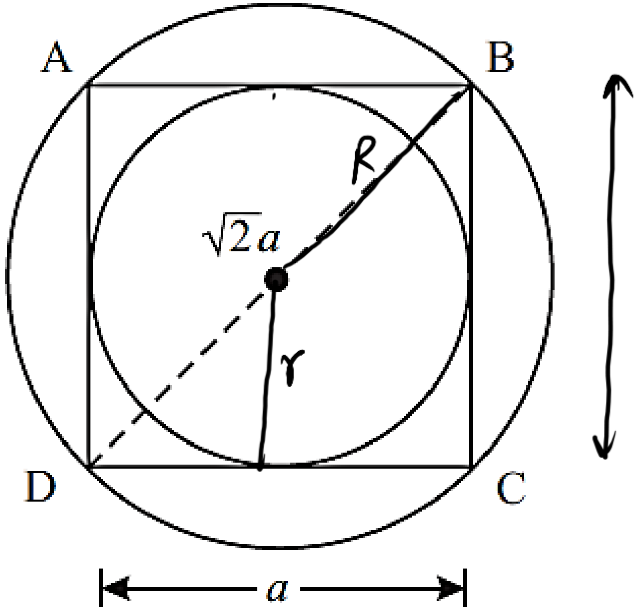
For a given perimeter of a rectangle, a square has maximum area.

$(l = b)$



SQUARE

The side of a square is the diameter of the inscribed circle and diagonal of the square is the diameter of the circumscribing circle.



$2r \longrightarrow$

$2r = a$

$$\boxed{r = \frac{a}{2}}$$

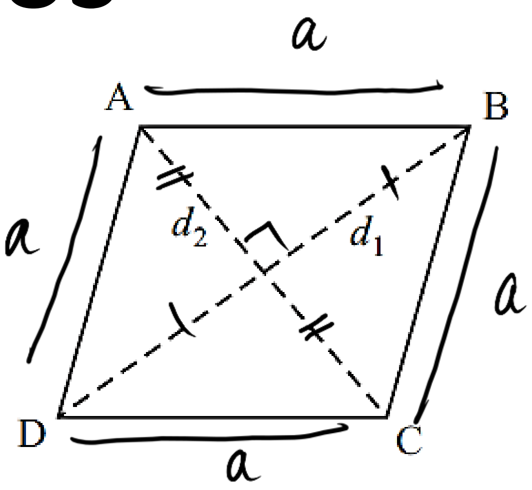
$2R = d$

$$R = \frac{d}{2} = \frac{\sqrt{2}a}{2}$$

$$\boxed{R = \frac{a}{\sqrt{2}}}$$

Hence inradius $= \frac{a}{2}$ and circumradius $= \frac{\sqrt{2}a}{2} = \frac{a}{\sqrt{2}}$

RHOMBUS

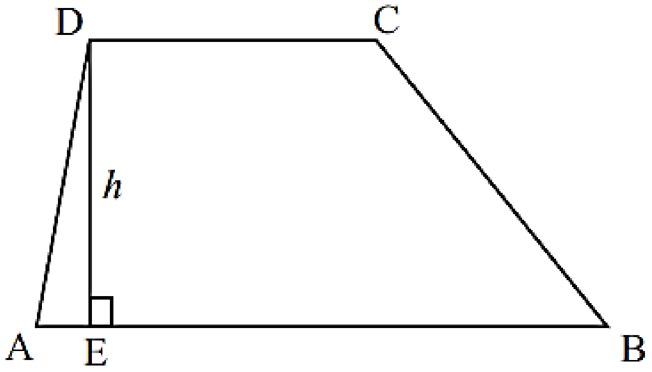


diagonals bisect at 90°.

Area of a rhombus $= \frac{1}{2} \times$ product of diagonals

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

TRAPEZIUM



One pair of opposite sides are $\underline{\text{parallel}}$.

- Distance between parallel sides of a trapezium is called height of trapezium.
- In fig. $ABCD$ is a trapezium, whose sides AB and CD are parallel,

$$DE = h = \text{Height of the trapezium}$$
$$= \text{Distance between } \| \text{ sides.}$$

- $$\text{Area of trapezium} = \frac{1}{2}\ \underline{(\text{sum of } \| \text{ sides})} \times \underline{\text{height}}$$

$$= \frac{1}{2} \underline{\times (AB + CD)} \times DE$$

CDS-AFCAT 1 2025

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MATHS

MENSURATION 2D

CLASS 2

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