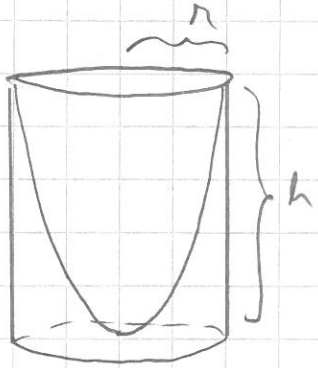
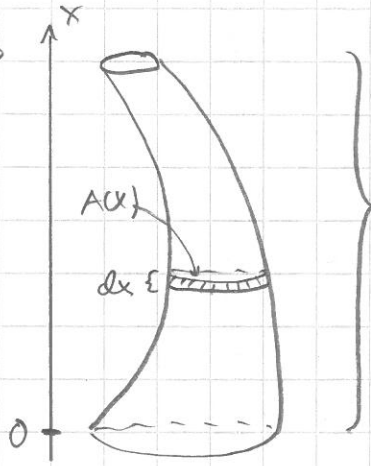
$= \frac{\pi r^2}{h} \cdot \frac{1}{2} h^2 = \frac{1}{2} \pi r^2 h = \frac{1}{2} V_{lieriö}$



$V_{lieriö} = \pi r^2 h$

16. Yleisiä tilavuustarkasteluja

16.3



Viipaleen:
- paksuus: dx
- poikkileikkauksen pinta-ala: $A(x)$
- tilavuus: $A(x)\,dx$

$$\Rightarrow V = \int_0^h A(x)\,dx = \int_0^{1,7} 2\pi (1-0{,}4x)^2\,dx$$

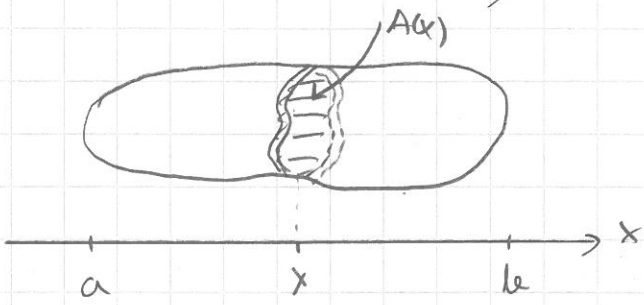
$$= 2\pi \int_0^{1,7} (1-0{,}4x)^2\,dx = 2\pi \cdot \frac{1}{-0{,}4} \int_0^{1,7} \underbrace{-0{,}4}_{\varphi'(x)} \underbrace{(1-0{,}4x)^2}_{\varphi(x)}\,dx$$

$$= 2\pi \cdot \frac{1}{-0{,}4} \Big/_0^{1,7} \frac{1}{3}(1-0{,}4x)^3 = 2\pi \cdot \frac{1}{-0{,}4} \left[\frac{1}{3}(1-0{,}4\cdot 1{,}7)^3 - \frac{1}{3}(1-0)^3 \right]$$

$\approx 5{,}06441\ (m^3)$

$\rho = \frac{m}{V} \mid \cdot V \Leftrightarrow m = \rho V = 680 \frac{kg}{m^3} \cdot 5{,}06441\,m^3 \approx 3443{,}8\,kg \approx \underline{3400\,kg}$

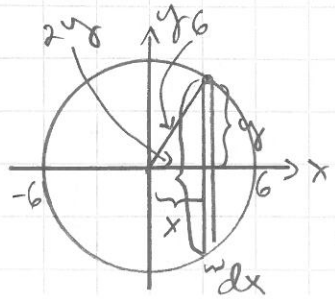
Yleisesti



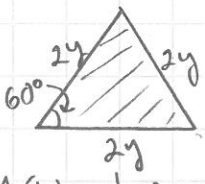
Viipaleen:
- paksuus: dx
- pohja-ala: $A(x)$
- tilavuus: $A(x)\,dx$

$$\Rightarrow \boxed{V = \int_a^b A(x)\,dx}$$

16.6



pohja:



Pythagoras: $x^2 + y^2 = 6^2$

$\Leftrightarrow y^2 = 36 - x^2$

$A(x) = \frac{1}{2} \cdot 2y \cdot 2y \cdot \sin 60° = 2y^2 \cdot \frac{\sqrt{3}}{2} = y^2 \cdot \sqrt{3} = \sqrt{3}(36 - x^2)$