TROJÚHELNÍK

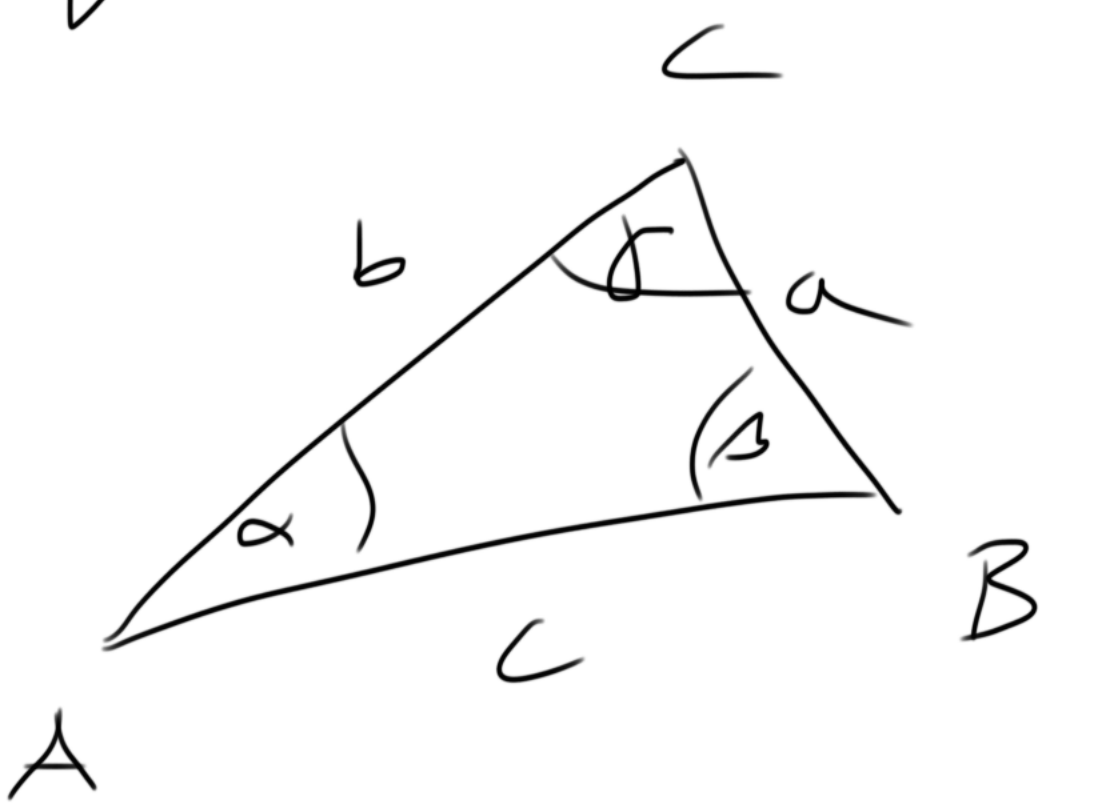
určité

neurčité

pravidelní
nepravidelné

konvexní
nekonvexní

triangle dreieck



△ABC

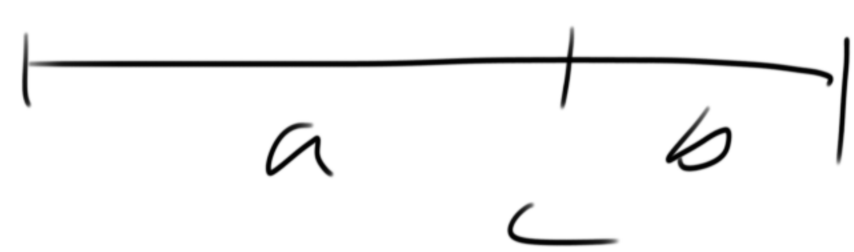
- Součet vnitřních úhlů △ je $180°$

- △ - nerovnost

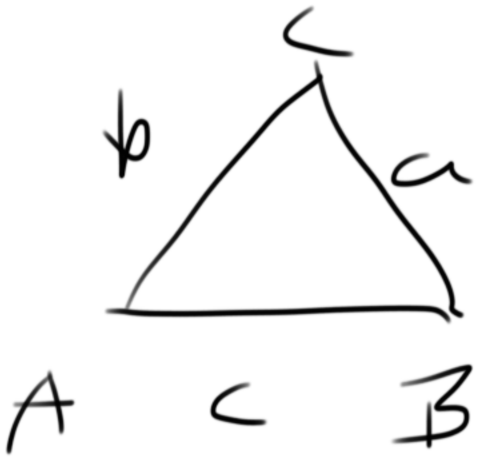
a, b, c

$a+b>c \quad a+c>b \quad c+b>a$

X $a+b=c$



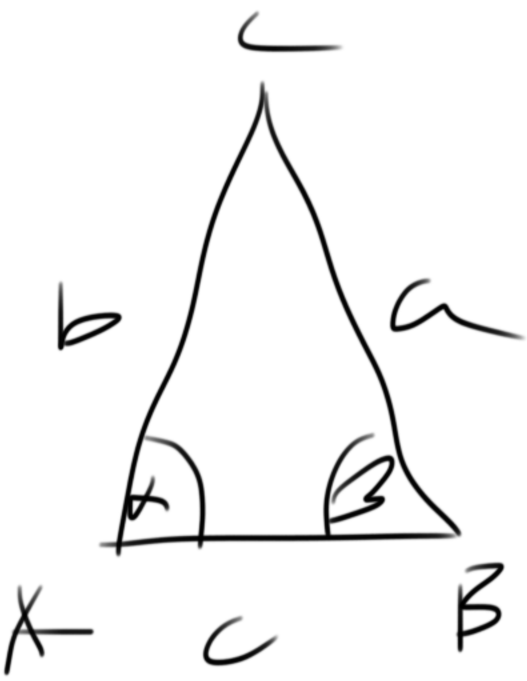
Podle stran



Rovnostranný

$a = b = c$

$\alpha = \beta = \gamma = 60°$

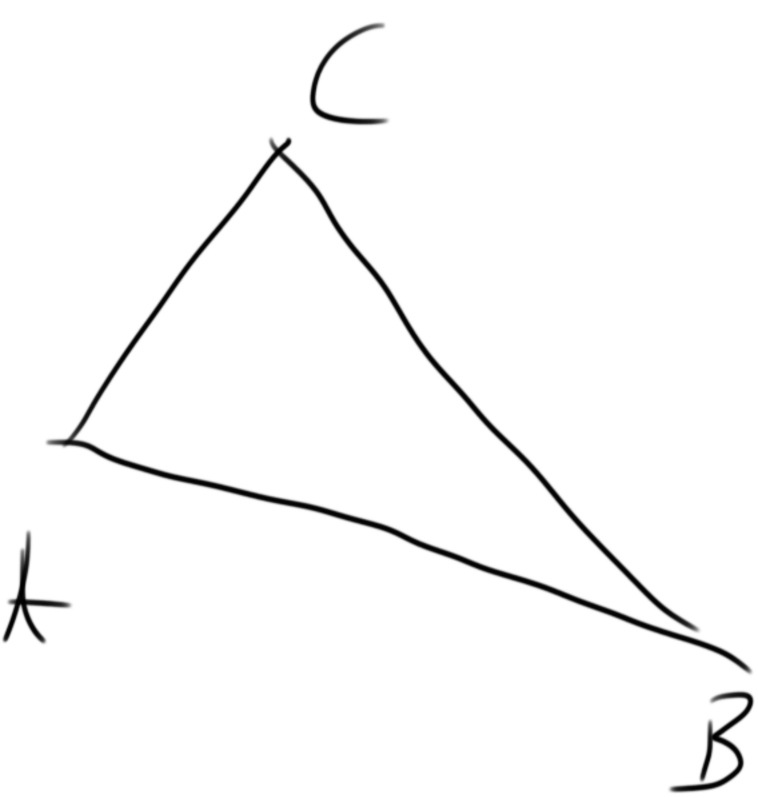


Rovnoramenný

$a = b$ ramena

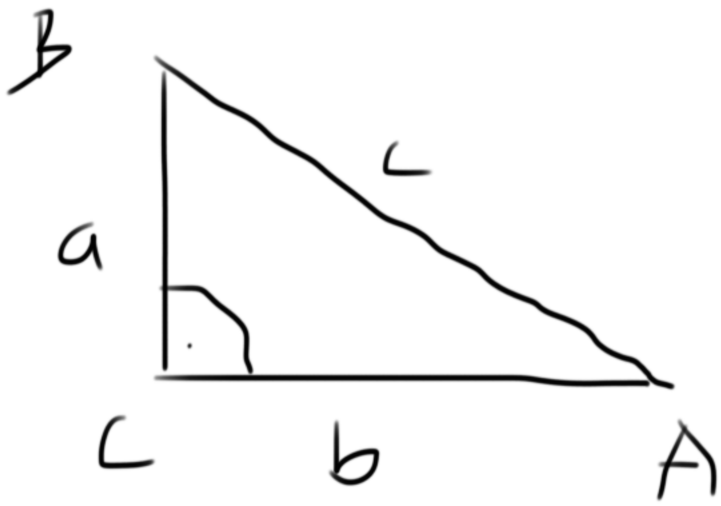
c základna

$\alpha = \beta$



Obecný

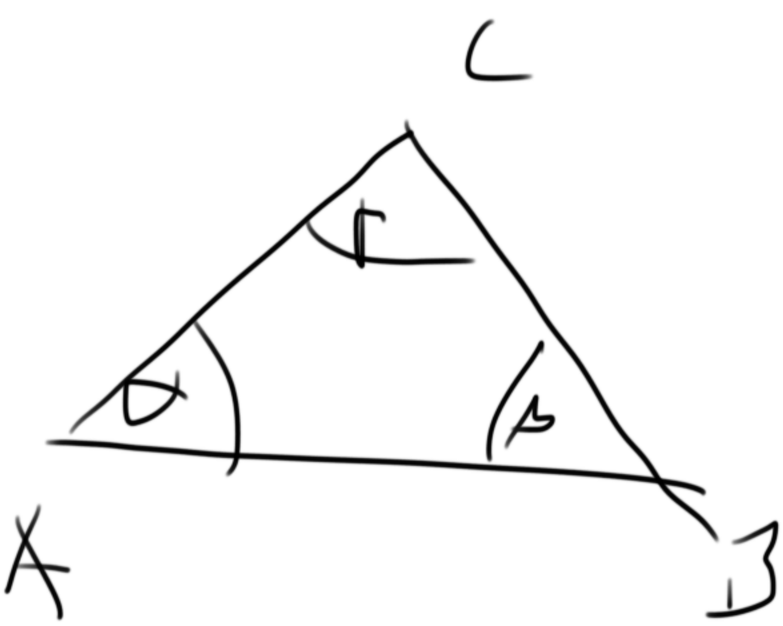
Podle úhlů



Pravoúhlý $\gamma = 90°$

a, b … odvěsny

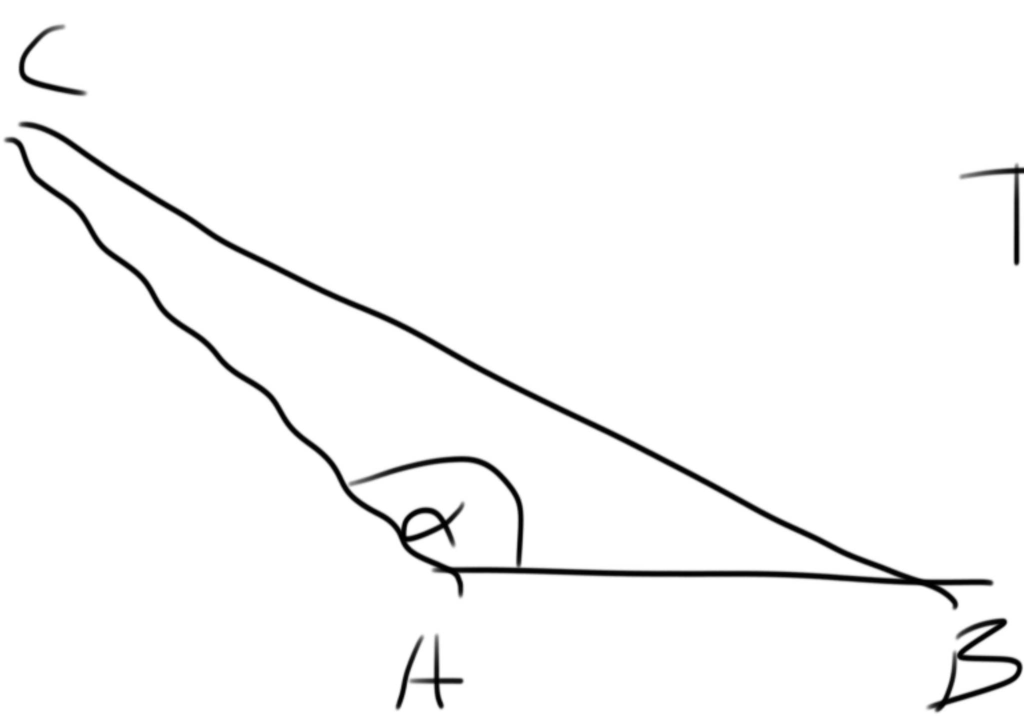
c … přepona



Ostroúhlý

α, β, γ ostré

$< 90°$



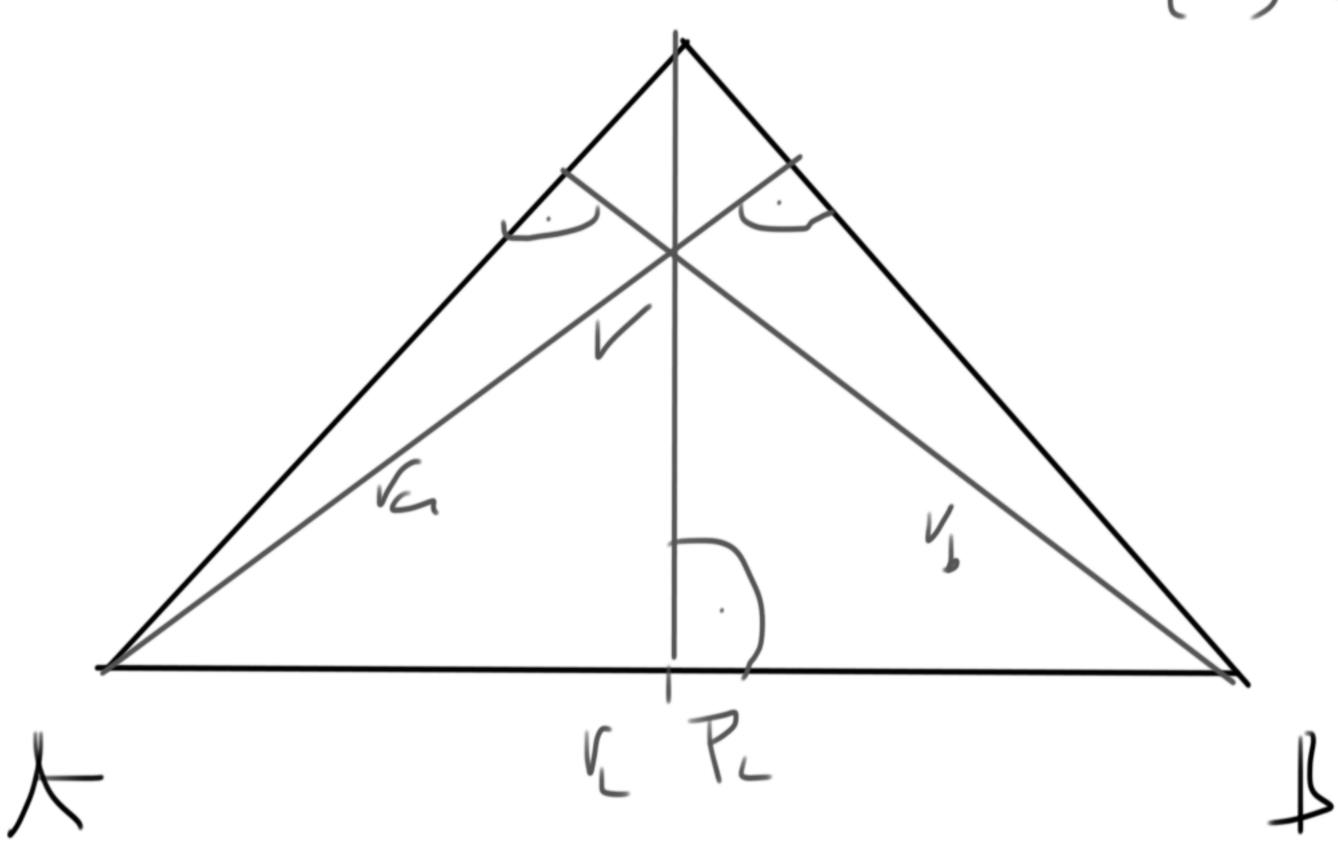
Tupoúhlý

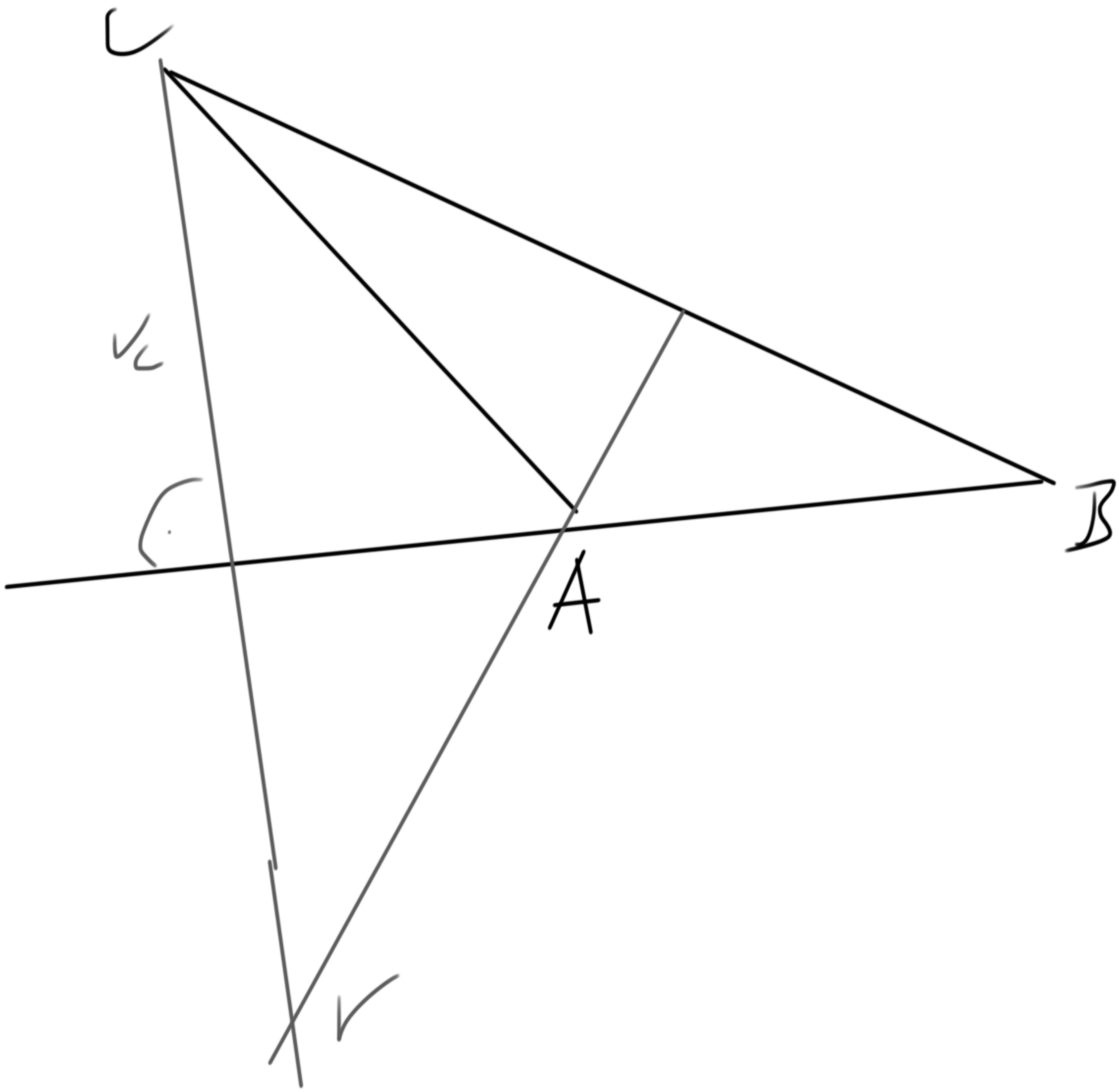
α tupý

$> 90°$

Výška $\triangle$

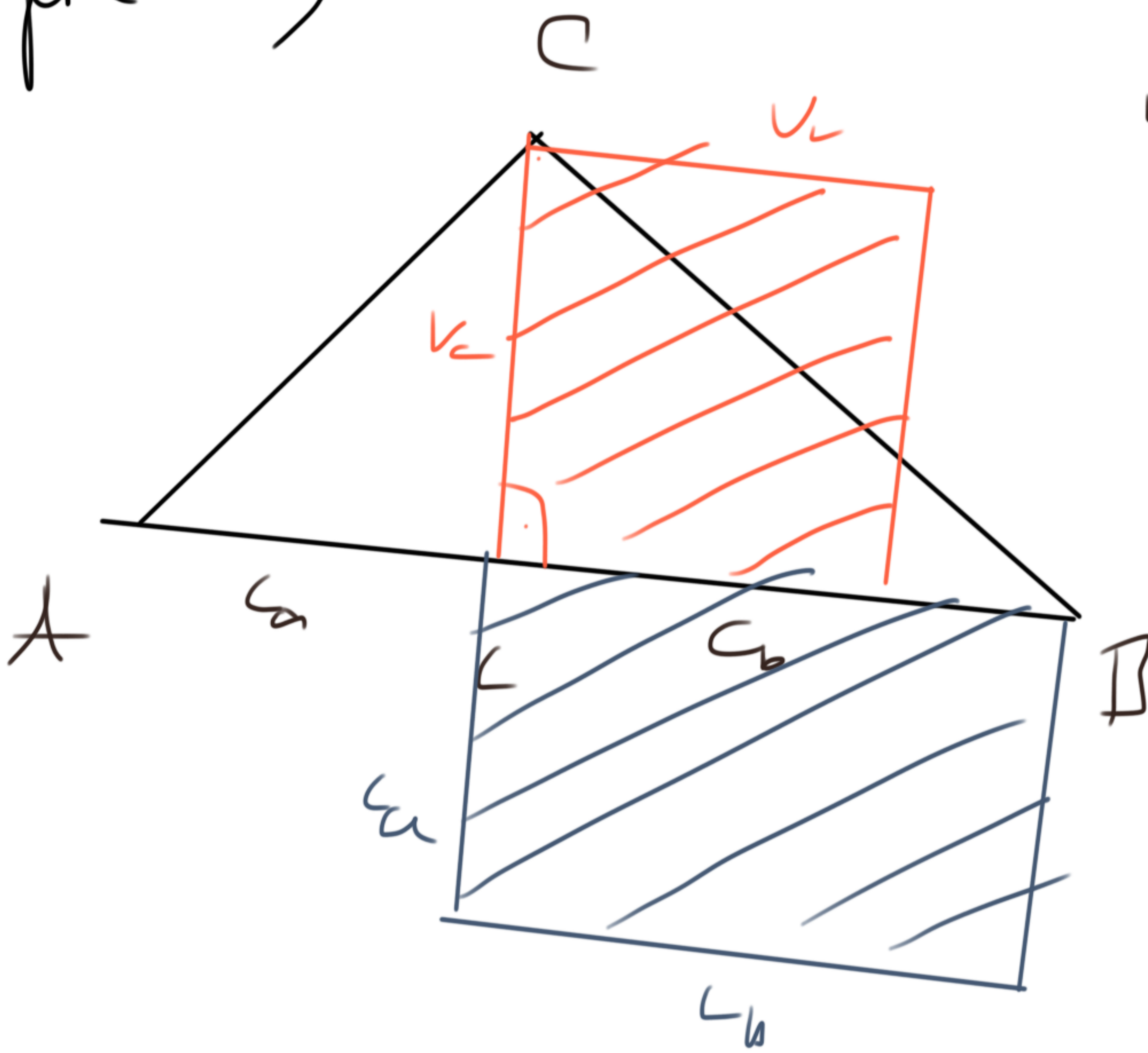
V(O) ORTOCENTRUM





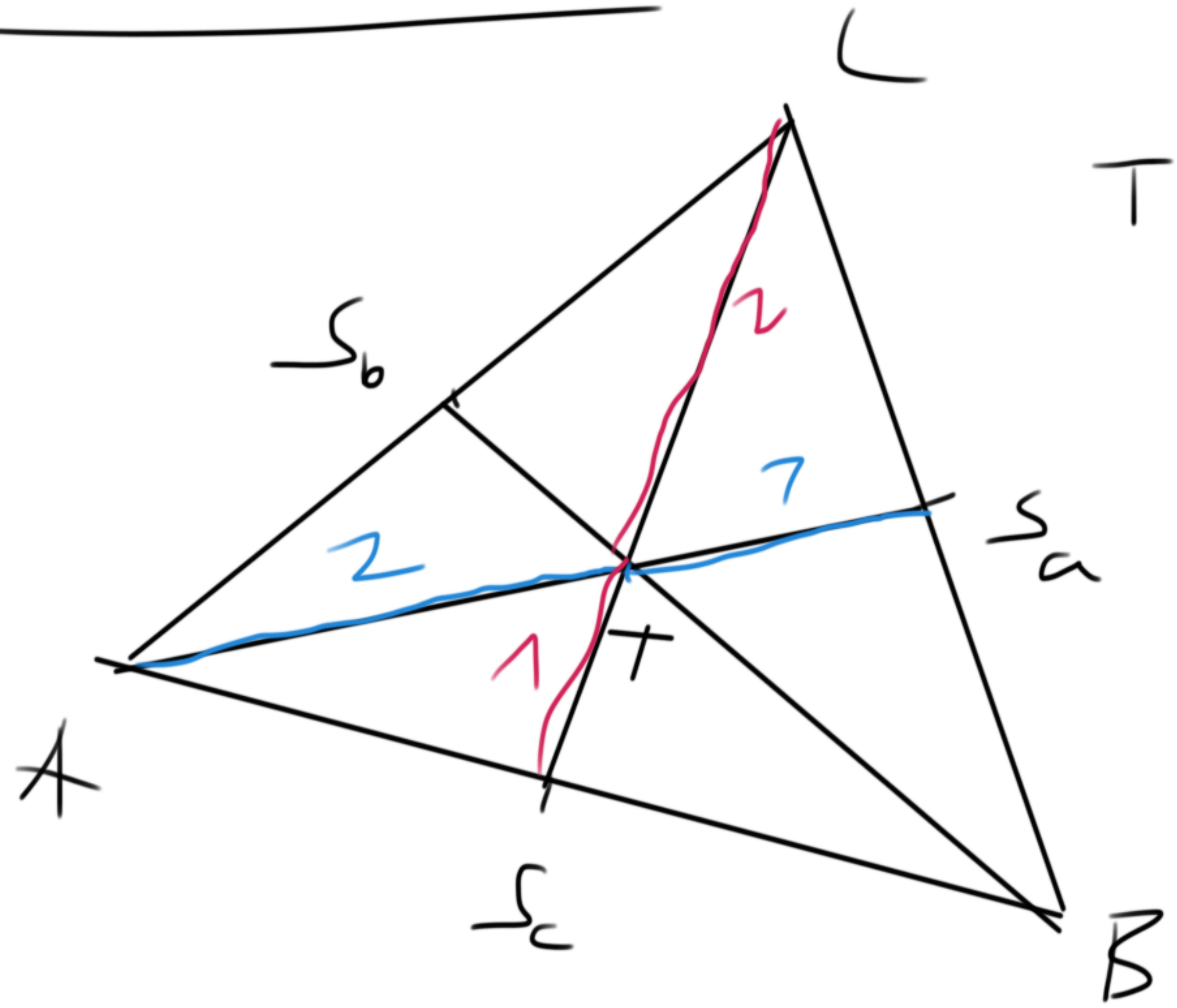
Eukleidova věta o výšce

pravoúhlý △



$\underline{v_c^2} = \underline{c_a \cdot c_b}$

Těžnice

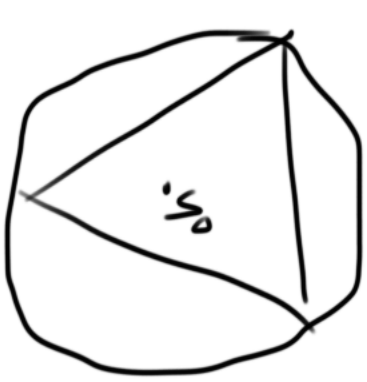


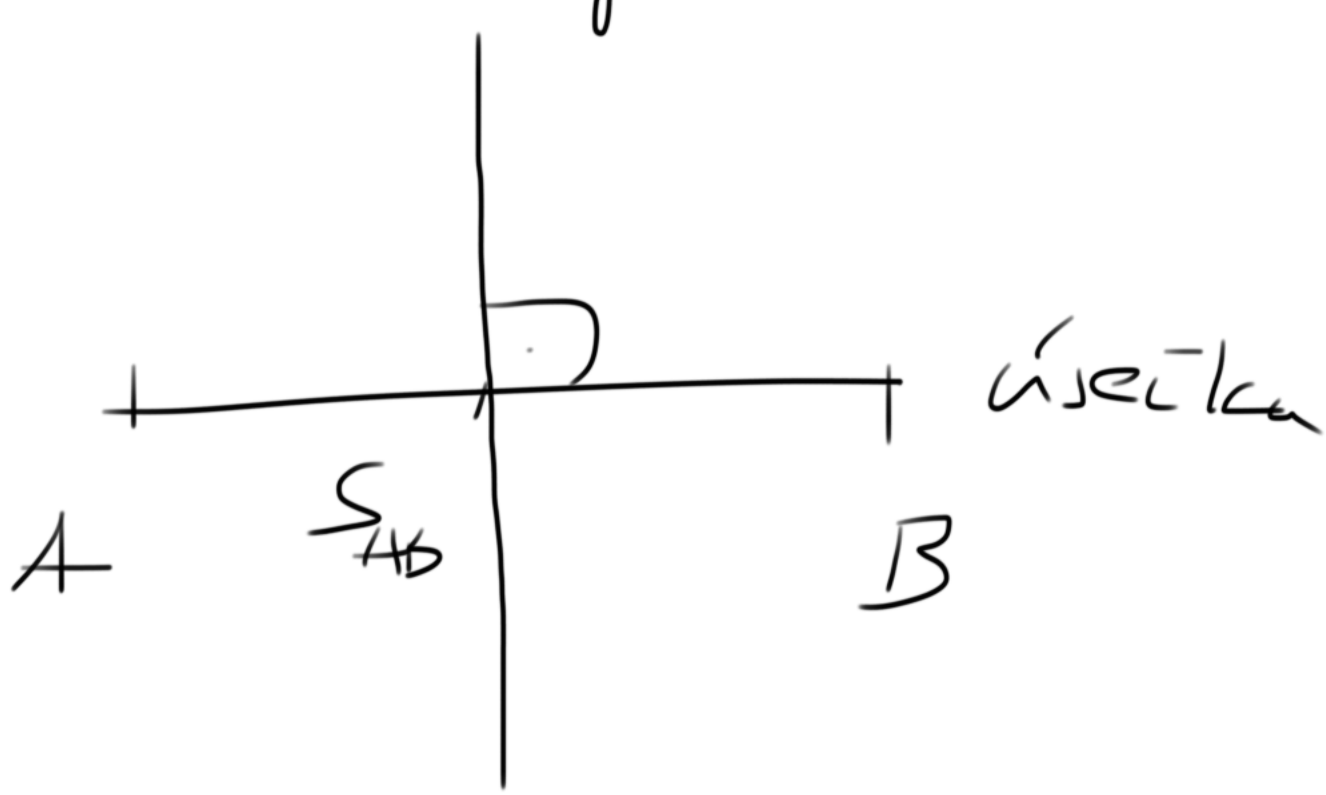
T ... těžiště

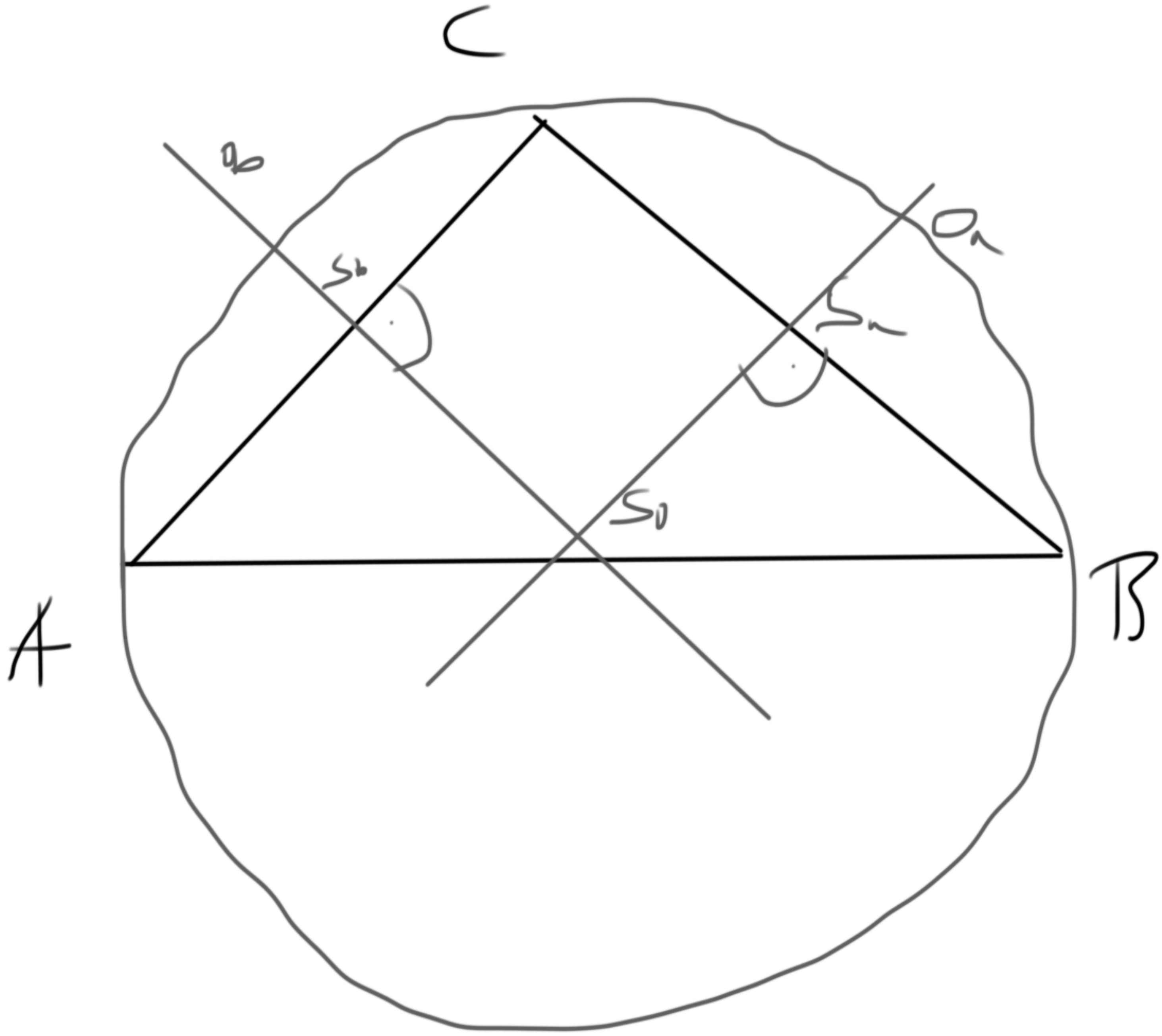
těžnice se dělí v poměru 2 : 1

Kružnice opsaná a vepsaná

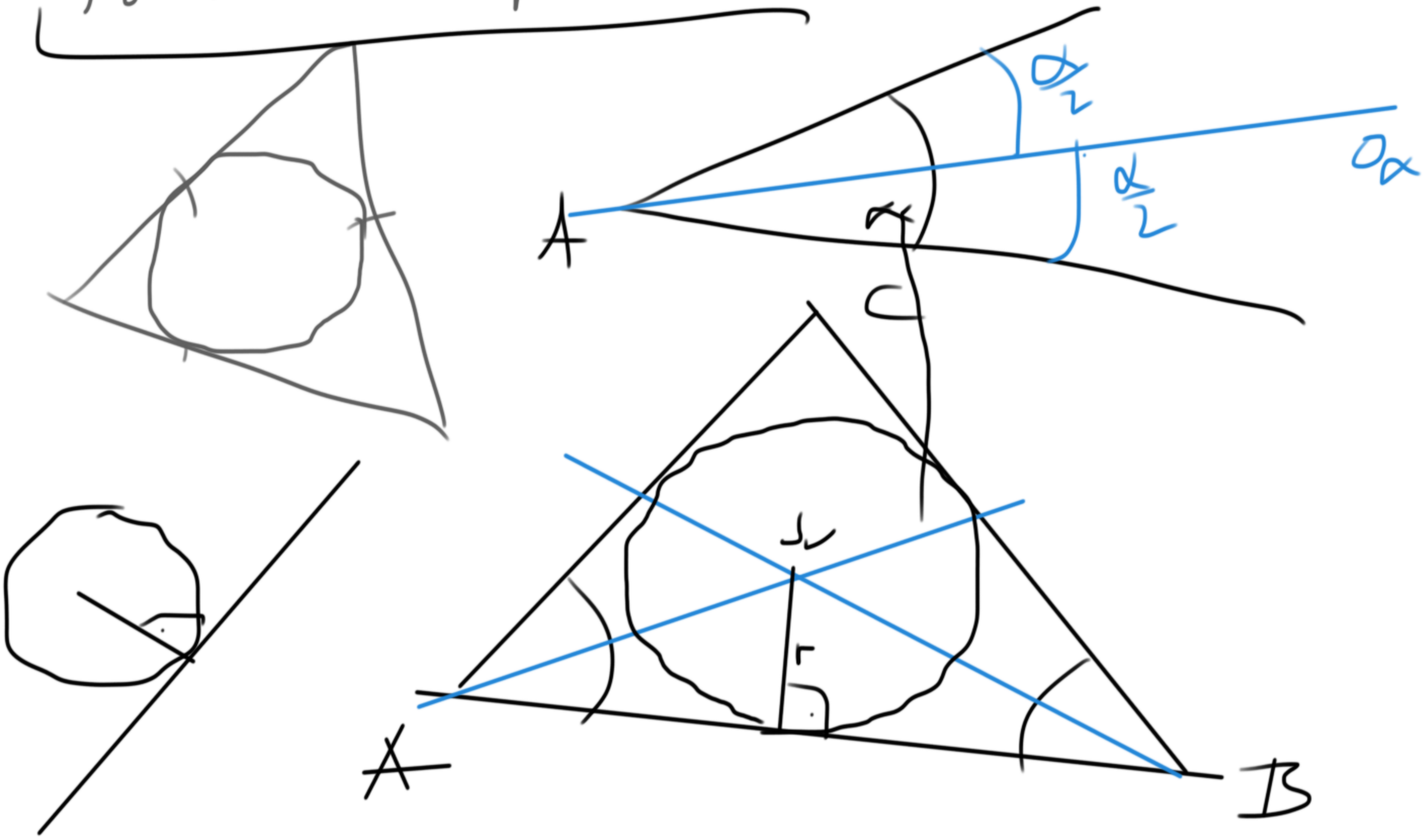
S_o leží na průsečíku os stran







Kružnice vepsaná



Podobnost trojúhelníků

$\triangle ABC$ $\triangle A'B'C'$ jsou si podobné

pokud $\exists k > 0$: $a' = k \cdot a$

$b' = k \cdot b$

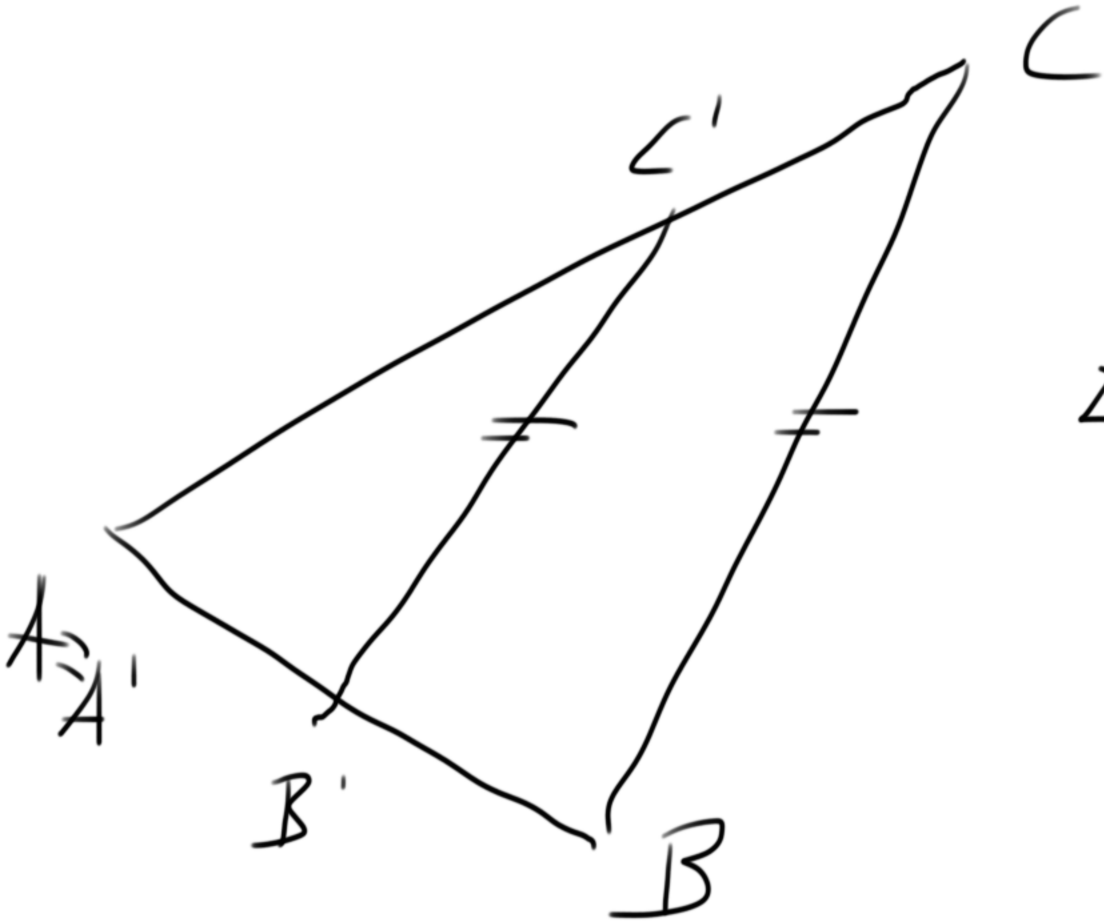
$c' = k \cdot c$

k .. koeficient podobnosti

$k < 1$ ... zmenšení

$k > 1$ ... zvětšení

$k = 1$ .. shodné trojúhelníky

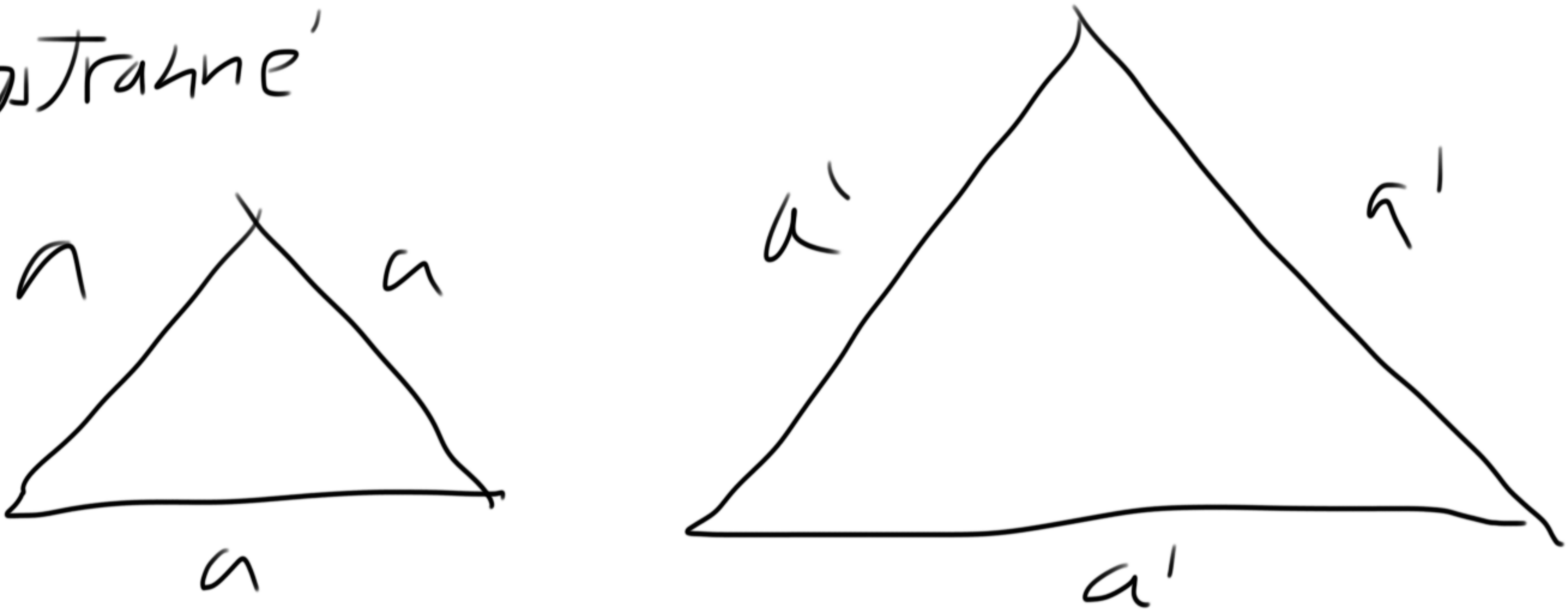


$k \sim 2$

$\triangle ABC$ $\triangle A'B'C'$

jsou si podobné

rovnostranné



$$\boxed{k = \frac{a'}{a}}$$

podobné

$a' = k \cdot a$

$b' = k \cdot b$

$c' = k \cdot c$

Věty o podobnosti △

2 △ si jsou podobné, pokud...

sss: ... se shodují poměry délek stran

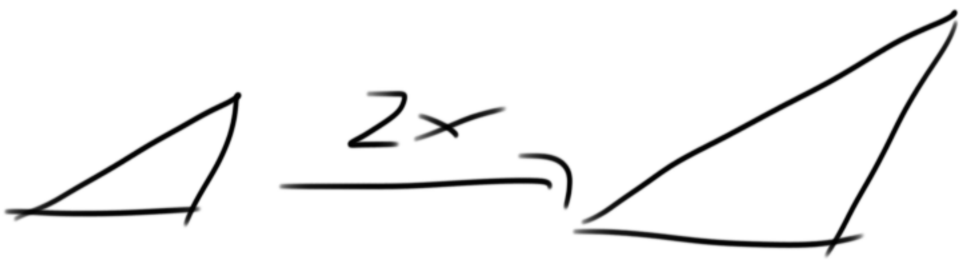
uu: ... se shodují ve dvou úhlech

sus ... se shodují poměr dvou stran

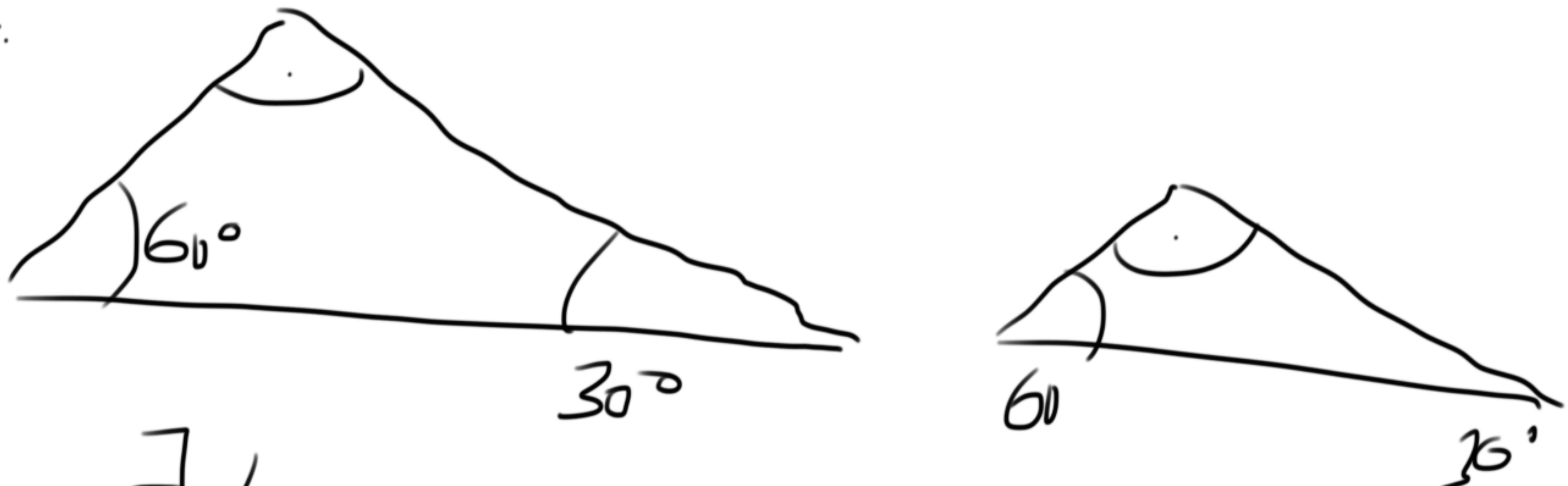
Ssu: ... se shodují poměry dvou stran a úhel proti větší z nich

SSS: $\frac{a'}{a}=k_a$ $\frac{b'}{b}=k_b$ $\frac{c'}{c}=k_c$

$k_a=k_b=k_c=k$ $\Rightarrow$ definicija podobnosti

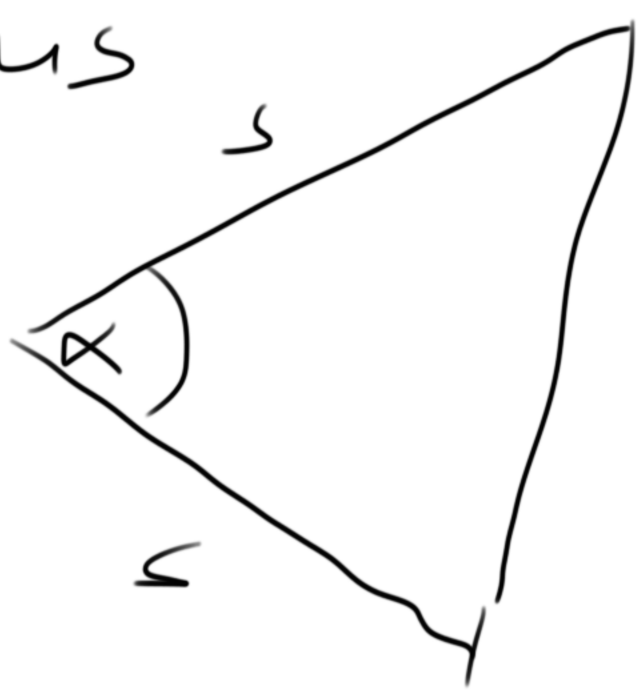


UU:



$\exists k$: . . . – .

SUS



$k=\frac{1}{2}$

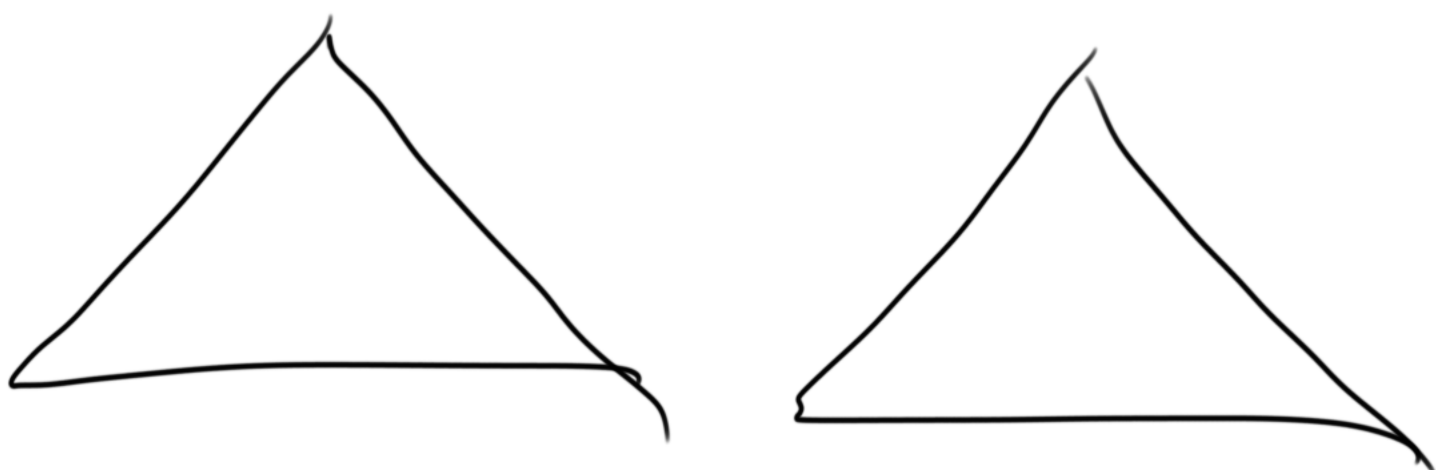
SSU:

u = 1   sus   s... poměry

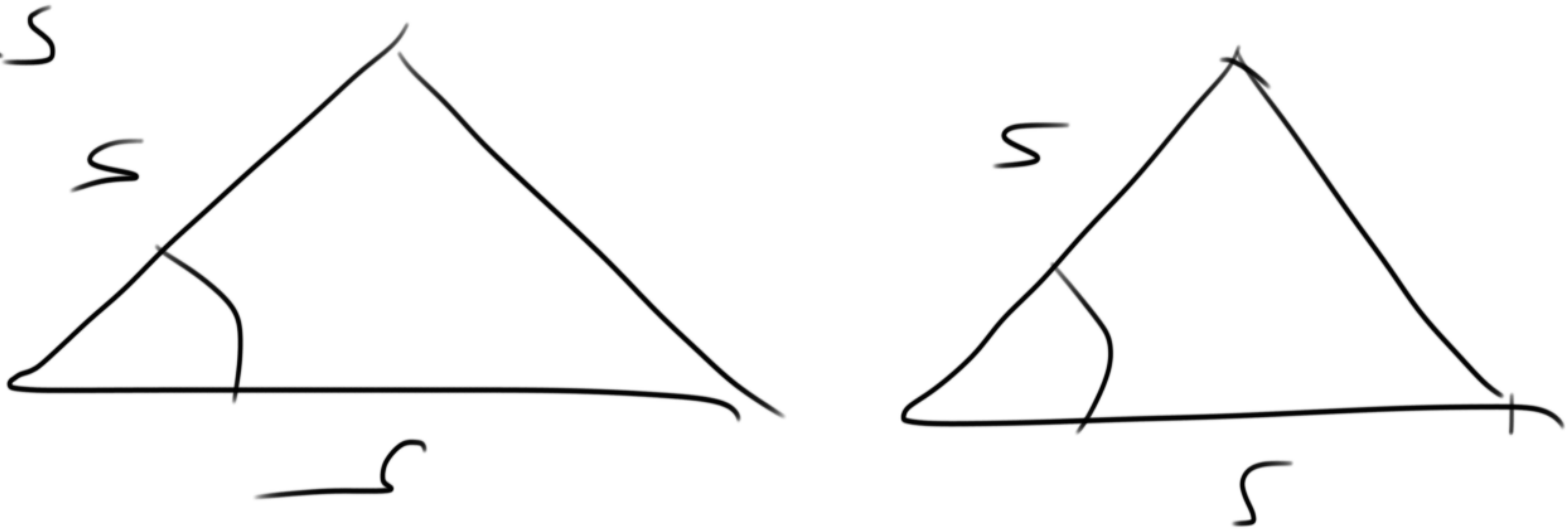
Věty o shodnosti △

V. P: s ⟶ s
poměry   rovnost odp. stran

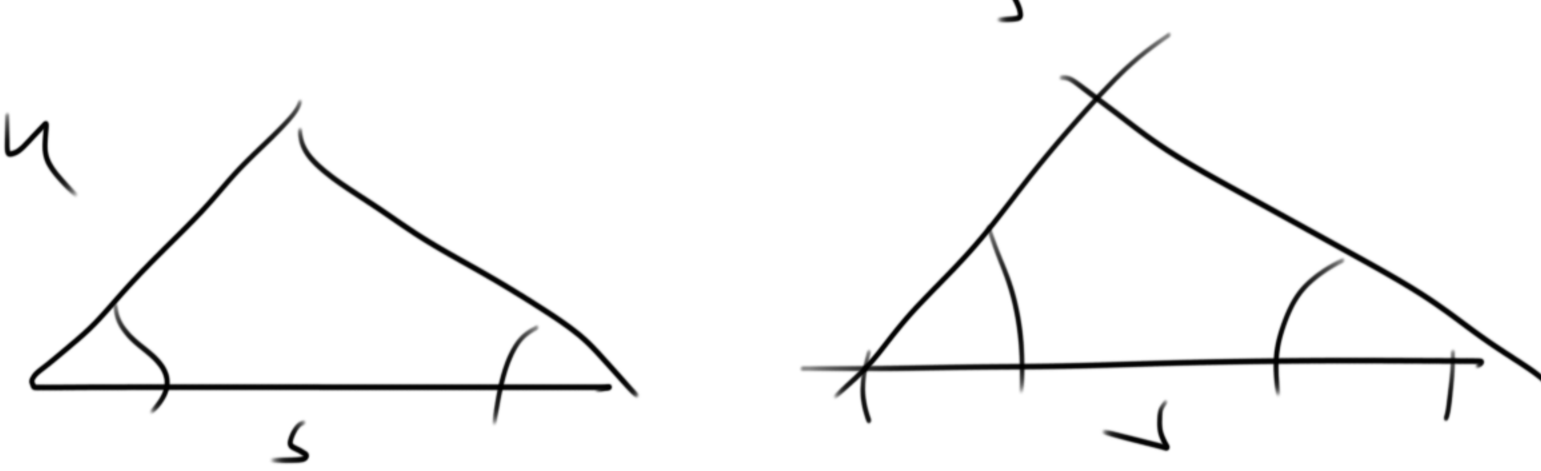
sss..



sus



usu

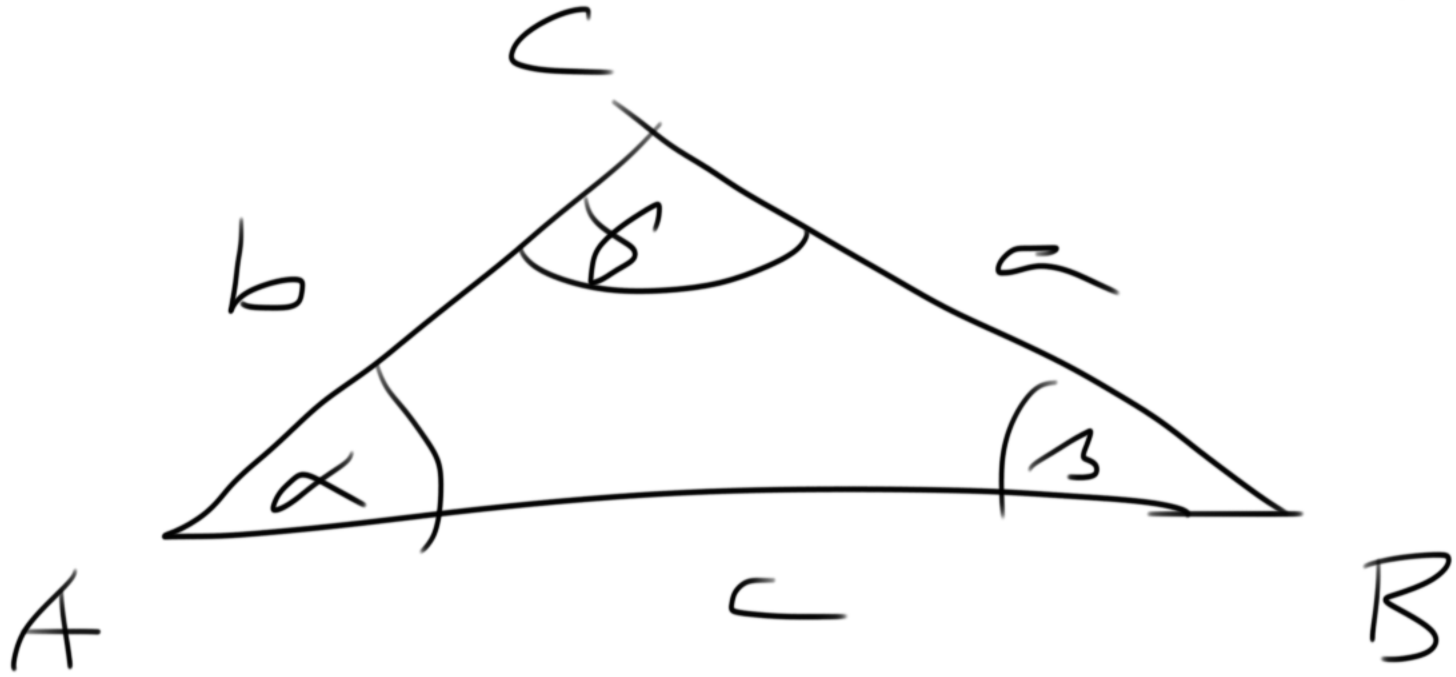


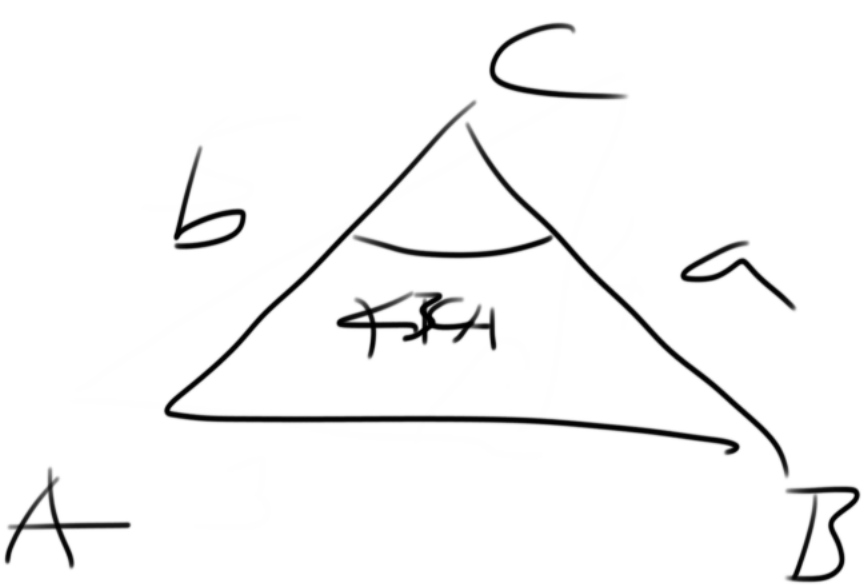
Sinová a cosinová věta

Pro každý △

Sinová:

$$\frac{a}{\sin\alpha} = \frac{b}{\sin\beta} = \frac{c}{\sin\gamma}$$





$a = 5\ \text{cm}$

$b = 3\ \text{cm}$

$|\measuredangle BCA| = 30^\circ$

cosinová:

$$a^2=b^2+c^2-2\cdot b\cdot c\cos\alpha$$

$$b^2=a^2+c^2-2a\cdot c\cos\beta$$

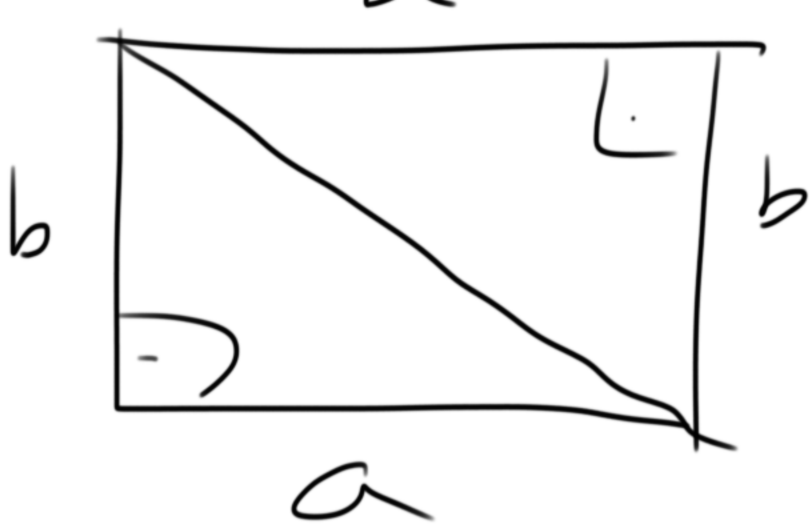
$$c^2=a^2+b^2-2a\cdot b\cos\gamma$$

Obvod a Obsah

$$\boxed{O=a+b+c}$$

S:

$$\boxed{S=\frac{v_a\cdot a}{2}=\frac{v_b\cdot b}{2}=\frac{v_c\cdot c}{2}}$$



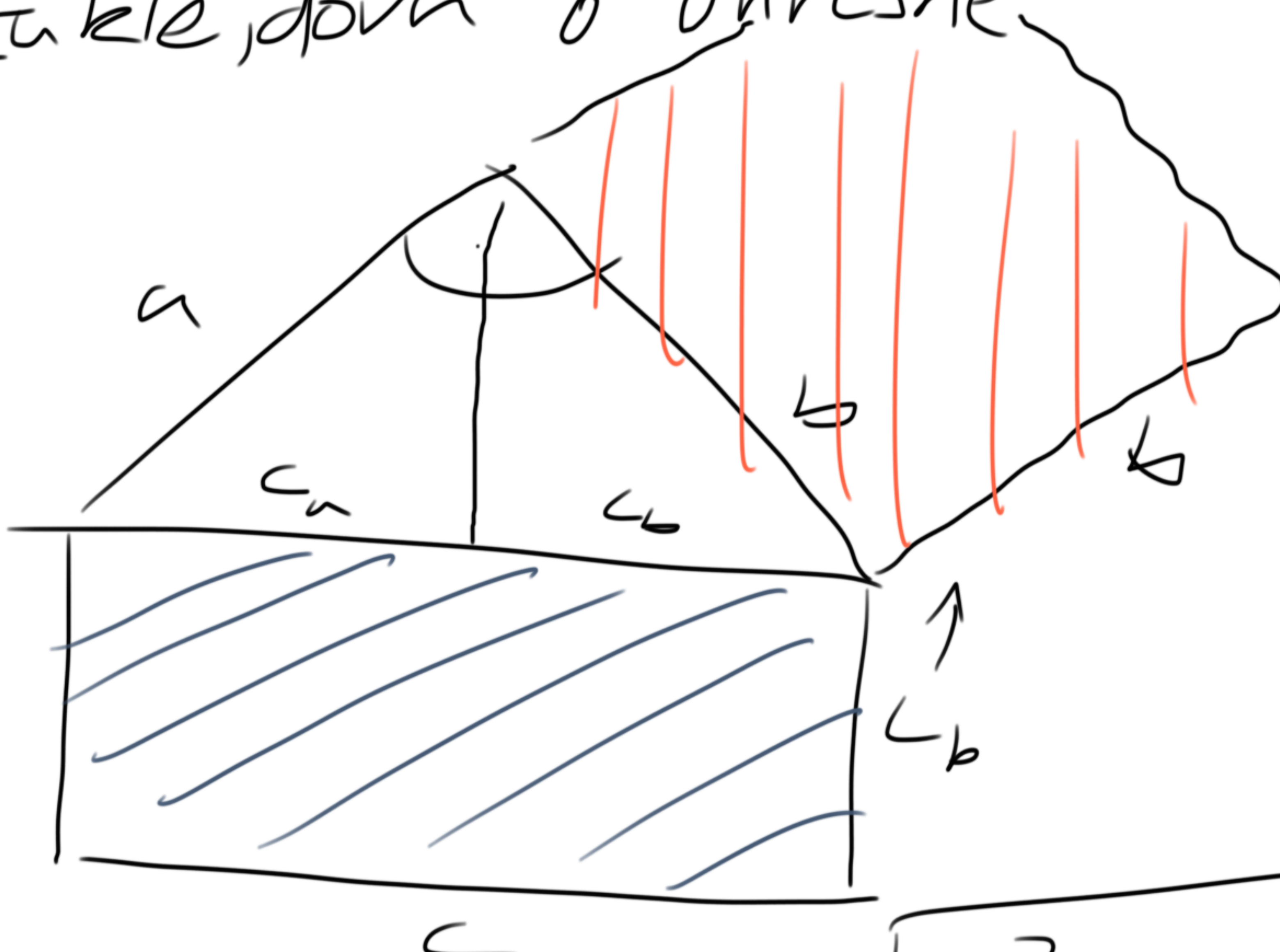
$$S_{\square}=a\cdot b$$

$$S_{\triangle}=\frac{a\cdot b}{2}=\frac{v_b\cdot b}{2}=\frac{a\cdot v_a}{2}$$

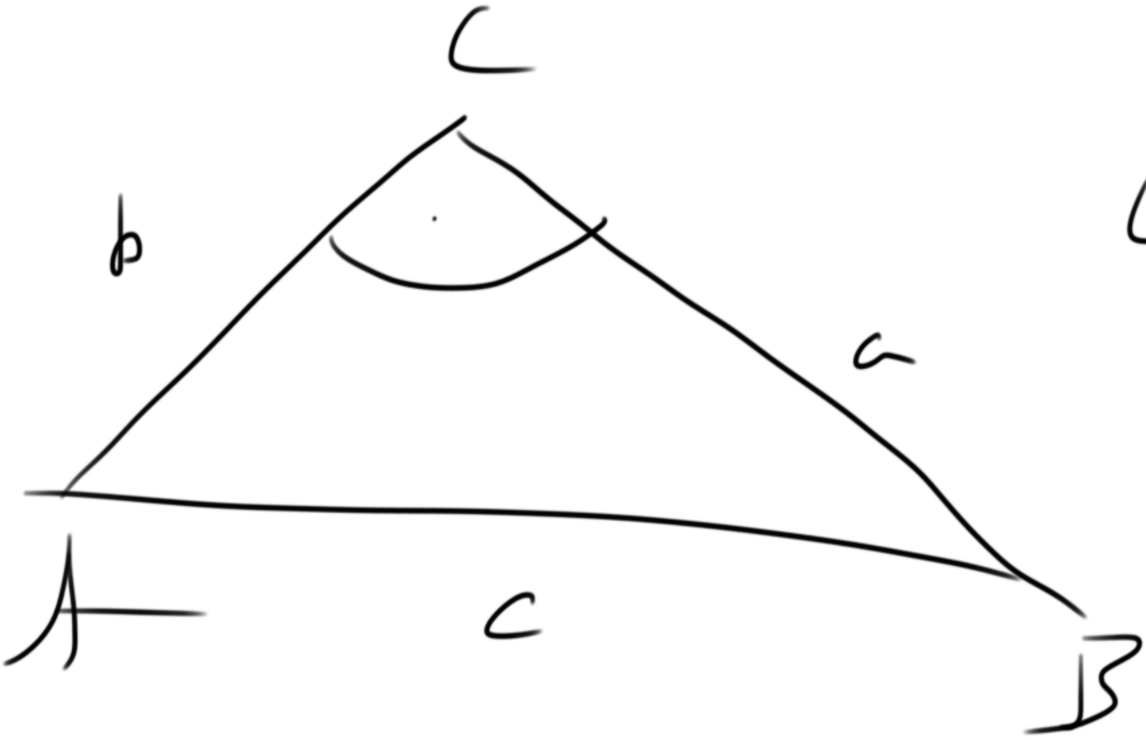
$b=v_a \quad a=v_b$

Pravoúhlý trojúhelník

Eukleidova o odvěsně



$$b^2 = c \cdot c_b$$
$$a^2 = c \cdot c_a$$

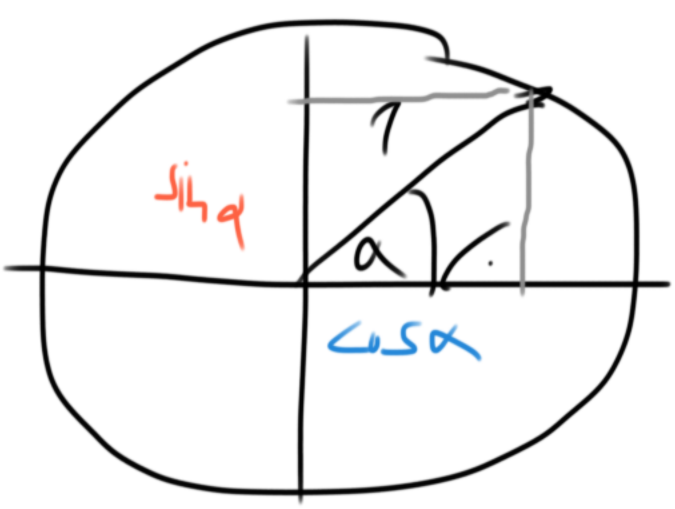


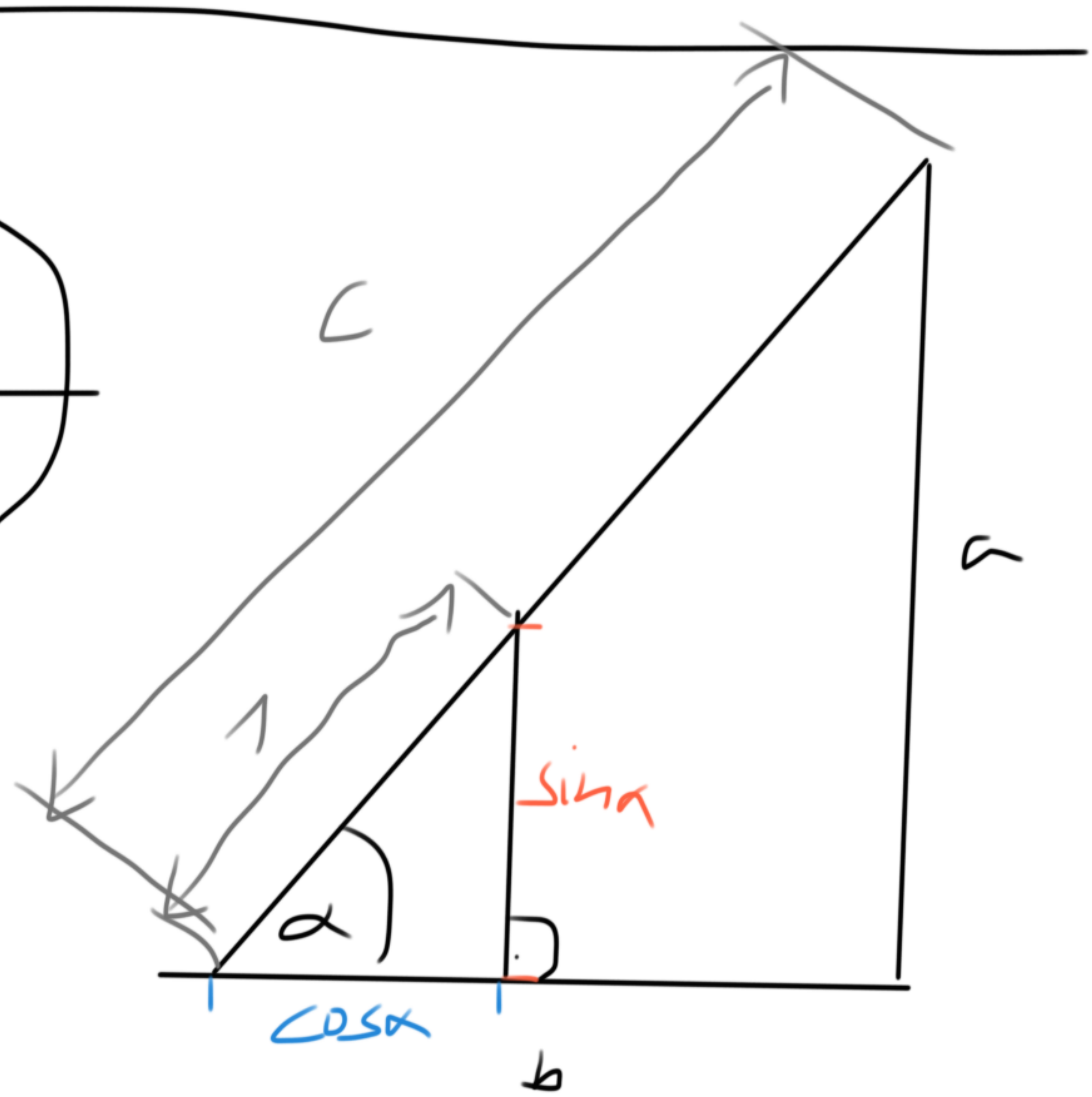
$$c^2 = a^2 + b^2 - 2\cdot a\cdot b\cos\gamma$$

$$\gamma = 90^\circ = \frac{\pi}{2}$$

$$\cos\frac{\pi}{2} = 0$$

$$\boxed{c^2 = a^2 + b^2}$$ Pythagorova věta





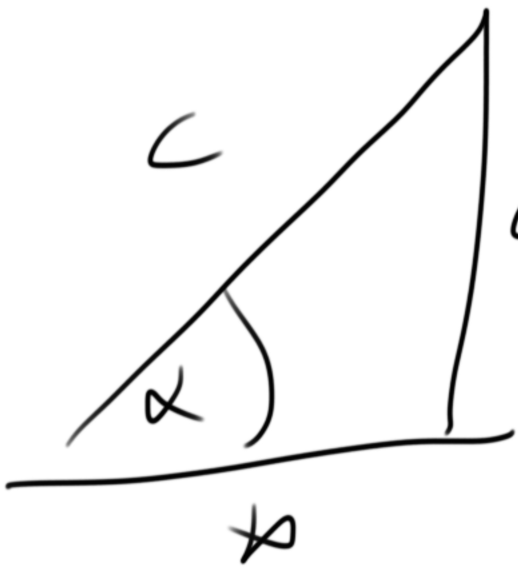
$$\cos^2\alpha + \sin^2\alpha = 1$$

Pythagorova věta

$1 \to c$

$k = c$

$b = c\cdot\cos\alpha$ $\quad a = c\cdot\sin\alpha$



c

$$b = c \cdot \cos\alpha$$

$$a = c \cdot \sin\alpha$$

$$\boxed{\sin\alpha = \frac{a}{c}} \qquad \boxed{\frac{\text{„protilehlá odv."}}{\text{přepona}}}$$

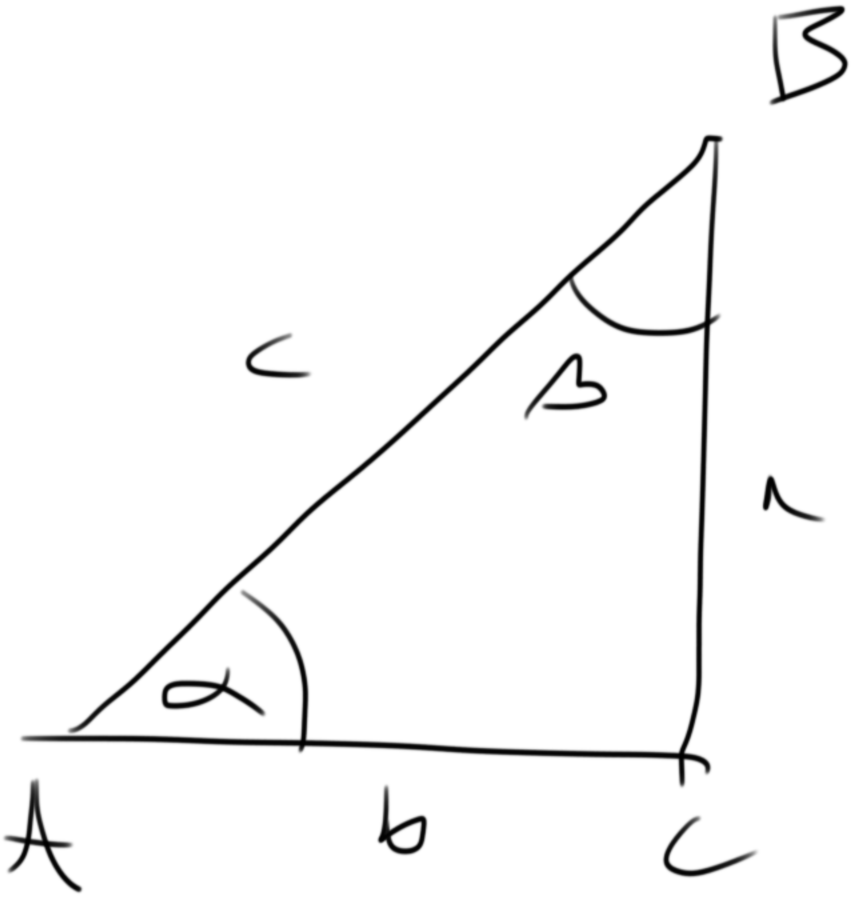
$$\boxed{\cos\alpha = \frac{b}{c}} \qquad \boxed{\frac{\text{„přilehlá"}}{\text{přepona}}}$$

$$\operatorname{tg}\alpha = \frac{\sin\alpha}{\cos\alpha} = \frac{\frac{a}{c}}{\frac{b}{c}} = \frac{a}{b} \qquad \frac{\text{„protil."}}{\text{přilehl.}}$$

$$\operatorname{cotg}\alpha = \frac{1}{\operatorname{tg}\alpha} = \frac{b}{a} \qquad \frac{\text{přilehl.}}{\text{protilehl.}}$$

$$\underline{a^2 + b^2} = (c \cdot \sin\alpha)^2 + (c \cdot \cos\alpha)^2 =$$

$$= c^2 \underbrace{(\sin^2\alpha + \cos^2\alpha)}_{1} = \underline{c^2}$$



$$\sin\alpha = \frac{a}{c}$$

$$\sin\beta = \frac{b}{c}$$

$$\cos\alpha = \frac{b}{c}$$

$$\cos\beta = \frac{a}{c}$$

$$\underline{\sin^2\alpha + \cos^2\alpha} = \frac{a^2}{c^2} + \frac{b^2}{c^2} = \frac{a^2+b^2}{c^2}$$

$$= \frac{c^2}{c^2} = \underline{1}$$