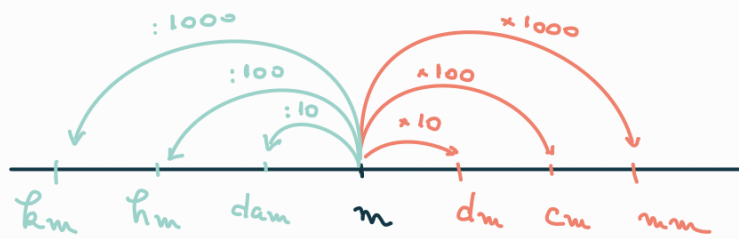


UNITATI DE MĂSURA

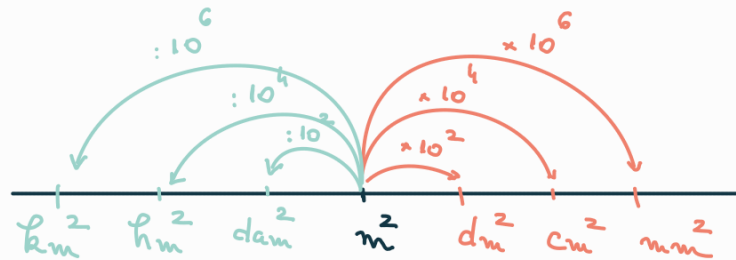
LUNGIME :



Ex. 1. $12 \text{ m} = 12 \cdot 10 \text{ dm} = 120 \text{ dm}$

2. $4 \text{ km} = 4 \cdot 1000 \text{ m} = 4000 \text{ m}$

SUPRAFAȚĂ :

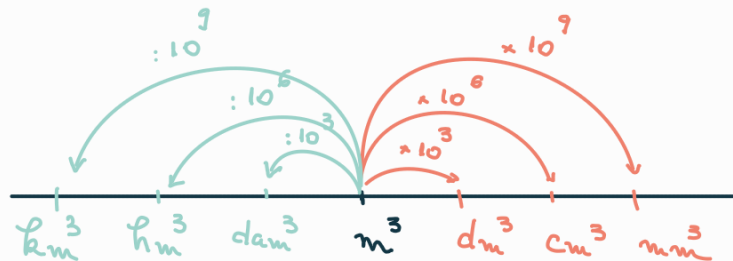


Ex : 1. $5 \text{ m}^2 = 5 \cdot 10^4 \text{ cm}^2 = 50000 \text{ cm}^2$

$$1 \text{ ha} = 100 \text{ ari} = 10000 \text{ m}^2$$

$$1 \text{ ar} = 100 \text{ m}^2$$

VOLUM :



Ex : $1 \text{ m}^3 = 1000 \text{ dm}^3 = 1000 \text{ l}$

$$1 \text{ l} = 1 \text{ dm}^3$$

MASA

$$1 \text{ t} = 1000 \text{ kg}$$

$$1 \text{ kg} = 1000 \text{ g}$$

$$1 \text{ g} = 100 \text{ kgf}$$

TIMPUL

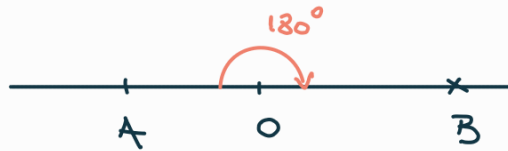
$$1 \text{ min} = 60 \text{ s}$$

$$1 \text{ h} = 60 \text{ min}$$

$$1 \text{ zi} = 24 \text{ h}$$

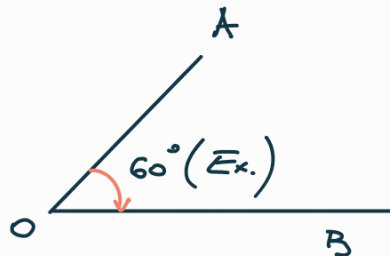
UNGHIU

1. ALUNGIT



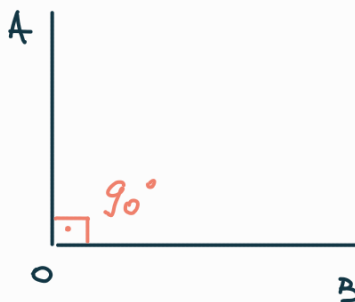
$$\angle AOB = 180^\circ$$

2. ASCUTIT



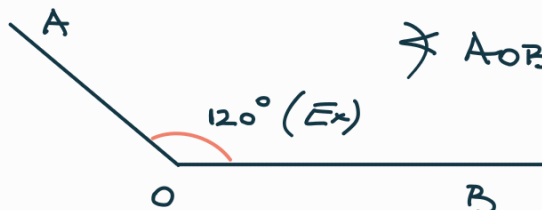
$$\angle AOB < 90^\circ$$

3. DREPT



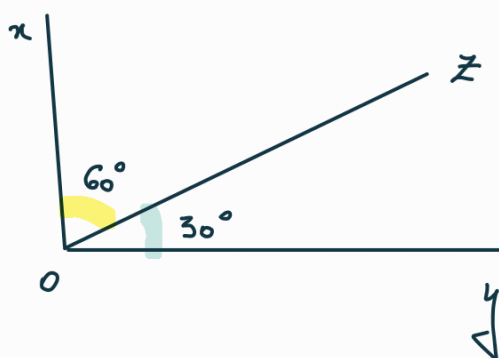
$$\angle AOB = 90^\circ$$

4. OBTUZ



$$\angle AOB > 90^\circ$$

UNGHURI COMPLEMENTARE :

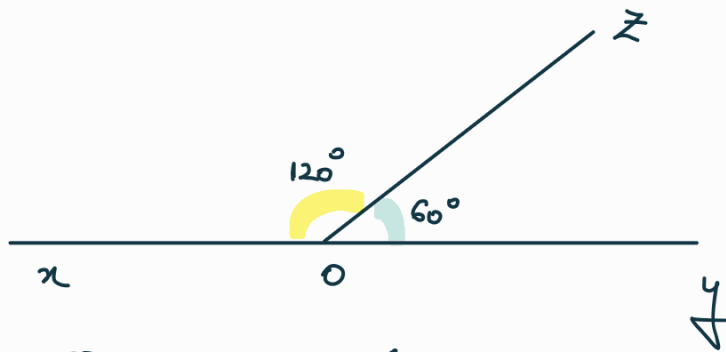


$$\angle XOZ + \angle ZOY = 90^\circ$$

$$\text{Ex. } 60^\circ + 30^\circ = 90^\circ$$

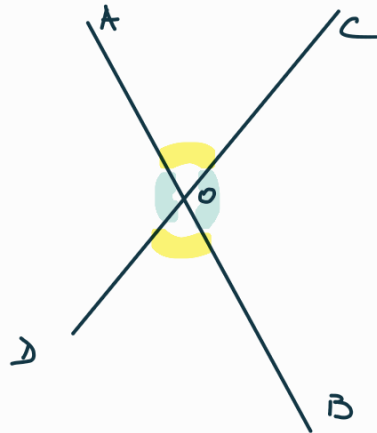
UNGHIURI

SUPLEMENTARE



$$\angle xOZ + \angle yOZ = 180^\circ$$

UNGHIURI OPUSE LA VÂRF



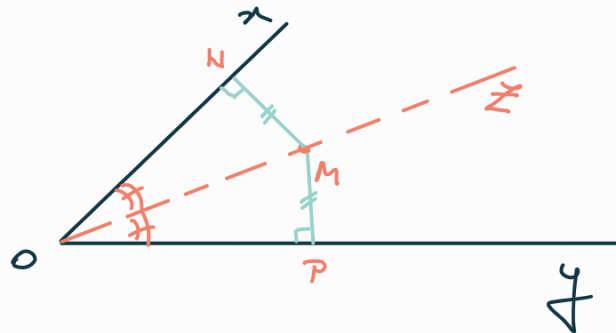
$$\begin{aligned} \angle AOC &= \angle BOD \text{ (opuse la vârf)} \\ \angle AOD &= \angle BOC \text{ (op. la vârf)} \end{aligned}$$

Linii importante în Δ :

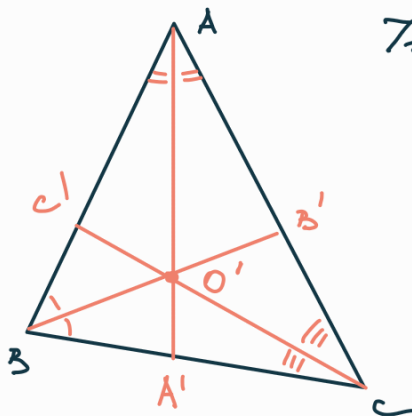
1. BISECTOAREA

$$\angle xOZ = \angle yOZ$$

$$\begin{aligned} MN \perp OX \\ MP \perp OY \end{aligned} \Rightarrow MN \equiv MP$$

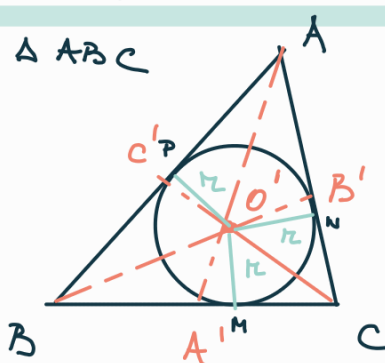


$AA', BB', CC' = \text{bisectoare}$



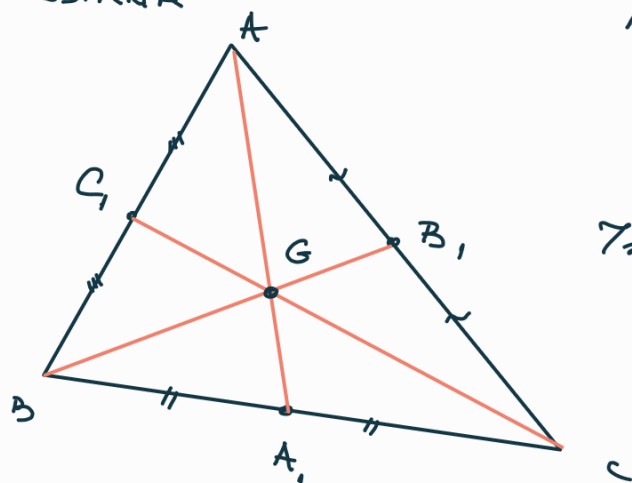
Intersecția bisectoarelor este O'

$O' = \text{centrul cercului interior}$



$$\begin{aligned} O'P &= O'N = O'M = r \\ O'P &\perp AB \\ O'N &\perp AC \\ O'M &\perp BC \end{aligned}$$

2. MEDIANA



A_1, B_1, C_1 = mijloacele laturilor $\triangle ABC$

AA_1, BB_1, CC_1 = mediane

Intersecția medianelor =
= G = centrul de greutate
 $\triangle ABC$

$$AG = \frac{2}{3} AA_1$$

;

$$GA_1 = \frac{1}{3} AA_1$$

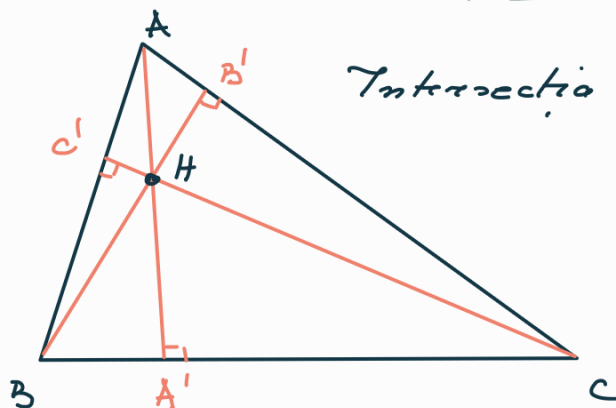
Mediana împarte $\triangle ABC$ în 2 $\triangle$ cu arii egale

Ex.

$$A_{\triangle BA_1} = A_{\triangle AA_1C}$$

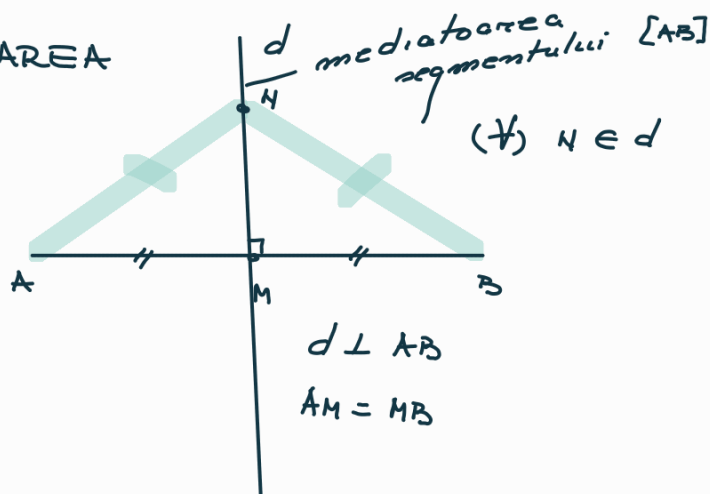
3. ÎNĂLȚIMEA

$AA' \perp BC$; $BB' \perp AC$; $CC' \perp AB$



Intersecția înălțimilor = H = ortocentrul
 $\triangle ABC$

4. MEDIATOAREA



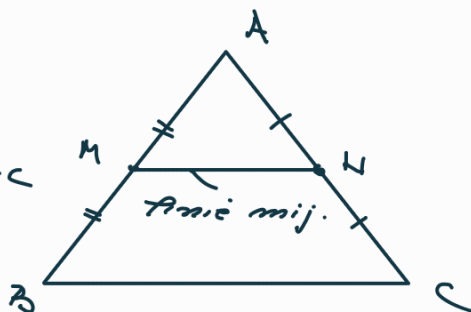
$(\forall) N \in d \Rightarrow AN = NB$

$d \perp AB$

$AM = MB$

5. LINIA MIJLOCIE: M, N = mij. AB, AC

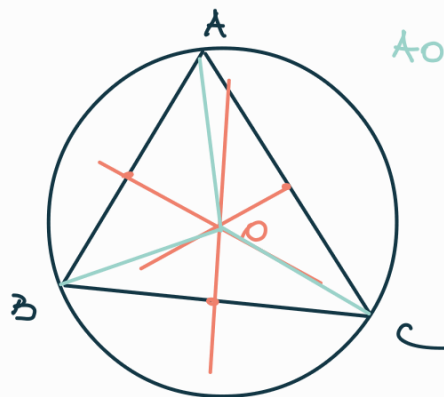
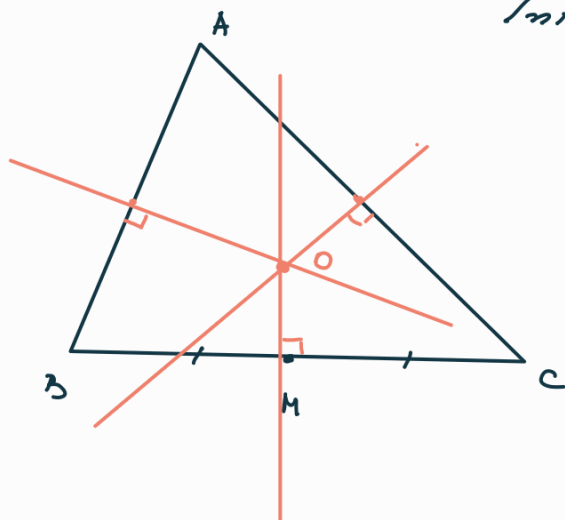
$$\Rightarrow \begin{cases} MN = \frac{BC}{2} \\ MN \parallel BC \end{cases}$$



Intersecția mediatoarelor =

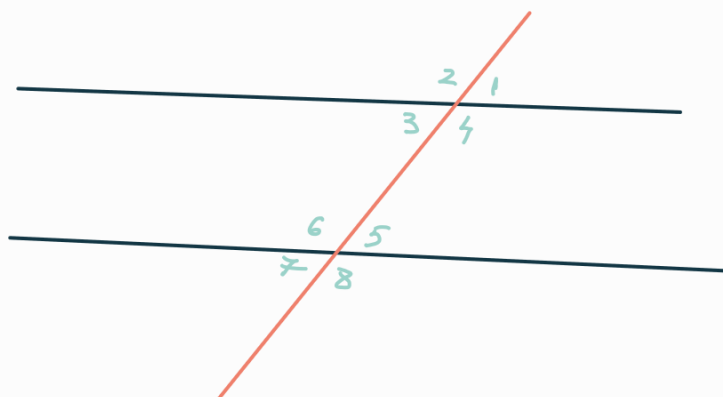
= O = centrul cercului circumscris

$\triangle ABC$



$AO = BO = OC = R$

DREPTÉ PARALELE TRASE DE O SECANTĂ



ALTERNE INTERNE

$$\hat{3} = \hat{5}$$

$$\hat{4} = \hat{6}$$

ALTERNE EXTERNE

$$\hat{2} = \hat{8}$$

$$\hat{1} = \hat{7}$$

CORRESPONDENTE

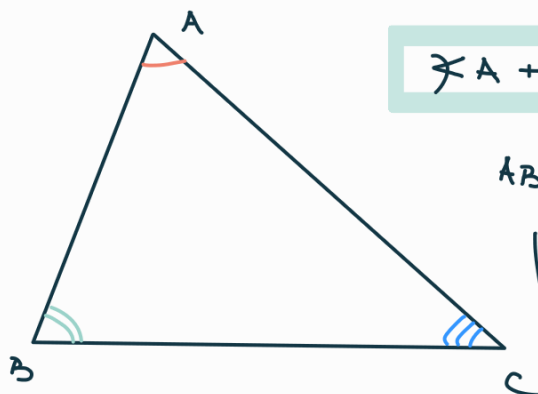
$$\hat{1} = \hat{5}$$

$$\hat{2} = \hat{6}$$

$$\hat{4} = \hat{8}$$

$$\hat{3} = \hat{7}$$

TRIUNGHUL :



$$\angle A + \angle B + \angle C = 180^\circ$$

$$AB + AC > BC$$

$$|AB - AC| < BC$$

CAZURI DE CONGRUENȚĂ

1. A OARECARE

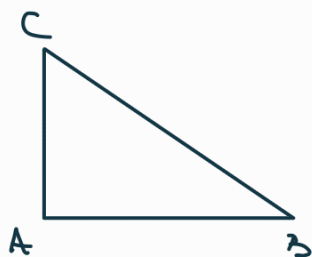


$$1. \text{ L. U. L } \left(\begin{array}{l} \text{Ex. } AB \equiv A'B' \\ \angle B \equiv \angle B' \\ BC \equiv B'C' \end{array} \right)$$

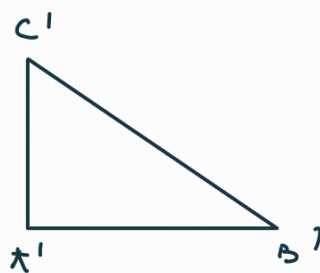
$$2. \text{ U. L. U } \left(\begin{array}{l} \text{Ex. } \angle A \equiv \angle A' \\ AB \equiv A'B' \\ \angle B \equiv \angle B' \end{array} \right)$$

$$3. \text{ L. L. L. } \left(\begin{array}{l} AB \equiv A'B' \\ BC \equiv B'C' \\ AC \equiv A'C' \end{array} \right)$$

2. Δ DREPTUNGHICE



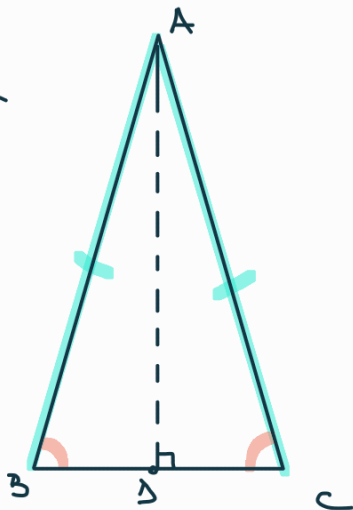
$\equiv$



1. C. C. (Ex. $AC = A'C'$
 $AB \equiv A'B'$)
2. C. U. ($AC \equiv A'C'$
 $\angle C \equiv \angle C'$)
3. I. U. ($BC = B'C'$
 $\angle B \equiv \angle B'$)
4. I. C. ($BC \equiv B'C'$
 $AB \equiv A'B'$)

TRIUNGHIURI

1. ISOSCEL



$$AB = AC$$

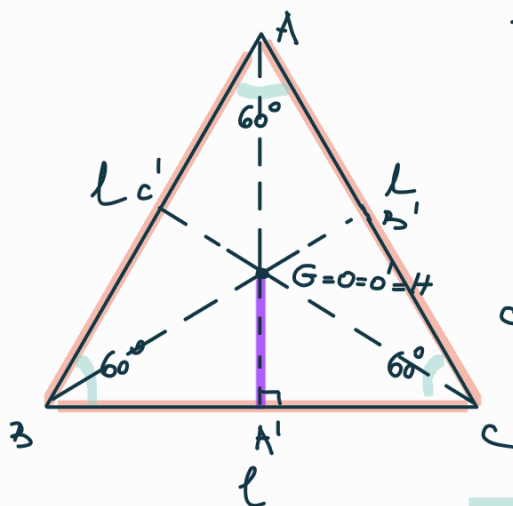
$$\angle B = \angle C$$

$$\Rightarrow \Delta ABC = \text{isoscel}$$

$$AD \perp BC \Rightarrow D = \text{mij. } BC$$

$$A_{\Delta ABC} = \frac{B \cdot h}{2} = \frac{BC \cdot AD}{2}$$

2. ECHILATERAL



$$AB = AC = BC = l$$

$$\angle A = \angle B = \angle C = 60^\circ$$

$$AA' \perp BC$$

$$BB' \perp AC$$

$$CC' \perp AB$$

$$\Rightarrow AA', BB', CC' = \text{mediane, inaltimi, mediatoare, bisectoare}$$

$$P_{\Delta ABC} = 3l$$

$$AA' = h_3 = \frac{l\sqrt{3}}{2}$$

$$A_{\Delta ABC} = \frac{l^2\sqrt{3}}{4}$$

$$AG = R = \text{raza cerc. circum.} = \frac{2}{3} AA'$$

$$AG = \frac{2}{3} \frac{l\sqrt{3}}{2} = R$$

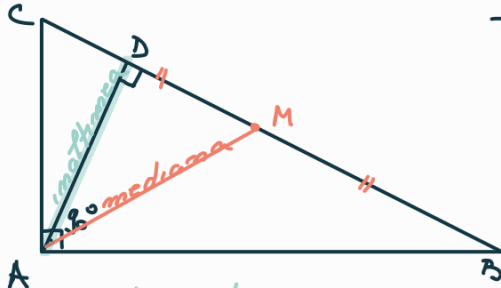
$$GA' = r = \text{rază cerc. inscrit} = \frac{1}{3} AA'$$

$$GA' = \frac{1}{3} \frac{l\sqrt{3}}{2} = r = a_3 = \text{apotema}$$

$$GA' = \text{apotema} \quad \Delta ABC = a_3 = \frac{1}{3} \frac{\tau\sqrt{3}}{2}$$

Δ DREPTUNGHIC

$$\angle BAC = 90^\circ$$



TH. PITAGORA

; CONSECINȚA TH. P.

$$AB^2 + AC^2 = BC^2$$

$$AB^2 = BC^2 - AC^2$$

TH. ÎNĂLȚIMII

;

TH. CATETEI

$$AD^2 = CD \cdot DB$$

$$AB^2 = BD \cdot BC$$

$$AC^2 = CD \cdot BC$$

Teorema $\Delta ABC = dh.$

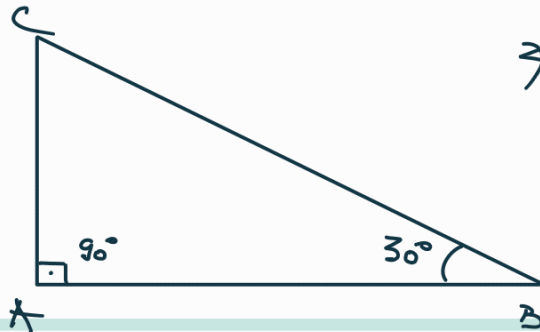
$$AD = \frac{C_1 \cdot C_2}{ip} = \frac{AB \cdot AC}{BC}$$

$$AM = \text{mediana} = \frac{BC}{2}$$

RECIPROCA TH. P

$$AB^2 + AC^2 = BC^2 \Rightarrow \angle BAC = 90^\circ$$

TH. $\angle 30^\circ$:

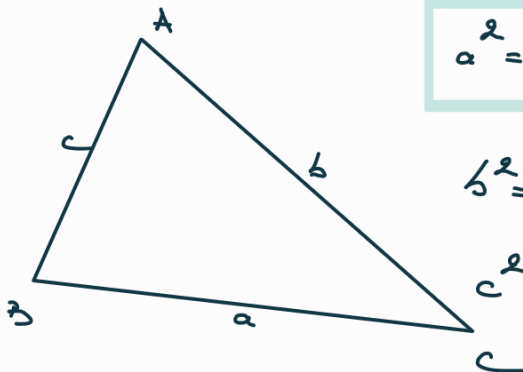


$$\angle A = 90^\circ$$

Cateta care se opune $\angle 30^\circ$ este jumătate din ipotenuză

$$\angle B = 30^\circ \Rightarrow AC = \frac{BC}{2}$$

TH. PITAGORA GENERALIZATĂ (TH. COS.) $\Delta ABC = \text{oarecure}$

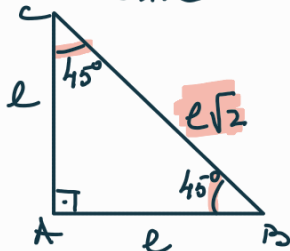


$$a^2 = b^2 + c^2 - 2bc \cos \hat{A}$$

$$b^2 = a^2 + c^2 - 2ac \cos \hat{B}$$

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

Δ DREPTUNGHIC ISOSCEL



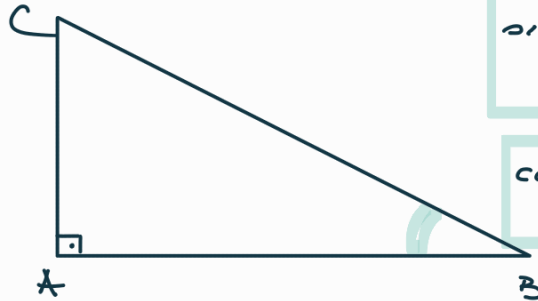
$$AB = AC$$

$$\angle A = 90^\circ$$

$$\angle B = \angle C = 45^\circ$$

$$BC = e\sqrt{2}$$

TRIGONOMETRIE



$$\sin \hat{B} = \frac{\text{cateta opusă}}{\text{ipotenuză}} = \frac{AC}{BC}$$

$$\cos \hat{B} = \frac{\text{cateta adiacentă}}{\text{ipotenuză}} = \frac{AB}{BC}$$

$$\tan x = \frac{1}{\cot x}$$

$$\tan \hat{B} = \frac{\text{cat. op}}{\text{cat. adiac.}} = \frac{AC}{AB}$$

$$\cot \hat{B} = \frac{\text{cat. adiac.}}{\text{cat. op}} = \frac{AB}{AC}$$

FORMULA FUNDAMENTALĂ A TRIGONOM.

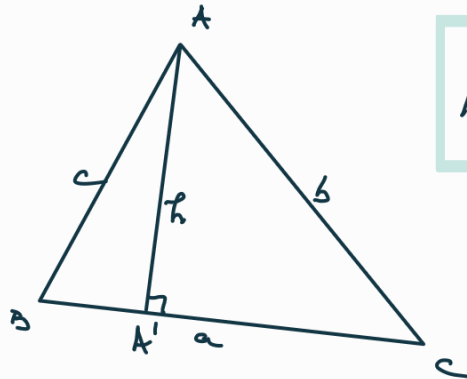
$$\sin^2 x + \cos^2 x = 1$$

x	30°	45°	60°
sin x	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos x	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tg x	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$	1	$\sqrt{3}$
ctg x	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$



ARI Δ :

1. Δ OARECARE



$$A_{\Delta ABC} = \frac{B \cdot h}{2} = \frac{BC \cdot AA'}{2}$$

FORMULA LUI HERON

$$p = \frac{a+b+c}{2} = \text{semiperimetrul } \Delta ABC$$

$$A_{\Delta ABC} = \sqrt{p(p-a)(p-b)(p-c)}$$

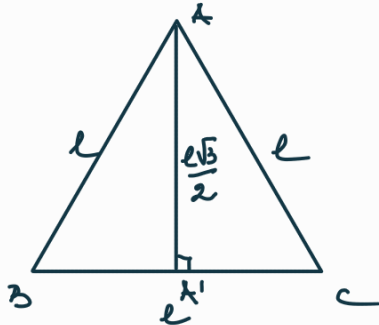
$$A_{\Delta ABC} = \frac{b \cdot c \sin \hat{A}}{2} = \frac{a \cdot c \sin \hat{B}}{2} = \frac{a \cdot b \sin \hat{C}}{2}$$

$$A_{\Delta ABC} = \frac{abc}{4R} = r \cdot p$$

$R = \text{raza cerc. circumscris}$

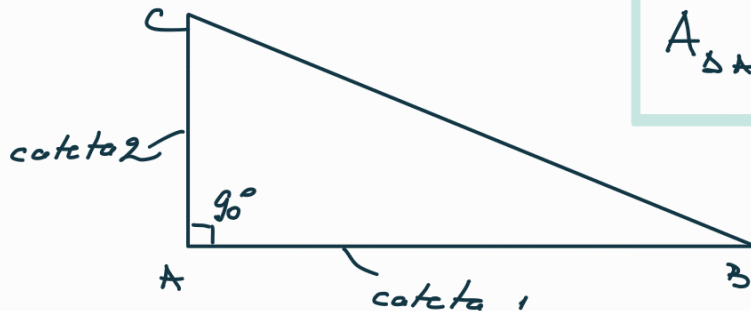
$r = \text{raza cerc. inscris}$

2. Δ ECHILATERAL



$$A_{\Delta ABC} = \frac{l^2 \sqrt{3}}{4}$$

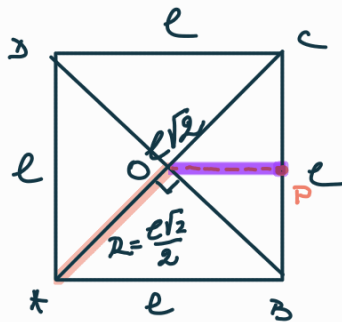
3. Δ DREPTUNGHI



$$A_{\Delta ABC} = \frac{C_1 \cdot C_2}{2} = \frac{AB \cdot AC}{2}$$

PATROLATERE.

1. PATRAT



$$AB = BC = CD = AD = l$$

$$AC \perp BD$$

$$OP = \text{apoteama} = a_4 = \frac{l}{2}$$

$AC = \text{diagonala patratului}$

$$AC = l\sqrt{2}$$

$$P_{ABCD} = 4l$$

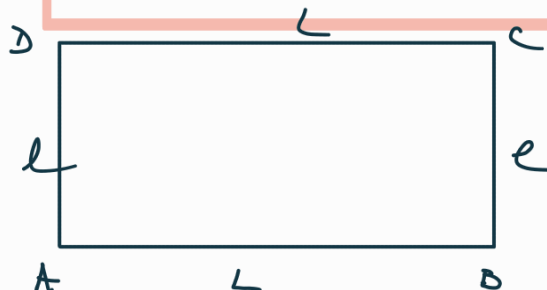
$$A_{ABCD} = l^2$$

$$R = \text{raza cerc. circum} = AO = \frac{l\sqrt{2}}{2}$$

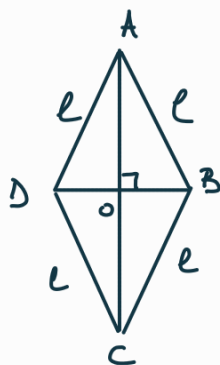
2. DREPTUNGHI

$$P_{ABCD} = 2(L + l)$$

$$A_{ABCD} = L \cdot l$$



3. ROMB



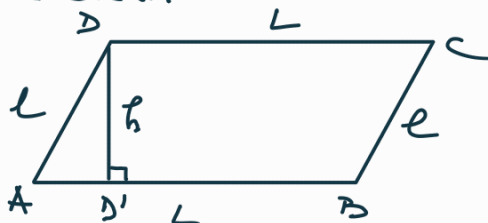
$$AB = BC = CD = AD = l$$

$$AC \perp BD$$

$$P_{ABCD} = 4l$$

$$A_{ABCD} = \frac{d_1 \cdot d_2}{2} = \frac{AC \cdot BD}{2} = l^2 \sin \hat{A}$$

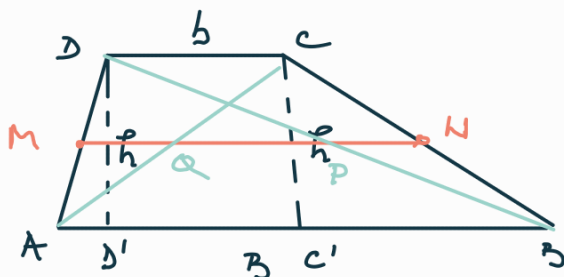
4. PARALELOGRAM



$$P_{ABCD} = 2(L + l)$$

$$A_{ABCD} = B \cdot h = AB \cdot DD'$$

5. TRAPEZ. a) OARECARE



$$DD' \perp AB$$

$$CC' \perp AB$$

$$P_{ABCD} = AB + BC + CD + AD$$

$$A_{ABCD} = \frac{(b + B) \cdot h}{2}$$

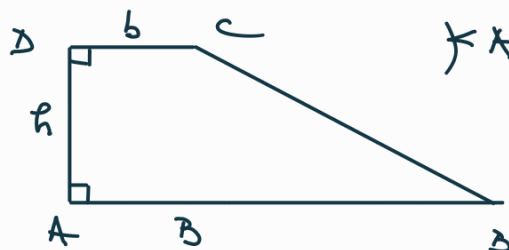
$M, N = \text{mij } AD, BC$

$$MN = \text{linie mijlocie} = \frac{b + B}{2}$$

$$, MN \parallel AB \parallel CD$$

$$QP = \frac{B - b}{2}$$

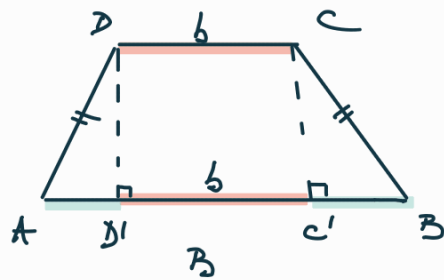
b) DREPTUNGHI



$$\angle A = \angle D = 90^\circ$$

$$\angle B + \angle C = 180^\circ$$

c) ISOSCEL



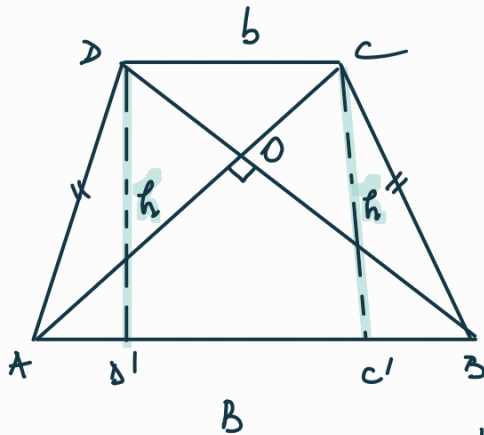
$$AD = BC$$

$$AD' = BC' = \frac{B-b}{2}$$

$$DC = D'C' = b$$

TRAPEZ ORTODIAGONAL = diagonalele sunt perpendiculare

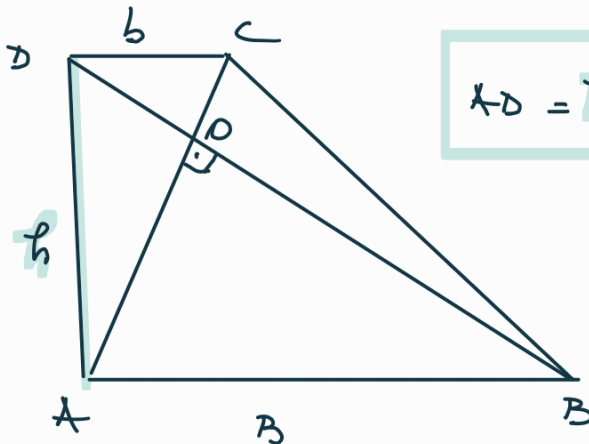
1. ISOSCEL



$$AC \perp BD$$

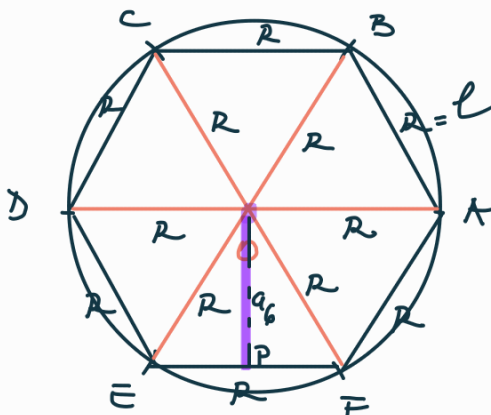
$$DD' = h = \frac{b+B}{2} = \frac{DC+AB}{2}$$

2. DREPTUNGHI



$$AD = h = \sqrt{b \cdot B}$$

6. HEXAGON REGULAT = este format din 6 Δ echitate.



$$R = AO = l$$

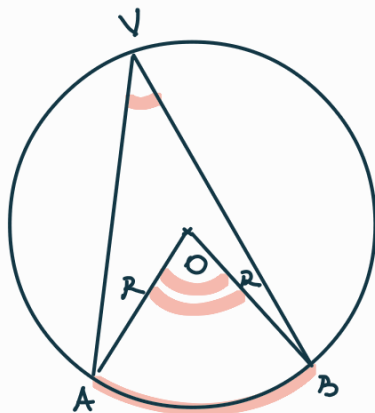
$$OP = \text{apoteama hexagon} = a_6$$

$$a_6 = \frac{r\sqrt{3}}{2}$$

$$A_{ABCDEF} = 6 \frac{r^2\sqrt{3}}{4}$$

$$P_{ABCDEF} = 6l$$

CERCUL



$$A_{C(0,R)} = \pi R^2$$

$$L_{C(0,R)} = 2\pi R$$

$\angle AOB = \angle$ la centru

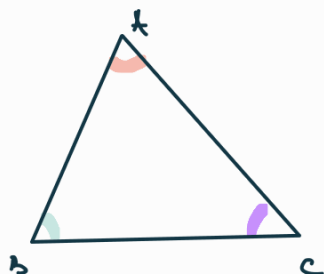
$\angle AVB = \angle$ cu vârful pe cerc

$$\angle AVB = \frac{\angle AOB}{2} = \frac{\widehat{AB}}{2}$$

$$\angle AOB = \widehat{AB}$$

ĂSEMĂNAREA TRIUNGHURILOR

$$\triangle ABC \sim \triangle A'B'C' \quad (=\Rightarrow)$$

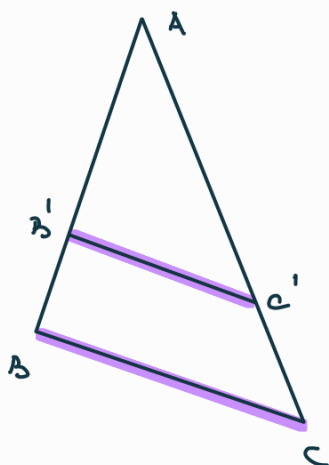


$$\left\{ \begin{array}{l} \angle A = \angle A' \\ \angle B = \angle B' \\ \angle C = \angle C' \end{array} \right.$$

și

$$\frac{AB}{A'B'} = \frac{AC}{A'C'} = \frac{BC}{B'C'} = k$$

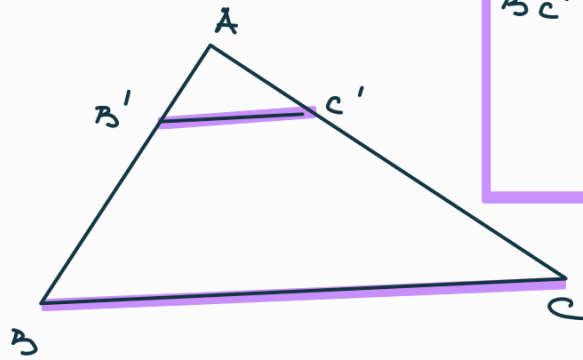
TEOREMA FUNDAMENTALĂ A ĂSEMĂNĂRII



$$B'C' \parallel BC \Rightarrow \triangle A'B'C' \sim \triangle ABC$$

$$\frac{AB'}{AB} = \frac{AC'}{AC} = \frac{B'C'}{BC}$$

TEOREMA DI THALES :



$$B'C' \parallel BC \Rightarrow \frac{AB'}{B'B} = \frac{AC'}{C'C}$$

$$\frac{AB'}{AB} = \frac{AC'}{AC}$$