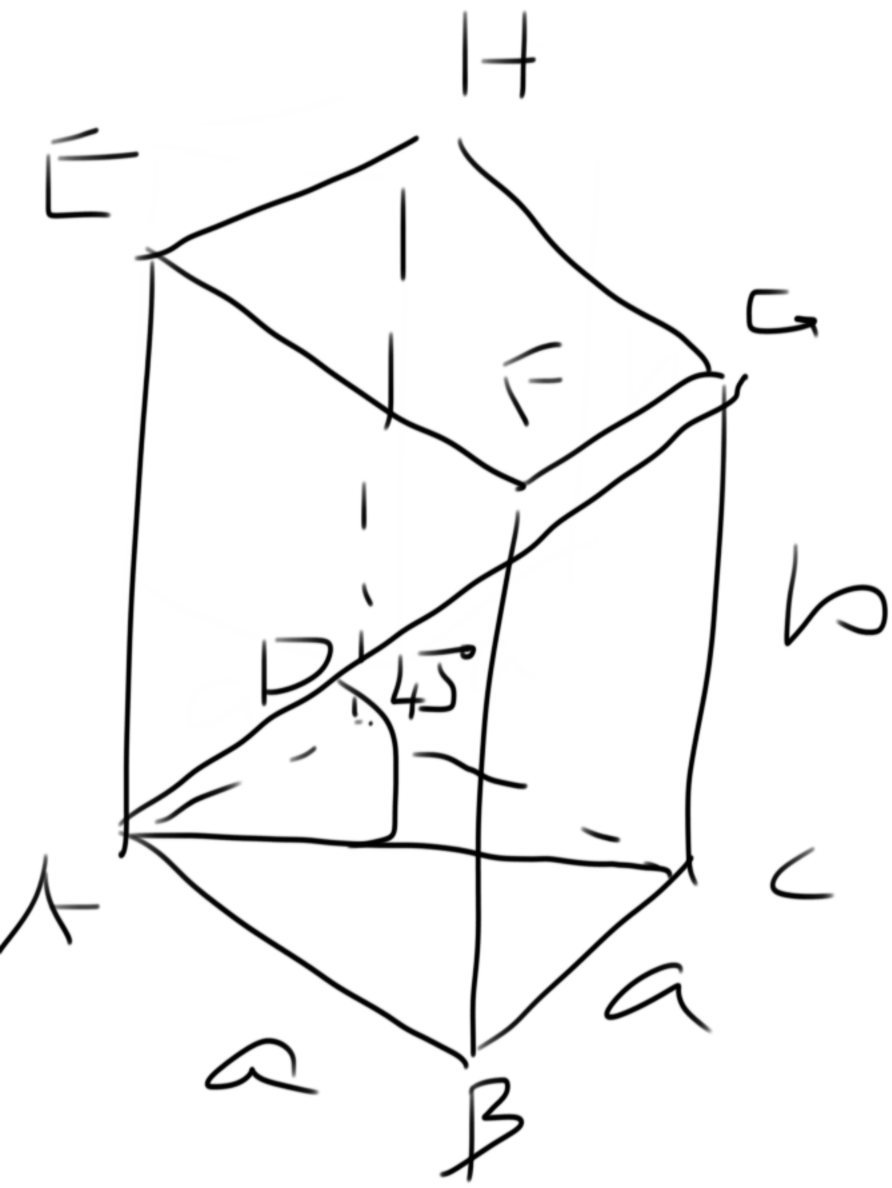

$V = 64\ cm^3$

$S = ?$

z minula

$a = 2^{\frac{11}{6}}\ cm$

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

$$b = 2^{\frac{1}{2}}\, 2^{\frac{11}{6}} = 2^{\frac{11}{6}+\frac{3}{6}} = 2^{\frac{14}{6}}\ cm$$

$$S = 2 \cdot a^2 + 4 \cdot a \cdot b$$

$$S = 2^{\frac{6}{6}} \cdot 2^{\frac{22}{6}} + \overset{12}{4} \cdot 2^{\frac{11}{6}} \cdot 2^{\frac{14}{6}}$$

$$= 2^{\frac{28}{6}} + 2^{\frac{11+14+12}{6}} = 2^{\frac{28}{6}} + 2^{\frac{37}{6}}$$

$$= 2^{\frac{28}{6}} \cdot \left(1 + 2^{\frac{3}{2}}\right) = 2^4\, 2^{\frac{2}{3}} \cdot \left(1 + \sqrt{2} \cdot 2\right)$$

$$\underline{= 16 \sqrt[3]{4} \left(1 + \sqrt{2} \cdot 2\right) cm^2}$$

2) Vypočítejte objem 6-bokého jehlanu, jehož podstavná hrana měří 3 cm a délka boční hrany měří 6 cm

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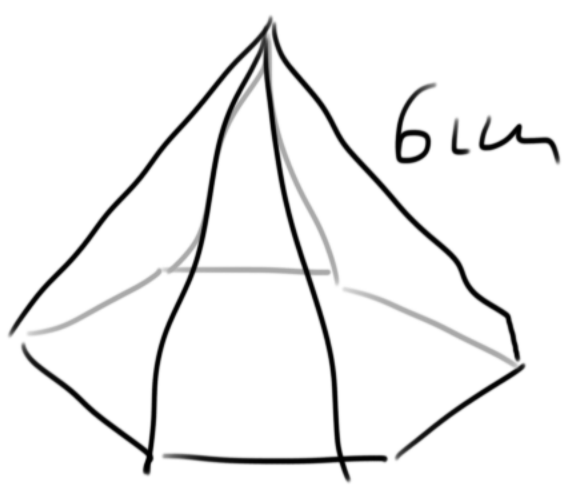
$V = \frac{1}{3} \cdot S_p \cdot v$



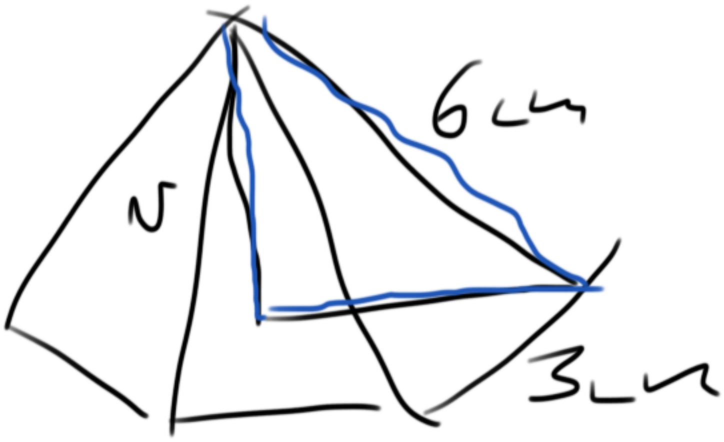
$S_n = \frac{n}{4} a^2 \cot g\left(\frac{\pi}{n}\right)$

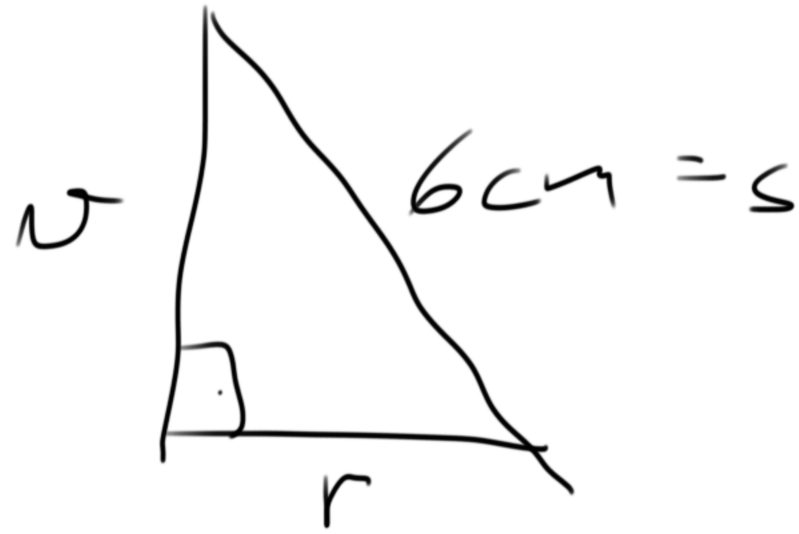
$S_p = S_6$

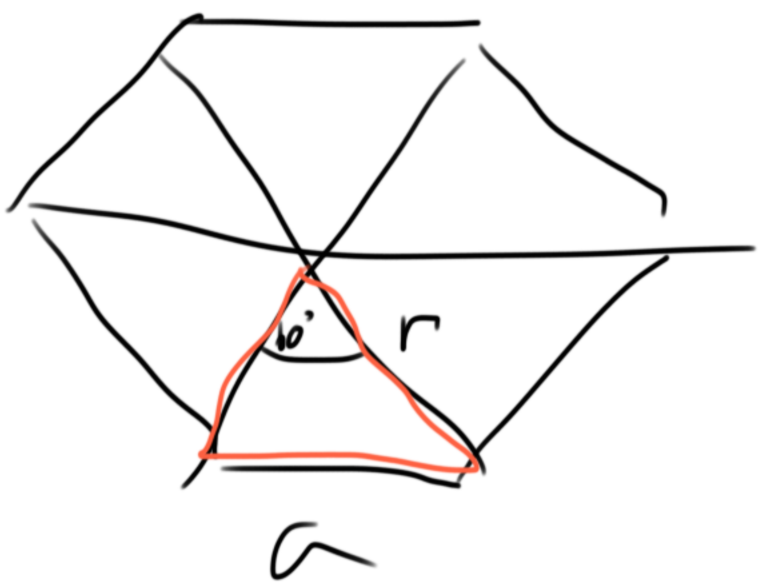
$\cot g\left(\frac{\pi}{6}\right) = \frac{\cos\frac{\pi}{6}}{\sin\frac{\pi}{6}} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$

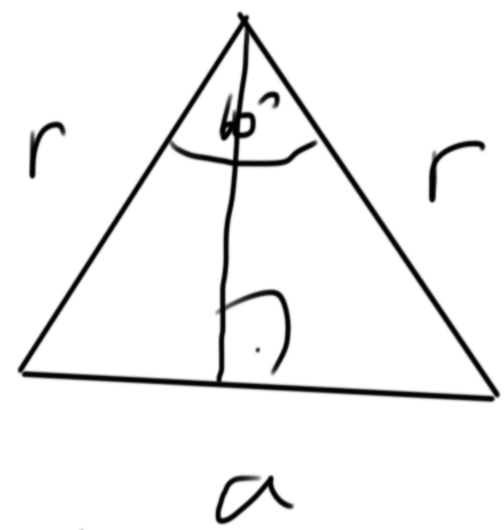
$S_p = S_6 = \frac{6}{4} \cdot a^2 \cdot \sqrt{3} = \frac{3}{2}\sqrt{3}\, a^2$

$a = 3\,cm$: $S_p = \frac{27}{2}\sqrt{3}$



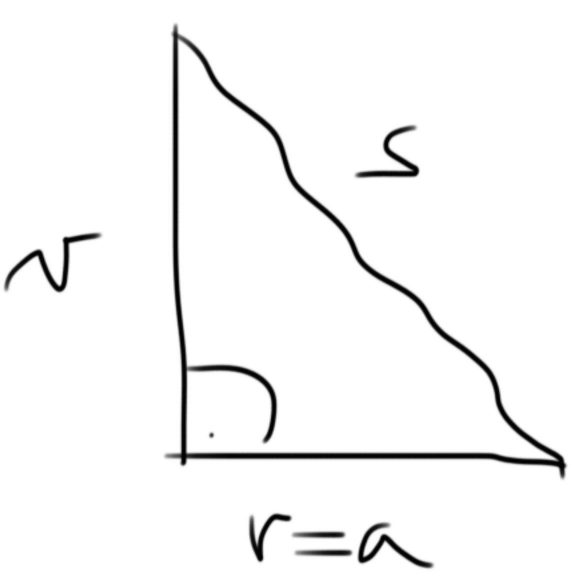






$$\sin 30 = \frac{a/2}{r} \Rightarrow r = \frac{\frac{a}{2}}{\sin 30^\circ}$$

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



$$s^2 = a^2 + v^2$$

$s = 6\,cm$

$a = 3\,cm$

$$v = \sqrt{s^2 - a^2}$$

$$v = \sqrt{36 - 9} = \sqrt{27} = 3 \cdot \sqrt{3}\ cm$$

$r = 3\cdot\sqrt{3}$ $\qquad S_p = \frac{27}{2}\sqrt{3}$

$$V = \frac{1}{3}\cdot S_p\cdot v = \frac{1}{\cancel{3}}\cdot\frac{27}{2}\sqrt{3}\cdot\cancel{3}\cdot\sqrt{3}$$

$$= \frac{81}{2} = 40{,}5\ cm^3$$

$v = 3\sqrt{3}$

$S_\triangle = \frac{1}{2}\cdot a\cdot v_a$

$S_\triangle = \frac{1}{2}\cdot 3\cdot 3\cdot\sqrt{3}$

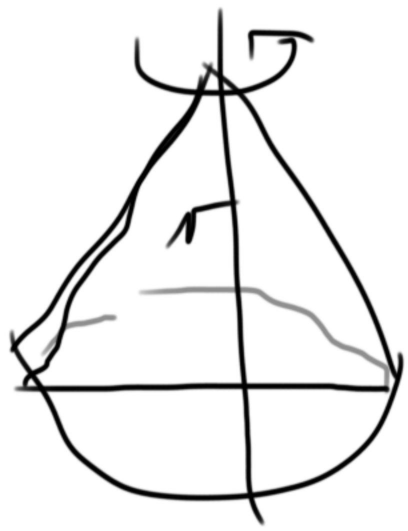
$= \frac{9}{2}\cdot\sqrt{3}$

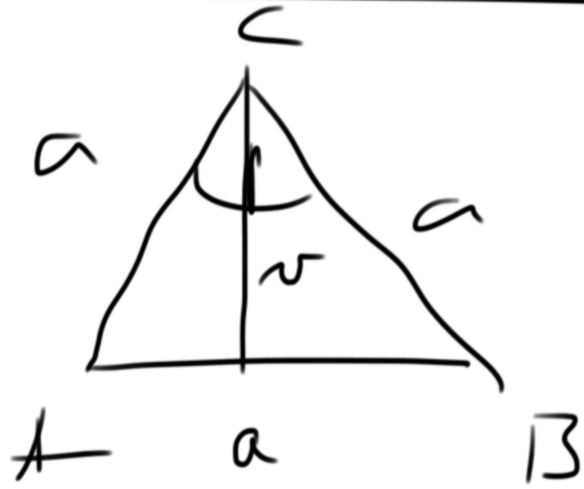
$$S_p = 6\cdot S_\triangle = 6\cdot\frac{9}{2}\cdot\sqrt{3} = 27\sqrt{3}$$

Kdo najde chybu, má bod.

---

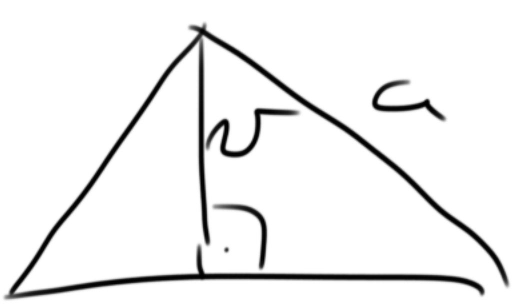
7) $V = ?$ $S = ?$
rovnostranného kužele,
který vznikl rotací rovnostranného △
ABC o straně $a = 4\,cm$ kolem
úhlu γ





$a = 4\,cm$

$V = \frac{1}{3} \cdot S_p \cdot v$ $\quad S = S_p + S_{pl}$



$a^2 = v^2 + \frac{a^2}{4}$

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

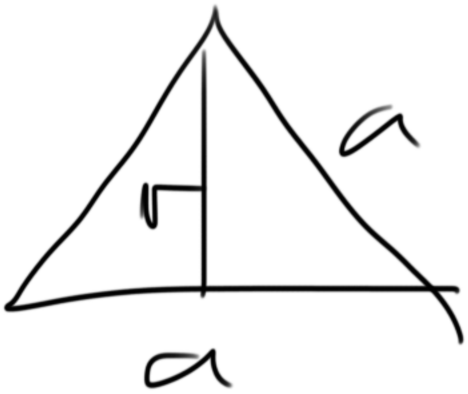
$= \sqrt{\frac{3}{4} a^2}$

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

$S_p = \pi \left(\frac{a}{2}\right)^2 = \pi \frac{a^2}{4}$

$V = \frac{1}{3} \pi \frac{a^2}{4} \cdot \frac{\sqrt{3}}{2} a = \frac{\pi \sqrt{3}}{3 \cdot 8} a^3 = \frac{\pi}{3} \frac{\sqrt{3}}{8} 64 = \underline{\frac{8\sqrt{3}}{3} \pi\, cm^3}$

$a = 4\,cm$ $\quad 4^3 = 64$



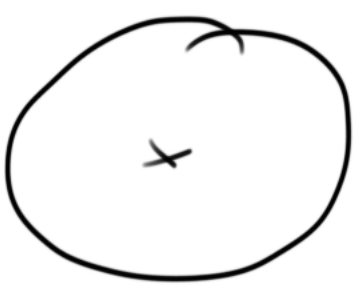
$a = 4\,cm$

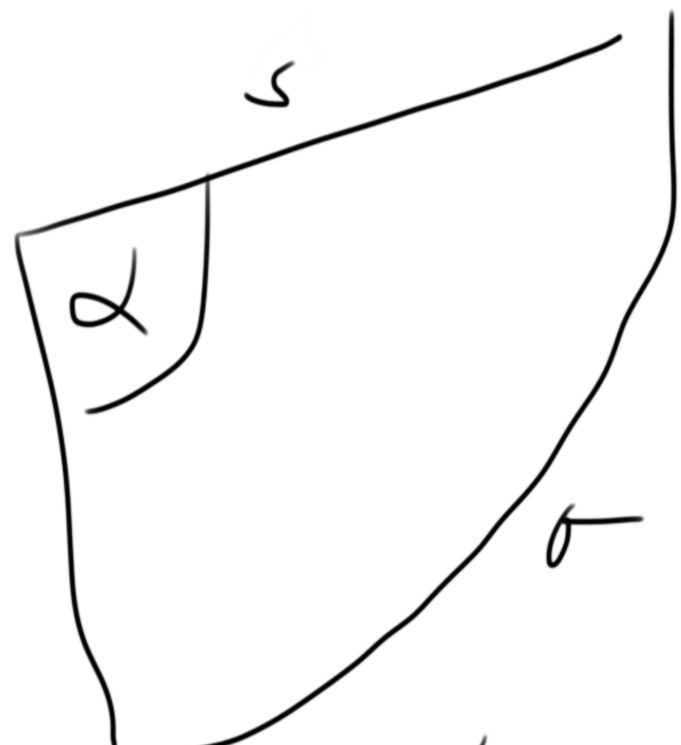
$r = \frac{\sqrt{3}}{2} a = 2\sqrt{3}\ cm$

$S_p = \pi \left(\frac{a}{2}\right)^2 = \pi 4\ cm^2$

$S = S_p + S_{pl}$

$s = a$





$\boxed{S_{pl} = \frac{1}{2} \cdot s \cdot \sigma}$

σ ... musí být obvod podstavy

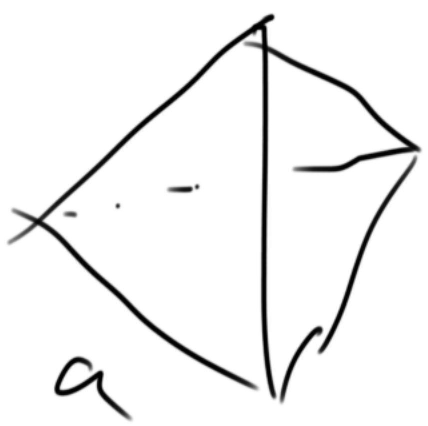
s ... délka boční hrany

$s = a = 4\,cm$ $\qquad \sigma = 2\pi \frac{a}{2} = 4\pi\ cm$

$S_{pl} = \frac{1}{2} \cdot a \cdot 2\pi \frac{a}{2} = \frac{1}{2} \cdot 4 \cdot 4\pi = 8\pi$

$S = S_p + S_{pl} = 4\pi + 8\pi = \underline{12\pi\ cm^2}$

1) Odvoďte vzorec pro výpočet objemu čtyřstěnu.



stěny jsou rovnostranné $\triangle$ a

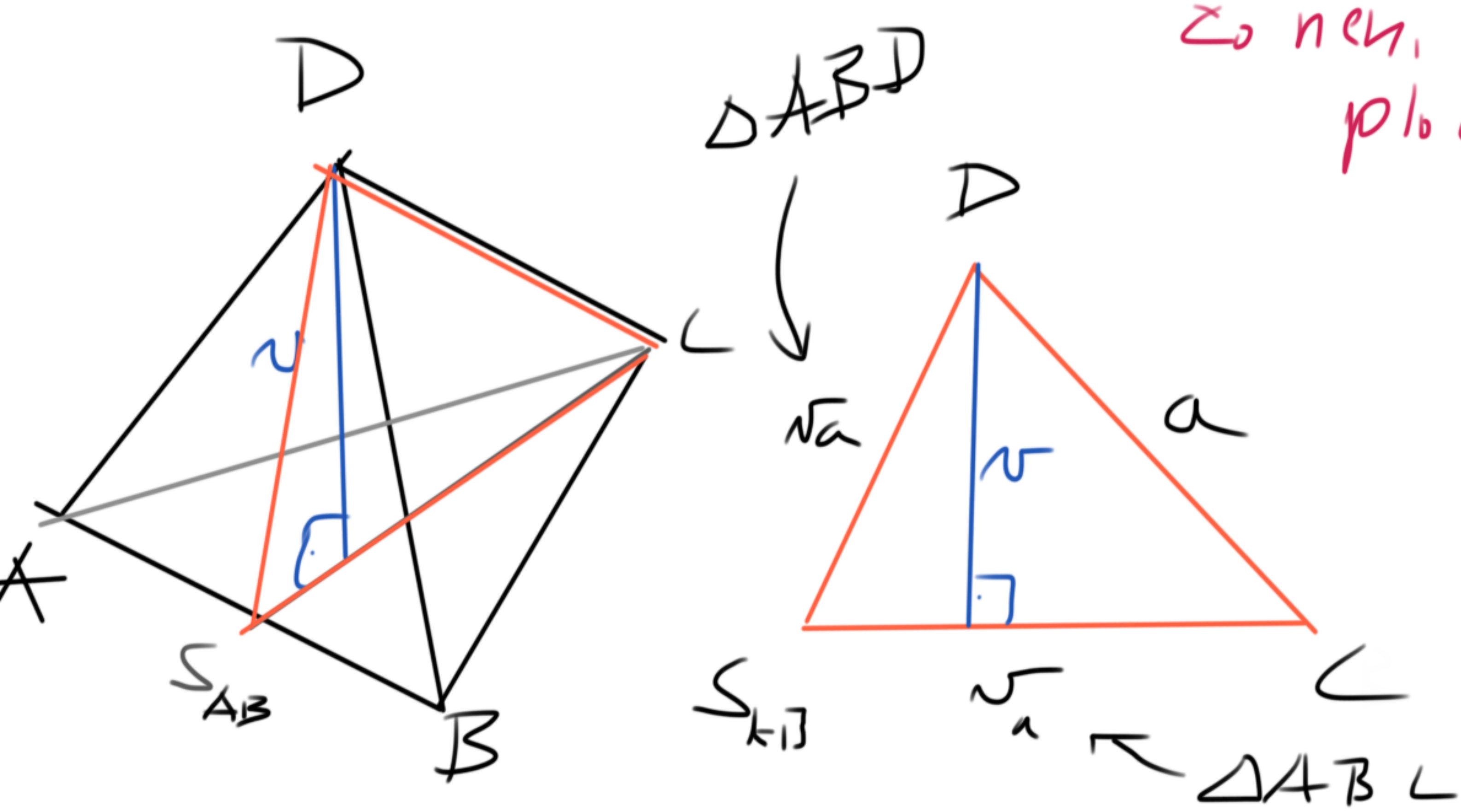
čtyřstěn: 3-boký jehlan

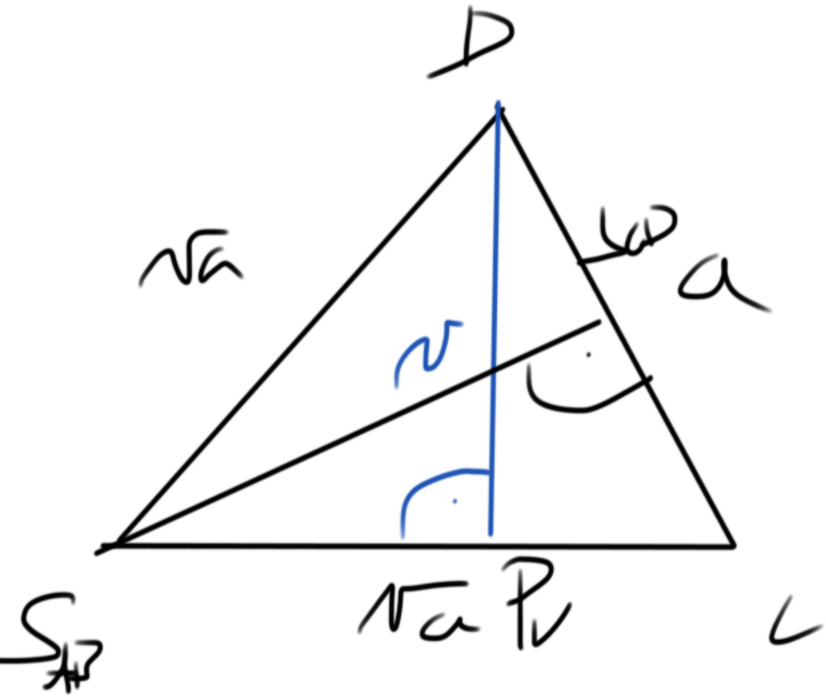
$$V = \frac{1}{3} \cdot S_p \cdot v$$

$$v_a = \frac{\sqrt{3}}{2} a$$

$$S_p = \frac{1}{2} \frac{\sqrt{3}}{2} a \cdot a = \frac{\sqrt{3}}{4} a^2$$

to není plocha $\frac{\sqrt{3}}{4} a$ ✗



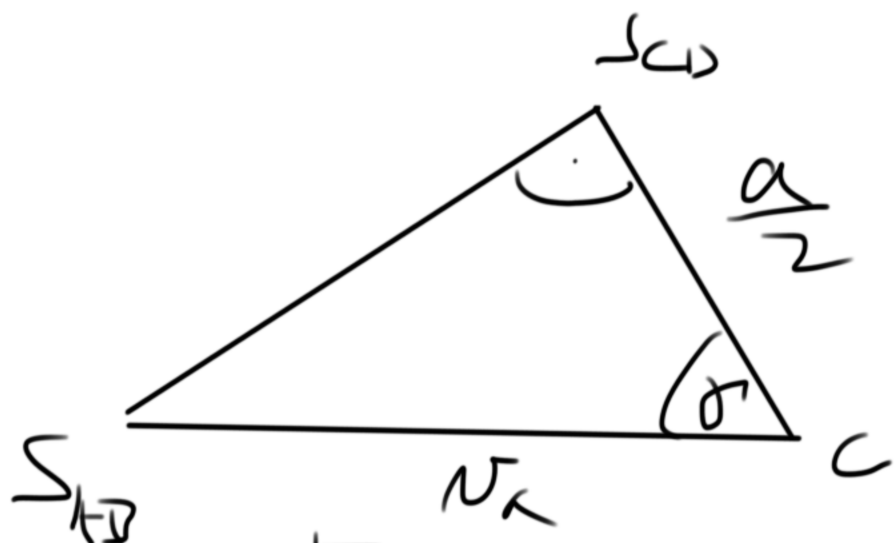


$$v_a = \frac{\sqrt{3}}{2} a$$

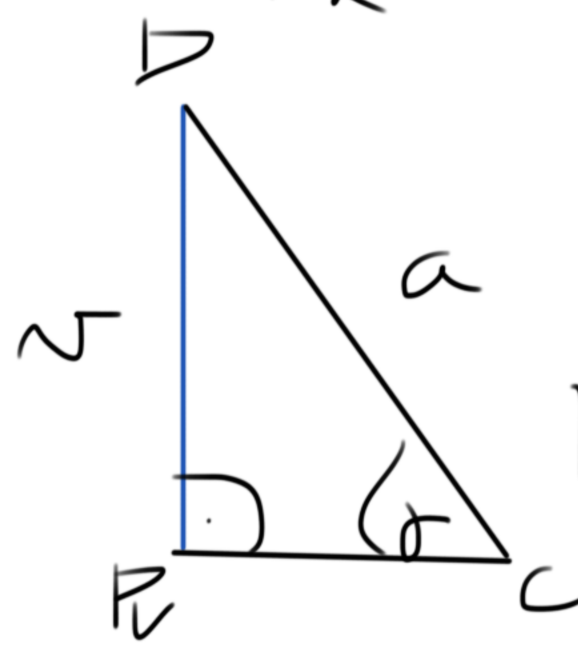
a

rovnoramenný

v_a



chceme $\sin \gamma$



$$\sin \gamma = \frac{v}{a}$$

$$\underline{v = a \cdot \sin \gamma}$$

$$\cos \gamma = \frac{\frac{a}{2}}{v_a}$$

$$\cos \gamma = \frac{a}{2 v_a} \qquad v_a = \frac{\sqrt{3}}{2} a$$

$$\cos \gamma = \frac{\cancel{a}}{\sqrt{3} \cancel{a}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

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

$$\underline{\sin \gamma} = \sqrt{1 - \cos^2 \gamma}$$

$$= \sqrt{1 - \frac{3}{9}} = \sqrt{\frac{6}{9}} = \underline{\frac{\sqrt{6}}{3}}$$

$$\sin \gamma = \frac{\sqrt{6}}{3}$$

$$\Rightarrow \boxed{v = a \cdot \frac{\sqrt{6}}{3}}$$

$$S_p = \frac{\sqrt{3}}{4} a^2 \qquad v = \frac{\sqrt{6}}{3} \cdot a$$

$$V = \frac{1}{3} \cdot S_p \cdot v = \frac{1}{3} \frac{\sqrt{3}}{4} a^2 \cdot \frac{\sqrt{6}}{3} \cdot a$$

$$= \frac{3 \cdot \sqrt{2}}{3 \cdot 12} a^3 = \frac{\sqrt{2}}{12} a^3$$

$$\boxed{V = \frac{\sqrt{2}}{12} a^3}$$

---

4) V, S prav. 6-bokého hranolu

délka podstavné hrany: 4cm

výška: 6cm

$$V = S_p \cdot v \qquad S = S_p + S_{pl}$$

$$S_\triangle = \frac{1}{2} \cdot v_a \cdot a = \frac{\sqrt{3}}{4} \cdot a^2$$

$$v_a = \frac{\sqrt{3}}{2} a$$

$$S_p = 6 \cdot S_\triangle = \frac{3\sqrt{3}}{2} a^2$$

$\Rightarrow r = a$

$$S_p = \frac{3}{4} \cdot \sqrt{3}\, a^2 \qquad a = 4\,cm$$

$$v = 6\,cm$$

$$V = S_p \cdot v = \frac{3}{4}\sqrt{3} \cdot 4^2 \cdot 6 =$$

$$= 3 \cdot 4 \cdot 2 \cdot 3\sqrt{3} = 72 \cdot \sqrt{3}\,cm^3$$

$$S = S_p + S_{pl}$$

plášť – 6 obdélníků

$$S_{pl} = 6 \cdot a \cdot v$$

$$= 6 \cdot 4 \cdot 6 = 144\,cm^2$$

$$S = \frac{3}{4}\sqrt{3}\,16 + 144 = 3 \cdot 4\sqrt{3} + 144$$

$$= \underline{12\left(\sqrt{3} + 12\right) cm^2}$$