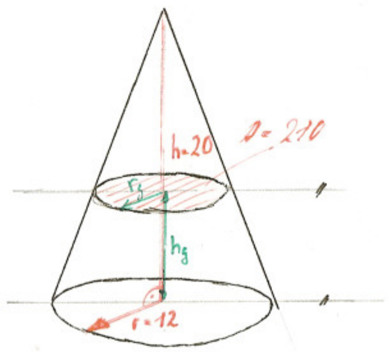
Weitere Aufgaben:

①



$G = r^2 \cdot \pi = 452{,}389\ cm^2$

$\Omega = 210\ cm^2$

$\Big\} \Rightarrow$ Streckungsfaktor² $k^2 = \frac{\Omega}{G}$

$\Rightarrow \underline{k = 0{,}681}$

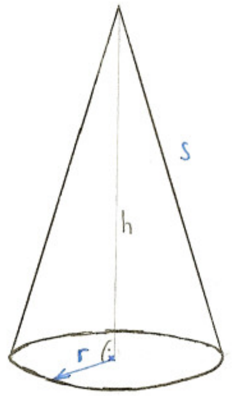
$\overset{SS}{\Rightarrow} (h - h_g) : h = k$

$\Leftrightarrow \underline{h_g} = h - h \cdot k = \underline{6{,}374 cm}$

(oder: $h : r = (h - h_g) : r_g \Leftrightarrow h_g = \dots$)

$r_g = \sqrt{\frac{\Omega}{\pi}}$

②



$M = \pi r s$

$G = r^2 \pi$

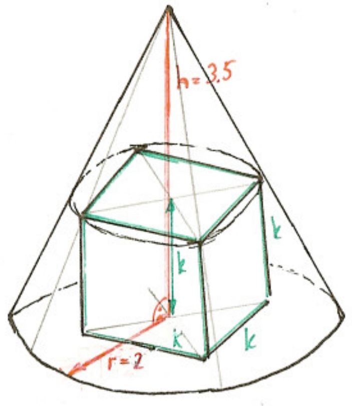
$\Big\} \; M = 2G \Rightarrow \underline{s \overset{(*)}{=} 2r}$

$V = \frac{Gh}{3} = 100 cm^3 \Leftrightarrow h = \frac{300 cm^3}{r^2 \cdot \pi}$

$s^2 = r^2 + h^2 \overset{(*)}{\Leftrightarrow} r^2 = (2r)^2 - h^2$

$\Big\} \Rightarrow \underline{h} = \frac{300\ cm^3}{\frac{h^2}{3} \cdot \pi} = \underline{6{,}592 cm}$

③



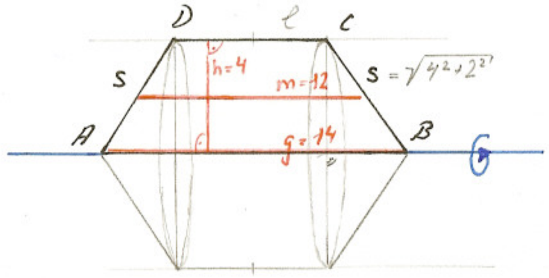
2.SS: $h : r = (h - k) : \frac{k \cdot \sqrt{2}}{2}$

$\Leftrightarrow \frac{hk\sqrt{2}}{2} = r(h - k) = rh - rk$

$\Leftrightarrow k\left(\frac{h\sqrt{2}}{2} + r\right) = r \cdot h$

$\Rightarrow \underline{k} = \dots = \underline{1{,}564}$

④



$\frac{g + \ell}{2} = m \Rightarrow \ell = 10$

$V = h^2 \cdot \pi \cdot 10 + 2 \cdot \frac{h^2 \cdot \pi \cdot 2}{3} = \underline{569{,}675}$

$O = 2\pi \cdot h \cdot 10 + 2 \cdot h \cdot s \cdot \pi = \underline{363{,}724}$

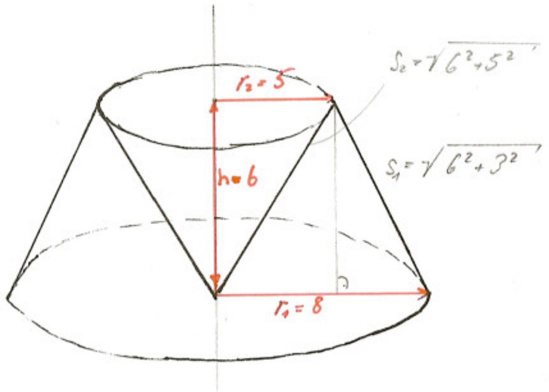
⑤ $V_{Zyl} = \underbrace{r^2\pi h = \frac{4\pi r^3}{3}}$ $= V_{Kugel}$ $\Rightarrow$ $\underline{O_{Kugel} = 4\pi r^2}$

$\Rightarrow h = \frac{4r}{3}$

$\Rightarrow \underline{O_{Zyl}} = 2 \cdot r^2\pi + 2r\pi \cdot \frac{4r}{3} = \underline{\frac{14}{3}\pi r^2}$

$\Rightarrow$ Zylinder hat die <u>größere Oberfläche.</u>

⑥



a) $\underline{O} = 553{,}570 - 78{,}540 + 122{,}683 = \underline{597{,}713}$

b) $\underline{V} = 810{,}531 - 157{,}080 = \underline{653{,}451}$

⑦ $O_{Würfel} = 6r^2 = 1 \Rightarrow r = 0{,}408$

$\Rightarrow \underline{V_{Würfel} = 0{,}068}$

$O_{Kugel} = 4\pi r^2 = 1 \Rightarrow r = 0{,}282$

$\Rightarrow \underline{V_{Kugel} = 0{,}094}$

$\Rightarrow$ <u>Kugel</u>

⑧ $V_{Kugel} = \frac{4\pi}{3} r^3$ —— $66{,}667\%$

$V_{Zyl.} = r^2\pi \cdot 2r = 2r^3\pi$ —— 100%

$\Rightarrow$ Verschenkt werden <u>33,333%</u>

(1/3 des Volumens!)

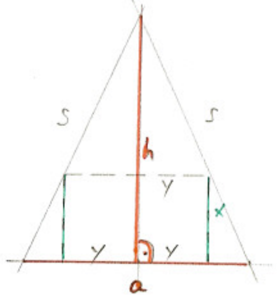
(11)

$$V_{Schachtel} = (b-2x)(a-2x)\cdot x$$
$$= 4x^3 - 2(a+b)x^2 + abx = V(x) \overset{!}{=} max$$

$$\Leftrightarrow \quad V'(x) = 0$$
$$\Leftrightarrow \quad 12x^2 - 4(a+b)x + ab = 0 \qquad \left(\frac{-b \pm \sqrt{b^2-4ac}}{2a}\right)$$
$$\Leftrightarrow \quad x_{1,2} = \frac{-(-4(a+b)) \pm \sqrt{(4(a+b))^2 - 4\cdot 12\cdot ab}}{2\cdot 12}$$
$$= \frac{4(a+b) \pm \sqrt{16a^2 - 16ab + 16b^2}}{24}$$

$$\overset{a=15}{\underset{b=24}{\Rightarrow}} \quad \cancel{x_1 = 10} \vee \underline{x_2 = 3}$$

(12)



a) $\cdot\ A_{▭} = x \cdot 2y = max$

$\cdot\ h : (\frac{a}{2}) = (h-x) : y \Leftrightarrow y = \frac{\frac{a}{2}\cdot(h-x)}{h} = \frac{a}{2h}\cdot(h-x)$

$$\Rightarrow A_{▭} = A(x) = x\cdot\frac{a}{2h}(h-x) = \frac{a}{2h}(hx-x^2) \overset{!}{=} max$$

$$\Leftrightarrow \quad A'(x) = 0$$
$$\Leftrightarrow \quad \frac{a}{2h}(h-2x) = 0 \quad \Leftrightarrow \quad \underline{\underline{x = \tfrac{1}{2}\cdot h}}$$

b) $\left.\begin{array}{l} \cdot\ U_{▭} = 2x + 4y \\ \cdot\ y = \frac{a}{2h}(h-x) \end{array}\right\} \Rightarrow U_{▭} = U(x) = 2x + 4\,\frac{a}{2h}(h-x)$

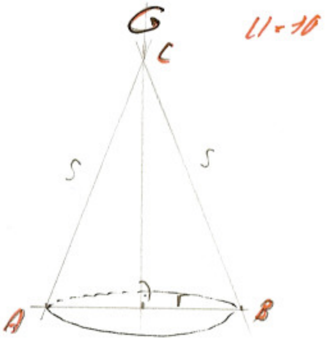
$$= 2x + 2a - \frac{2ax}{h} = max$$

$$\Leftrightarrow \quad U'(x) = 0$$
$$\Leftrightarrow \quad 2 - \frac{2a}{h} = 0 \quad \Leftrightarrow \quad \underline{a = h} \quad \Rightarrow$$

$\cdot$ für $a \neq h$ $\nexists$ Maximum

$\cdot$ für $a = h$: Umfang = konst, $\forall x \in]0, h[$.

(13)



$\cdot\ V = r^2\pi\cdot h \overset{!}{=} max$

$\left.\begin{array}{l} \left.\begin{array}{l} \cdot\ 2s + 2r = 10 \Leftrightarrow s = 5-r \\ \cdot\ h = \sqrt{s^2-r^2} \end{array}\right\} \Rightarrow h = \sqrt{25-10r} \end{array}\right\} \Rightarrow V = V(r) = r^2\pi\cdot\sqrt{25-10r}$

$$\Rightarrow \quad V'(r) = 0 \quad \Leftrightarrow \quad \underline{r_1 = 2 \vee \cancel{r_2 = 0}}$$

$$\Rightarrow \quad \underline{\text{Grundlinie}} = 2r = \underline{\underline{4}}$$