

Mensuration

क्षेत्रमिति

(2D)

l, b

- i Triangle (त्रिभुज)
- ii Quadrilateral (चतुर्भुज)
- iii Polygon (बहुभुज)
- iv Circle (वृत्त)

⇒ Area

⇒ Perimeter

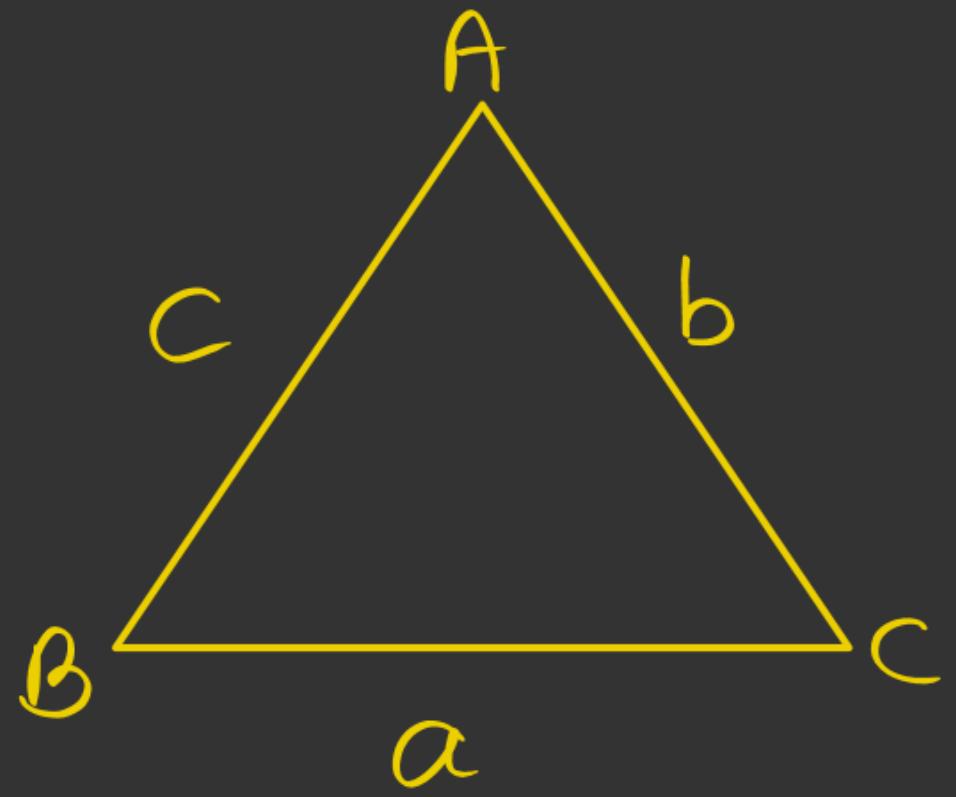
(3D)

l, b, h

- i घन (cube)
- ii घनाभ (cuboid)
- iii बेलन (cylinder)
- iv शंकु (cone)
- v गोला (sphere)
- vi प्रिज्म (prism)
- vii पिरामिड (pyramid)
- viii टेक्सेहेड्रॉन (समचतुर्फल)



Triangle \Rightarrow त्रिकुणि



i) Perimeter (परिमाप) = $a+b+c$

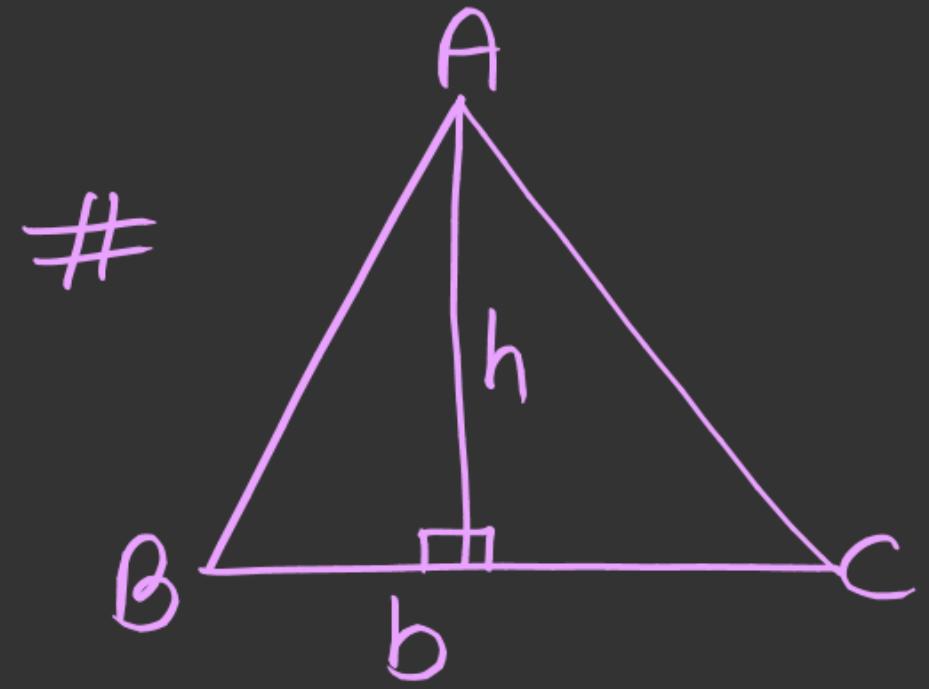
ii) Semi-perimeter (अर्धपरिमाप) $\rightarrow S$

$$S = \frac{a+b+c}{2}$$

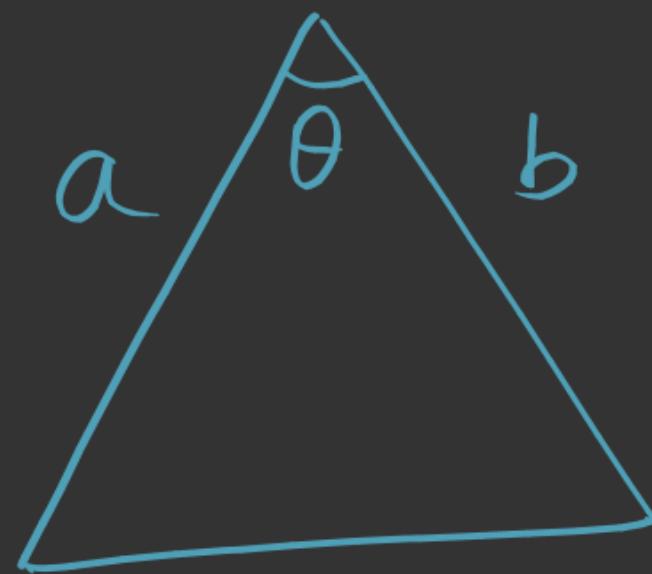
iii) Area = $\sqrt{S(S-a)(S-b)(S-c)}$

iv) $r = \frac{\Delta}{S}$

v) $R = \frac{abc}{4\Delta}$



$$\text{Area} = \frac{1}{2} \times b \times h$$

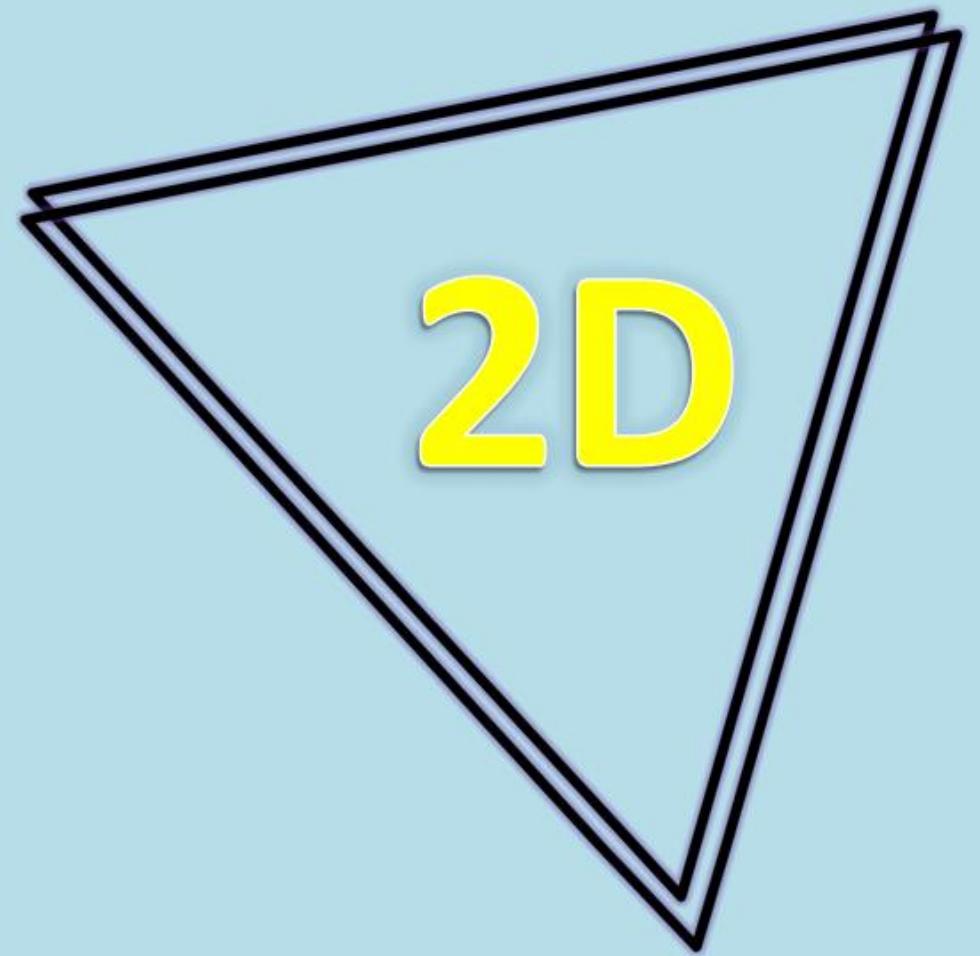


$$\text{Area} = \frac{1}{2} ab \sin \theta$$



| KGS

KHAN SIR



By: P.K Sir



1. The perimeter of an isosceles triangle is 28 cm while its equal sides together measure 18 cm. Find the third side and each of the equal sides.

समद्विबाहु त्रिभुज की परिमाप 28 सेमी है। जबकि उसके दो बराबर भूजा का जोड़ 18 सेमी है, तो तीसरी भूजा तथा प्रत्येक समान भूजा की लंबाई (सेमी में) ज्ञात करें।

- (A) 9, 10 (B) 10, 9 (C) 18, 9 (D) 9, 9

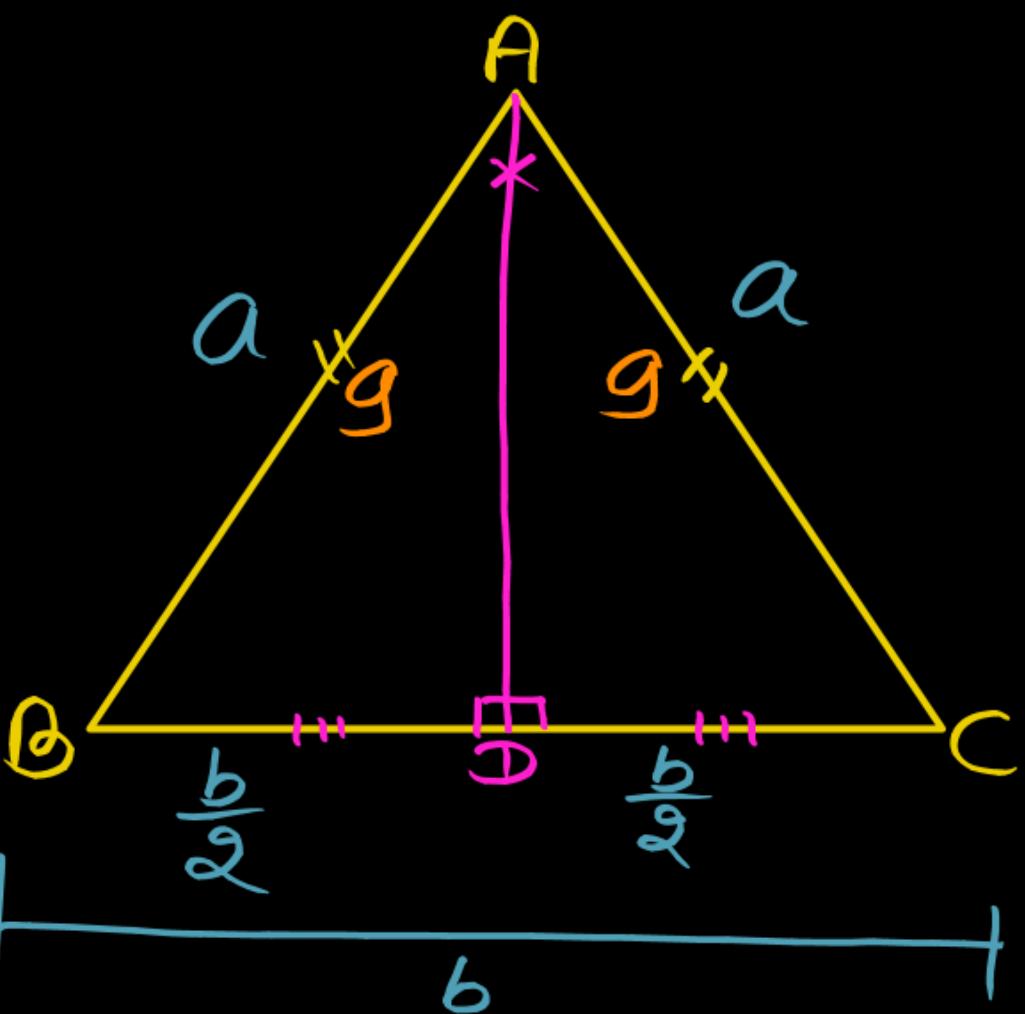
$$a+a=18$$

$$2a=18$$

$$\boxed{a = 9\text{cm}}$$

$$18+b=28$$

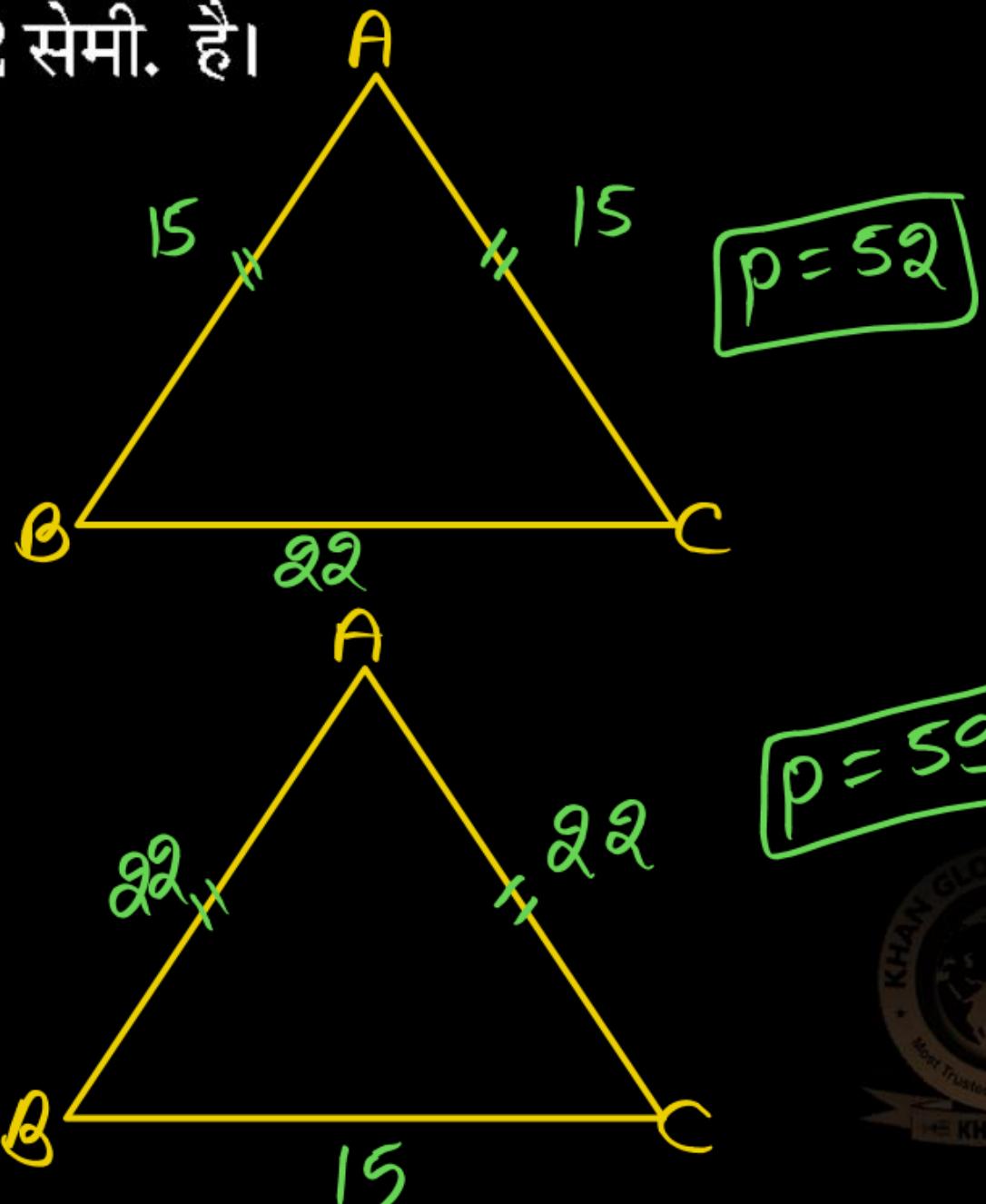
$$b=10\text{cm}$$



2. The length of two sides of an isosceles triangle are 15 and 22 respectively. What are the possible values of perimeter?

किसी समद्विबाहू त्रिभुज की दो भुजायें 15 सेमी. तथा 22 सेमी. है। परिमाप के संभव मान ज्ञात करें।

- (A) 52 or 59
- (B) 52 or 60
- (C) 37 or 29
- (D) 15 or 37



Side \rightarrow 9cm, 20cm

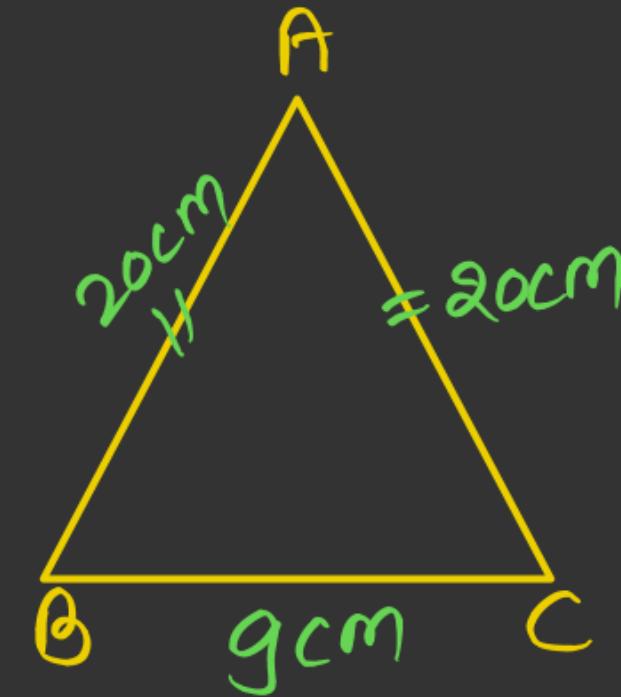
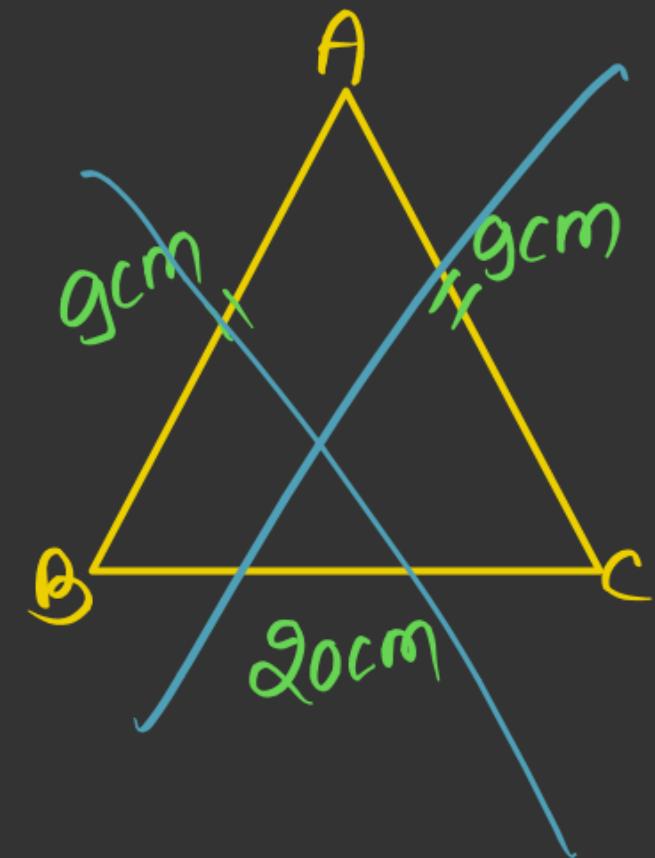
क्षेत्रफल परिमाप

~~a~~ 49 \rightarrow 110% सही

b 38 \rightarrow 500% गलत

c अतथा b कोनी \rightarrow 500% गलत

d) NOT



3. If the numerical value of the perimeter of an equilateral triangle is $\sqrt{3}$ times the area of it, then the length of each side of the triangles is—

किसी समबाहु त्रिभुज का परिमाप उसके क्षेत्रफल का $\sqrt{3}$ गुना है।

त्रिभुज की प्रत्येक भुजा ज्ञात करें।

- (A) 3 units
~~(C) 4 units~~

- (B) 2 units
 (D) 6 units

$$\textcircled{Vii} \quad r = \frac{a}{2\sqrt{3}}$$

$$\textcircled{Viii} \quad R = \frac{a}{\sqrt{3}}$$

$$\textcircled{Ix} \quad r : R \\ 1 : 2$$

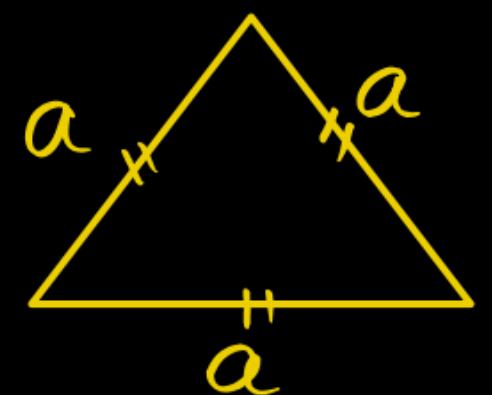
Area ratio

~~$$3a = \left(\frac{\sqrt{3}}{4} \times a^2 \right) \times \sqrt{3}$$~~

$$1 = \frac{a}{4}$$

$$\boxed{a=4}$$

Equilateral Δ (समबाहु Δ)



$$\textcircled{i} \quad \text{परिमाप} = 3a$$

$$\textcircled{ii} \quad \text{क्षेत्रफल} = \frac{\sqrt{3}}{4} a^2$$

$$\textcircled{iii} \quad \text{Area} = \frac{\sqrt{3}}{4} \times a^2$$

$$\textcircled{iv} \quad \text{क्षेत्रफल} = \frac{h^2}{\sqrt{3}}$$

$$\textcircled{vi} \quad \boxed{P_1 + P_2 + P_3 = h}$$



KHAN SIR

4. The perimeter of an equilateral triangle is 45 cm.
Find its area.

समबाहु त्रिभुज की परिमिति 45 सेमी है, त्रिभुज का क्षेत्रफल ज्ञात करें।

(A) $225\frac{\sqrt{3}}{2}$

(B) 225

(C) $\frac{15\sqrt{3}}{4}$

(D) $\frac{225\sqrt{3}}{4}$

$$\begin{aligned}3 \times a &= 45 \\a &= 15\end{aligned}$$

$$\text{Area} = \frac{\sqrt{3}}{4} \times 15^2$$

$$= \frac{225\sqrt{3}}{4}$$



5. A triangle with three equal sides has its area equal to $4\sqrt{3}$ square cm. What will be the perimeter of this triangle?

तीन समान भुजाओं वाले त्रिभुज का क्षेत्रफल $4\sqrt{3}$ वर्ग सेमी है।
उस त्रिभुज की परिमाप क्या होगा?

- (A) $9\sqrt{3}$ cm
- (B) $12\sqrt{3}$ cm
- (C) 9 cm
- (D) 12 cm

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

$$a^2 = 16$$

$$a = 4$$

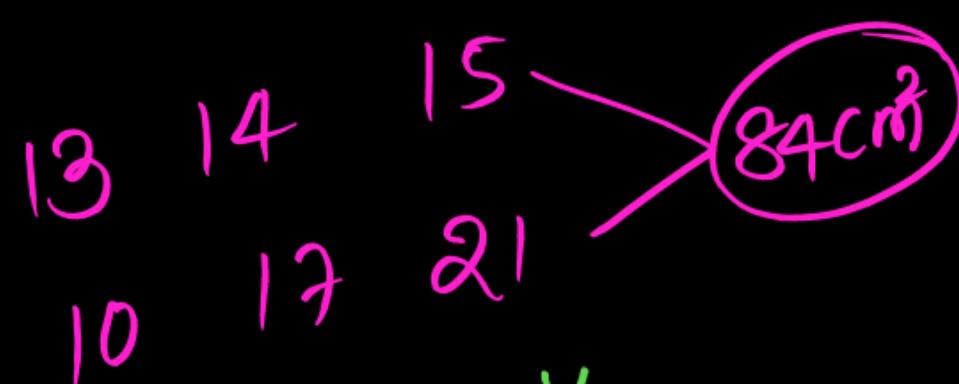
$$\text{परिमाप} = 3 \times 4 = 12 \text{ cm}$$



6. Find the area of a triangle whose sides are 26 cm, 28 cm and 30 cm.

उस त्रिभुज का क्षेत्रफल क्या होगा जिसकी तीनों भुजायें 26 सेमी, 28 सेमी तथा 30 सेमी हैं?

- (A) 336 sq. cm
 (B) 300 sq. cm
 (C) 236 sq. cm
 (D) 238 sq. cm



$$\begin{array}{ccc} 13 & 14 & 15 \rightarrow 84 \text{ cm}^2 \\ \cancel{1} \times \cancel{2} & \cancel{1} \times \cancel{2} & \cancel{1} \times \cancel{2} \\ 26 & 28 & 30 \rightarrow 84 \times \cancel{4}^2 \end{array}$$

$$S = \frac{26+28+30}{2}$$

$$\Delta = \sqrt{S(S-a)(S-b)(S-c)}$$

$$84 \times 4 = 336 \text{ cm}^2$$

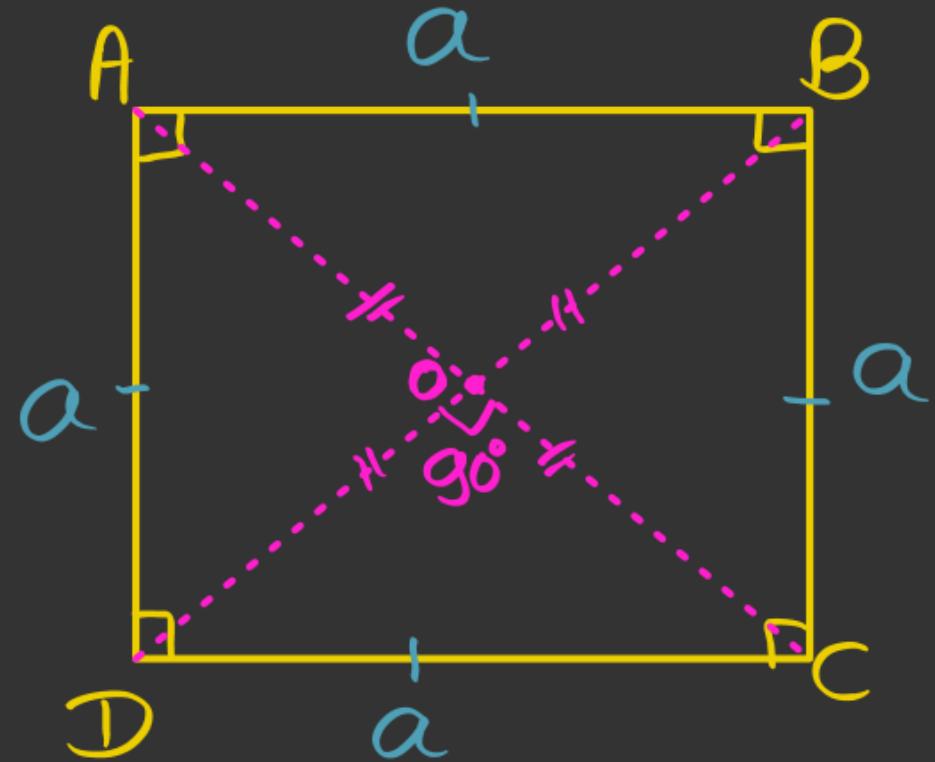
Side $\propto K$
 Perimeter $\propto K$
 Area $\propto K^2$



Quadrilaterals (चतुर्भुज)

- i) वर्ग (square)
- ii) आयत (Rectangle)
- iii) समांतरचतुर्भुज (parallelogram)
- iv) समचतुर्भुज (Rhombus)
- v) समभूष्ठचतुर्भुज (Trapezium)
- vi) पतंग (kite)

square → કર્ણ



vii) Area = a^2

$$\text{Area} = \frac{d^2}{2} = \frac{\text{વિકર્ણ}^2}{2}$$

viii) Perimeter (પરિમાપ) = $4a$

ix) Diagonal (વિકર્ણ) = $a\sqrt{2}$

i) $\angle A = \angle B = \angle C = \angle D = 90^\circ$

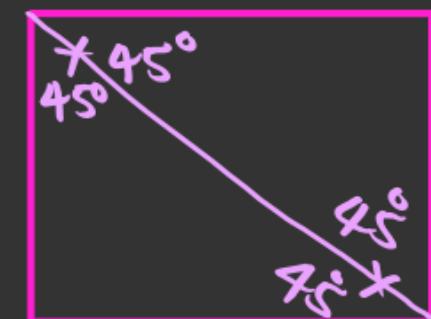
ii) $AB = BC = CD = DA = a$

iii) $AB \parallel CD, AD \parallel BC$

iv) $AC = BD = a\sqrt{2}$

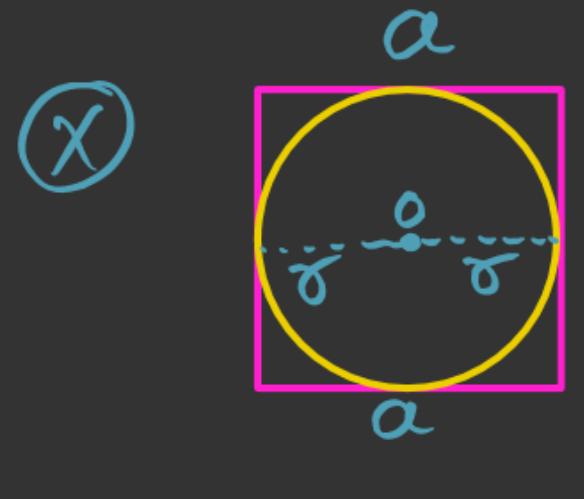
v) $AC \perp BD$

$OA = OC = OB = OD = \frac{AC}{2} = \frac{BD}{2} = \frac{a\sqrt{2}}{2} = \frac{a}{\sqrt{2}}$



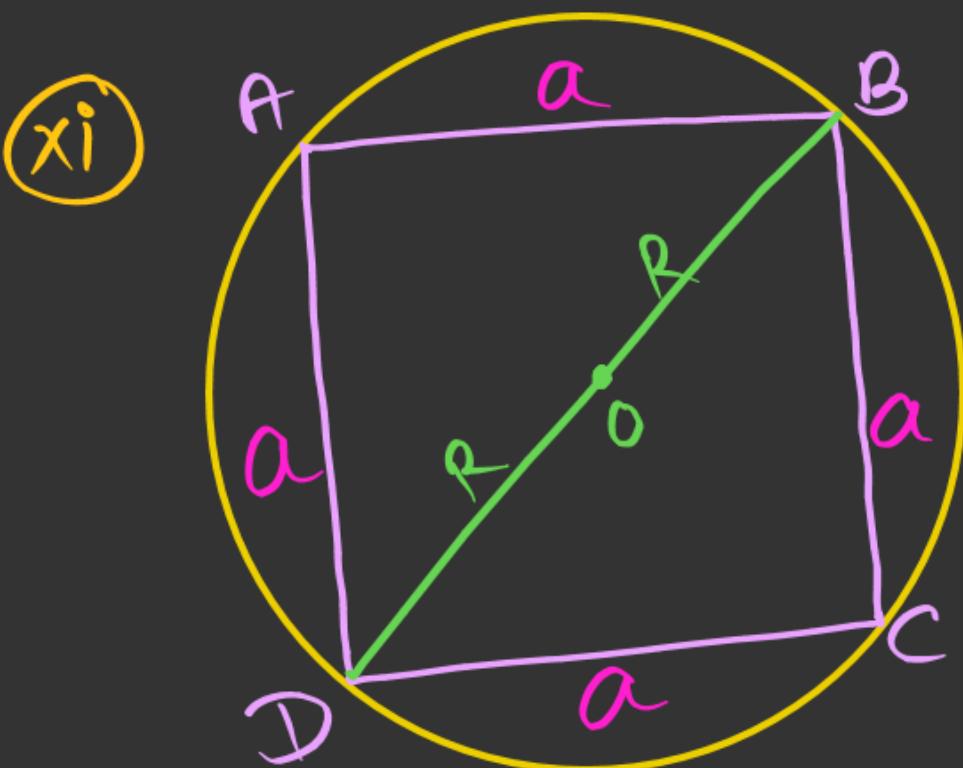
કર્ણની વિકર્ણ રીતું કોणની સમાનતા આપી શકતી હૈ।

કર્ણ ની વિકર્ણ એક દૂસરે ની લિંગબવત સમાનતા આપી શકતી હૈ।



$$2r = a$$

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



$$BD = a\sqrt{2} = \text{diameter}$$

$$R = \frac{d}{2} = \frac{a\sqrt{2}}{2} = \left(\frac{a}{\sqrt{2}}\right)$$

$$R = \frac{\text{विकर्ण}}{2}$$

7. The length of the diagonal of a square is ' a ' cm. Which of the following represents the area of the square (in sq. cm)?

किसी वर्ग के विकर्ण की लंबाई ' a ' सेमी है। निम्नलिखित में वर्ग का क्षेत्रफल वर्ग सेमी में ज्ञात करें।

- (A) $\frac{a^2}{4}$ (B) $\frac{a}{\sqrt{2}}$
~~(C) $\frac{a^2}{2}$~~ (D) $2a$

$$\text{Area} = \frac{\pi r^2}{2} = \left(\frac{a^2}{2} \right)$$

8. The length of three medians of a triangle are 9 cm, 12 cm and 15 cm. The area (in sq. cm) of the triangle is—

किसी त्रिभुज की मध्यकायें 9 सेमी, 12 सेमी तथा 15 सेमी हैं।
त्रिभुज का क्षेत्रफल ज्ञात करें।

- ~~(A) 72 sq cm~~ (B) 54 sq cm
 (C) 14 sq cm (D) 24 sq cm

m_1, m_2, m_3
 $9\text{cm}, 12\text{cm}, 15\text{cm} \rightarrow \text{Triplets}$

$$\boxed{9^2 + 12^2 = 15^2}$$

$$\text{Area} = \frac{2}{3} \times \frac{3}{2} \times 9 \times 12 = 72\text{cm}^2$$

मध्यका (Median) $\rightarrow m_1, m_2, m_3$

i) $\text{Area} = \frac{4}{3} \times \sqrt{s(s-m_1)(s-m_2)(s-m_3)}$

$$s = \frac{m_1+m_2+m_3}{2}$$

ii) $m_1^2 + m_2^2 = m_3^2$

$$\text{Area} = \frac{2}{3} m_1 m_2$$

