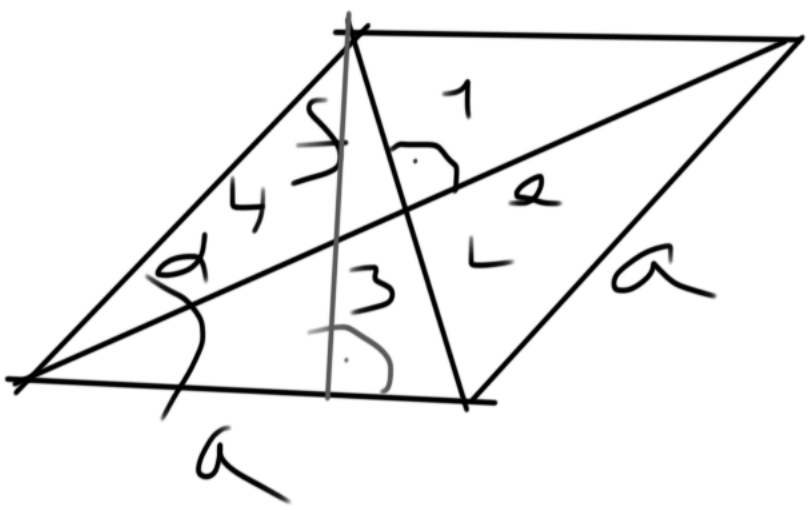
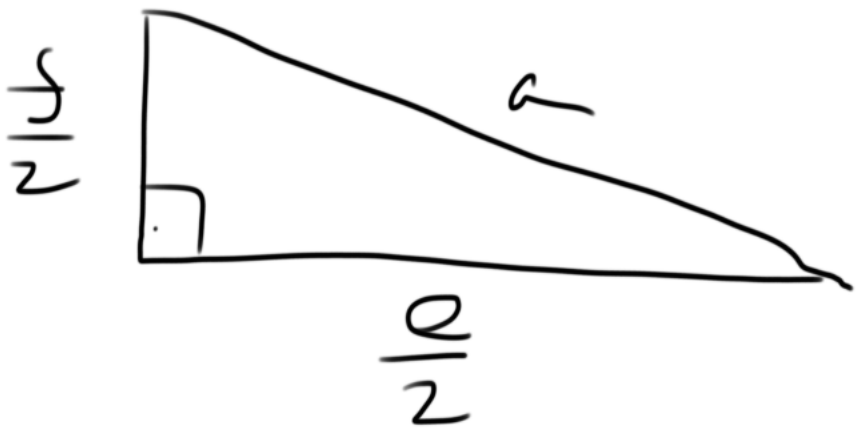


$$S = a^2 \cdot \sin\alpha$$

$$S = a \cdot b \cdot \sin\alpha$$

kosočtverník



$$S = 4 \cdot S_\Delta$$

$$S_\Delta = \frac{1}{2} \cdot \frac{f}{2} \cdot \frac{e}{2}$$

$$S_\Delta = \frac{e \cdot f}{8}$$

$$\boxed{S = \frac{e \cdot f}{2}}$$

Kosočtverec, $S = 54\ cm^2$, jedna úhlopříčka je o 12 cm delší než ta druhá.

$a = ?\quad e = ?\quad f = ?$

$\underline{e = f + 12}$ $\qquad \underline{S = \frac{e \cdot f}{2} = 54\ cm^2}$

$$54 = \frac{(f+12)\cdot f}{2}$$

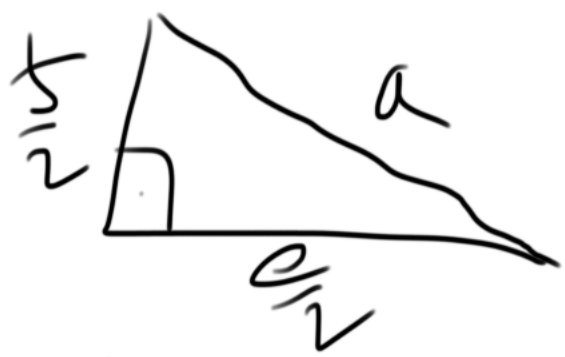
$$108 = f^2 + 12f$$

$$0 = f^2 + 12f - 108$$

$$f_{1,2} = \frac{-12 \pm \sqrt{144 + 432}}{2} = \frac{-12 \pm \sqrt{576}}{2}$$

$$576 = 4 \cdot 144$$

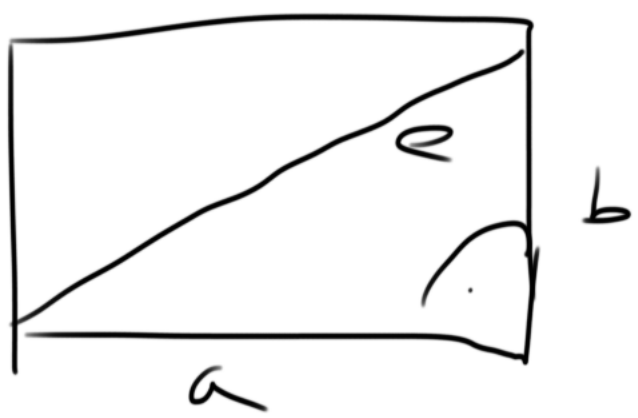
$$\sqrt{576} = 2 \cdot 12 = 24$$



$$f_{1,2} = \frac{-12 \pm 24}{2} = \begin{cases} 6 \\ -18 \end{cases} \times$$

$f = 6\ cm \qquad e = 18\ cm \qquad a = \sqrt{81 + 9} = \sqrt{90} = 3\sqrt{10}\ cm$

2)



$O = 46\ m$

$e = 17\ m$

$S = ?$

$O = a + b + a + b = 2(a+b)$

$S = a \cdot b$

$e^2 = a^2 + b^2$

$17^2 = a^2 + (23-a)^2$

$289 = a^2 + 529 - 46a + a^2$

$0 = 2a^2 - 46a + 240$

$0 = a^2 - 23a + 120$

$a_{1,2} = \frac{23 \pm \sqrt{529 - 480}}{2}$

$= \frac{23 \pm 7}{2} = \begin{cases} 15 \\ 8 \end{cases}$

$46 = 2 \cdot (a+b)$

$23 = a + b$

$\boxed{b = 23 - a}$

23	17
· 23	· 17
69	119
46	17
529	289

□ $a = 15$ $b = 8$

□ $a = 8$ $b = 15$

$S = ? = a \cdot b$

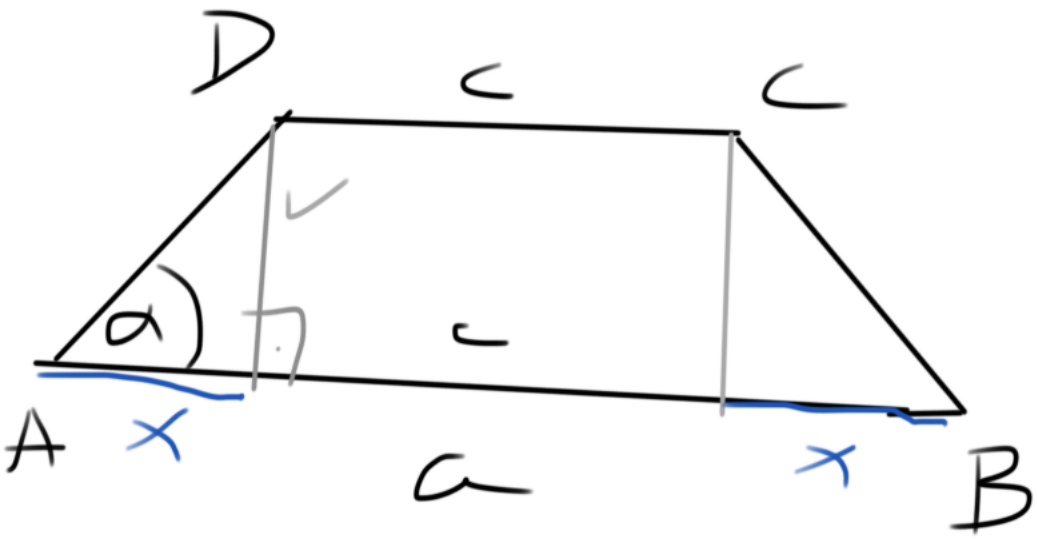
$\underline{S = 120\ cm^2}$

3) Rovnoramenný lichoběžník: dolní základna 20 cm

výška 6 cm

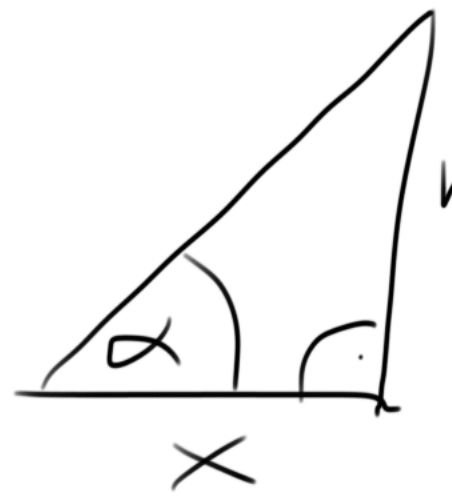
$\alpha = 45^\circ$

$S = ?$



$$S = \frac{1}{2} \cdot v \cdot (a + c)$$

$$c = a - 2x$$



$$\operatorname{tg}\alpha = \frac{v}{x} \Rightarrow x = \frac{v}{\operatorname{tg}\alpha}$$

$\alpha = 45^\circ \Rightarrow \operatorname{tg}\alpha = 1$

$x = v$ $\quad$ $x = 6\,cm$

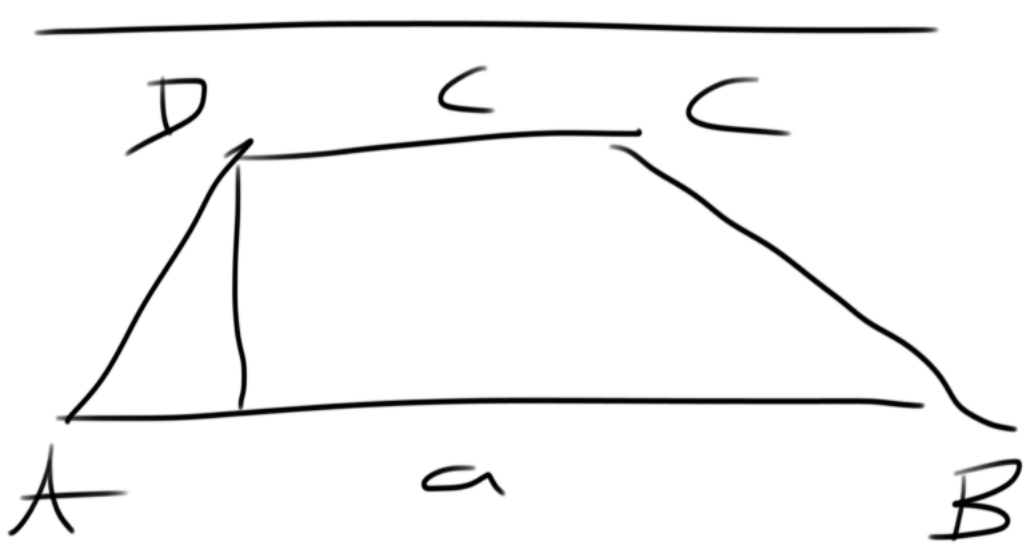
$$c = a - 2x = 20 - 12 = 8 \text{ cm}$$

$$S = \frac{1}{2} v \cdot (a + c) = \frac{1}{2} \cdot 6 \cdot 28 = 84 \text{ cm}^2$$

4) Výška a strany lichoběžníku rovnoběžné

jsou v poměru $v:a:c = 2:3:5$

$a = ?\quad c = ?\quad v = ?\quad S = 512\ cm^2$



$v = 2\ j$

$a = 3\ j$

$c = 5\ j$

$a = 24\ cm$

$c = 40\ cm$

$v = 16\ cm$

$$\frac{v}{a} = \frac{2\ j}{3\ j} = \frac{2}{3}$$

$$v = \frac{2}{3}a$$

$$S = \frac{1}{2} \cdot v \cdot (a + c)$$

$$\frac{a}{2} = \frac{b}{5}$$

$$S = \frac{1}{2} \cdot \frac{2}{3}a\left(a + \frac{5}{3}a\right)$$

$$c = \frac{5}{3}a$$

$$S = \frac{1}{3}a^2\frac{8}{3}$$

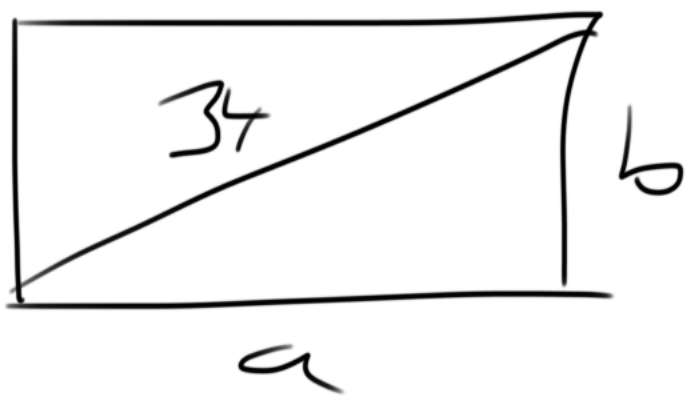
$$S = \frac{8}{9}a^2$$

$$512 = \frac{8}{9}a^2 \qquad a^2 = \frac{9 \cdot 256}{4}$$

$$\frac{9 \cdot 512}{8} = a^2 \qquad a = \frac{3 \cdot 16}{2} = 24$$

5) Obdélník s úhlopříčkou 34 cm.
Pokud se každá strana zvětší o 4 cm,
obsah se zvětší o 200 cm².

$a = ?$ $b = ?$



$S = a \cdot b$

$a+4$
$b+4$ $\Longrightarrow$ $S' = S+200$

$S' = (a+4)\cdot(b+4) = S+200$

$ab + 4a + 4b + 16 = S + 200$

$4(a+b) = 184$

$a+b = 46$

$b = 46 - a$

$34^2 = a^2 + b^2$

$$34^2 = a^2 + b^2 \qquad b = 46 - a$$

$$34^2 = a^2 + 46^2 - 92a + a^2$$

$$0 = 2a^2 - 92a + 46^2 - 34^2$$

$$46^2 - 34^2 = (46+34)(46-34) = 80 \cdot 12$$

$$A^2 - B^2 = (A+B)(A-B) \qquad = 960$$

$$0 = 2a^2 - 92a + 960$$

$$0 = a^2 - 46a + 480$$

$$D = 46^2 - 4 \cdot 480 = 4 \cdot (23^2 - 480)$$

$$46 = 2 \cdot 23 \qquad 529$$

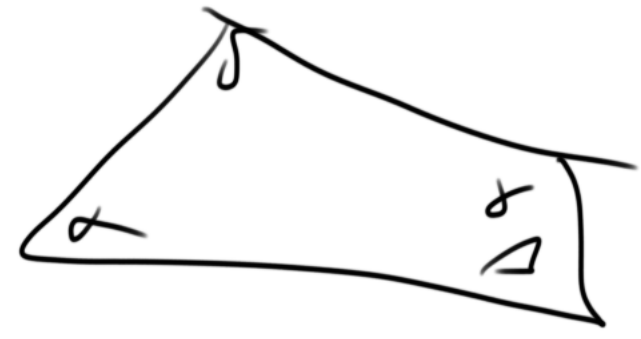
$$= 4 \cdot 49$$

$$\sqrt{D} = 2 \cdot 7 = 14$$

$$a_{1,2} = \frac{46 \pm 14}{2} = \begin{cases} 30 \\ 16 \end{cases}$$

$$\boxed{a = 30 \text{ cm} \quad b = 16 \text{ cm}} \qquad a + b = 46$$

6) Jak velké jsou úhly v □,
jsou-li v poměru 8 : 9 : 10 : 13



α β γ δ

$\alpha + \beta + \gamma + \delta = 360$

$\alpha = 8$ j.
$\beta = 9$ j.
γ j.

1 j. = ? °

$8+9+10+13 = 40$

40 j. . . . . 360°
1 j. . . . . x°

$x = \frac{1}{40} \cdot 360 = 9°$

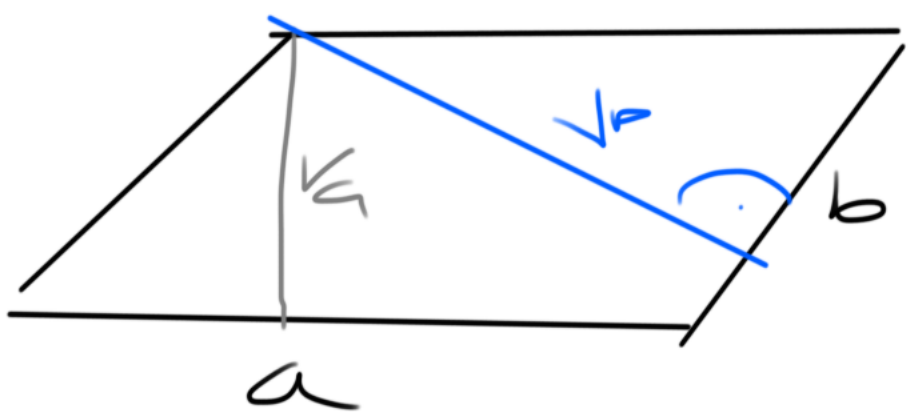
1 j. ~ 9°

$\alpha = 8 \cdot 9 = 72°$
$\beta = 9 \cdot 9 = 81°$
$\gamma = 10 \cdot 9 = 90°$
$\delta = 13 \cdot 9 = 117$ ✓

7) $O = ?$ $S = ?$ druhou výšku

rovnoběžníku, známe-li

$a = 5\,cm$ $b = 7\,cm$ $v_a = 7\,cm$



$O = 2 \cdot (a + b)$

$= 24\,cm$

$S = a \cdot v_a = \underline{35\,cm}$

$= b \cdot v_b$

$v_b = \frac{S}{b} = 5\,cm$

Plechová střecha, $\square$ $7{,}5\,m \times 4\,m$.

Kolik kg barvy se spotřebuje na nátěr, jestliže 1 kg vystačí na $8\,m^2$.

1 kg	$8\,m^2$
x	$30\,m^2$

$S = 30\,m^2$

$x = \frac{30}{8} = 3\frac{6}{8} = \underline{3{,}75\,kg}$

□ $a = 4m$ $\quad S' = 2 \cdot S$

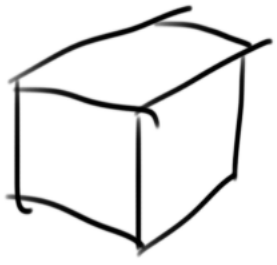
$a' = ?$

$a' = k \cdot a \qquad k \in \mathbb{R}$

$S' = (k \cdot a)^2 = 2 \cdot S = 2a^2$

$k^2 a^2 = 2a^2$

$\underline{k = \sqrt{2}}$



$\longrightarrow \quad a' = ka$
$V' = 2V \Rightarrow \sqrt[3]{2}\,a$

Jednotlivé strany čtverce měří:

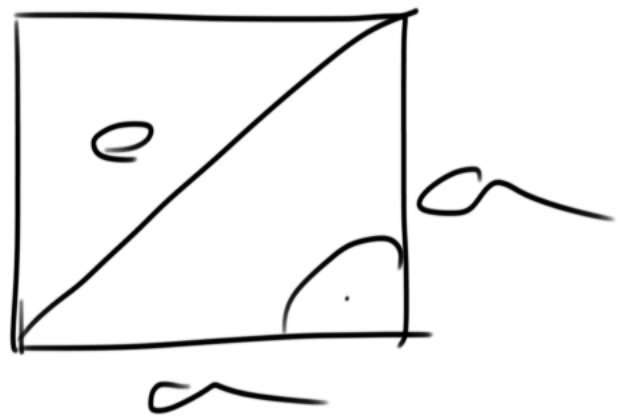
$O = 36\,m \wedge S = 49\,cm^2$

$O = 4 \cdot a \quad O = 36 \longrightarrow a = 9\,cm$

$S = a^2 \quad S = 49\,cm^2 \longrightarrow a = 7\,m$

X

$a = 5\,cm$ uhlopříčka $5\sqrt{2}$



$$e = \sqrt{a^2 + a^2} = \sqrt{2a^2} = \sqrt{2}\,a$$

$$a = 5\,cm \Rightarrow e = \sqrt{2} \cdot 5$$ ✓

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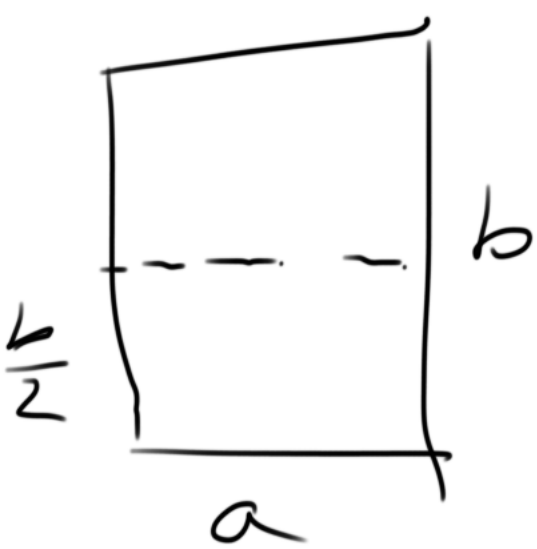
papírové formáty $\frac{A4}{B}$



A:

$$\frac{b}{a} = \frac{a}{b/2}$$

$$b^2 = 2a^2$$

$$b = \sqrt{2}\,a$$

A0: $S = 1\,m^2$

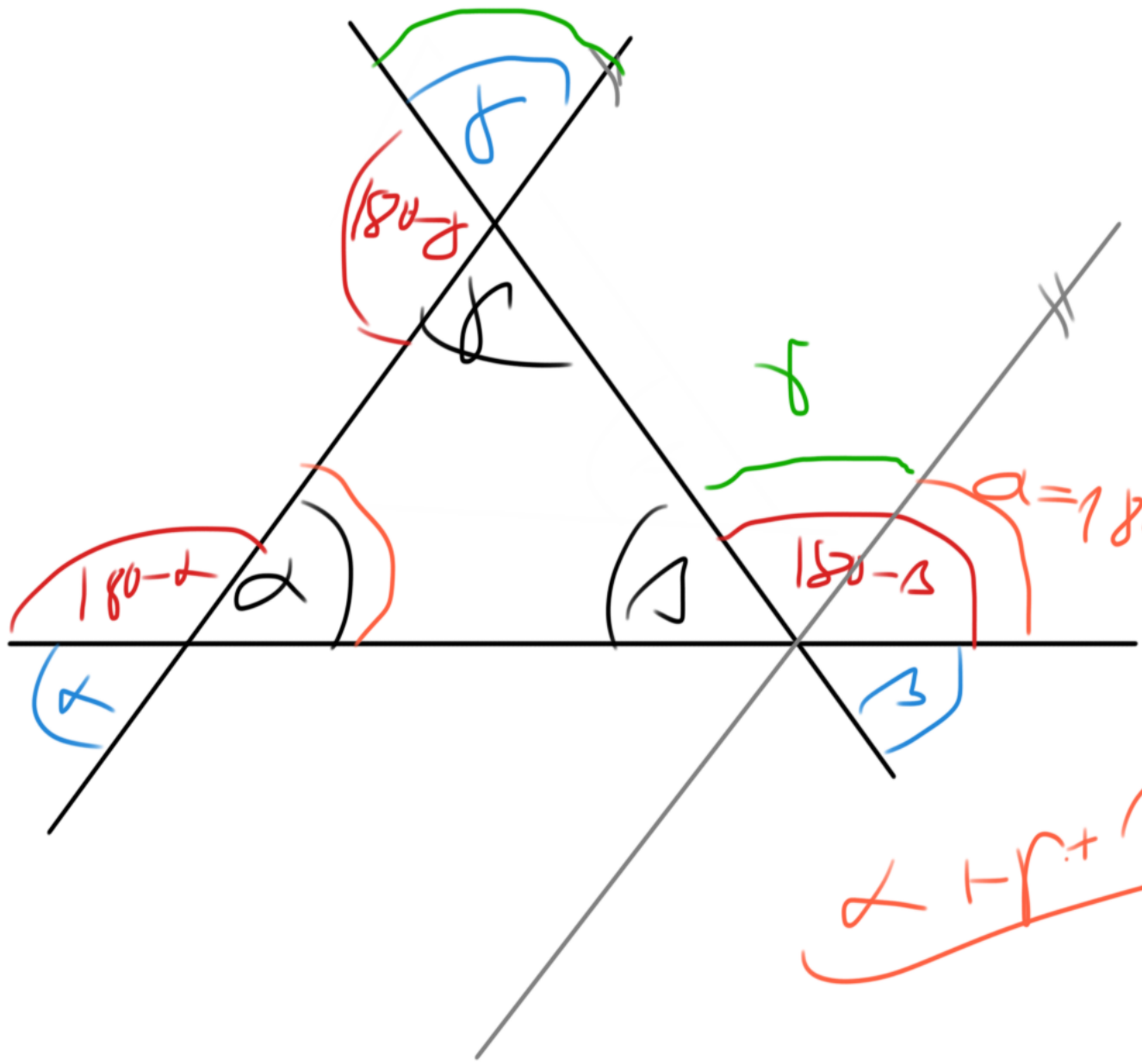
$a, \sqrt{2}a$

$$S = \sqrt{2} \cdot a^2$$

$$1 = \sqrt{2}\,a^2$$

$$a = \frac{1}{\sqrt{2}}$$

Součet vnitřních úhlů v Δ



vrcholové

vedlejší

souhlasné

$\alpha + \gamma + \beta = 180$