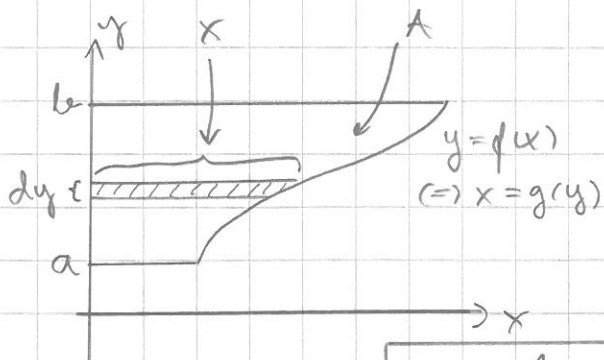


## 12. Käytän $y$ -akselin itälinen alue ja sovelluksia



Olet.  $x \geq 0$

Pylytöön:

- pinta:  $dy$
- korkeus:  $x = g(y)$
- pinta-ala:  $x dy = g(y) dy$

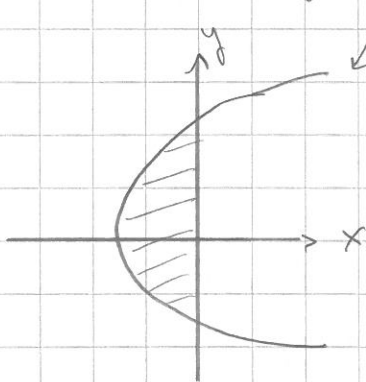
$$\Rightarrow A = \int_a^b x dy = \int_a^b g(y) dy$$

huom. jos  $x \leq 0$  eli käytän  $y$ -akselin vasemmalla puolella:

$$A = - \int_a^b x dy = - \int_a^b g(y) dy$$

12.12

$$x = y^2 - 6y - 16$$



akselille ( $a=1 > 0$ ) antava parabeli

$$x = y^2 - 6y - 16 = 0 \Rightarrow y = \begin{cases} -2 \\ 8 \end{cases}$$

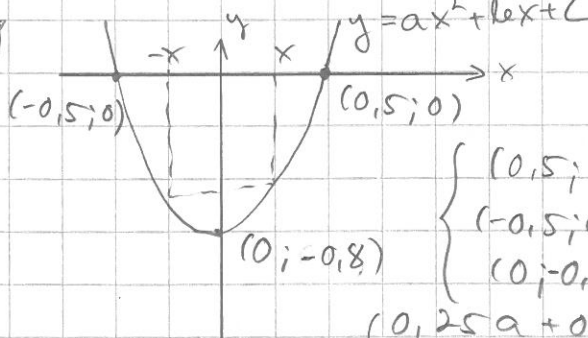
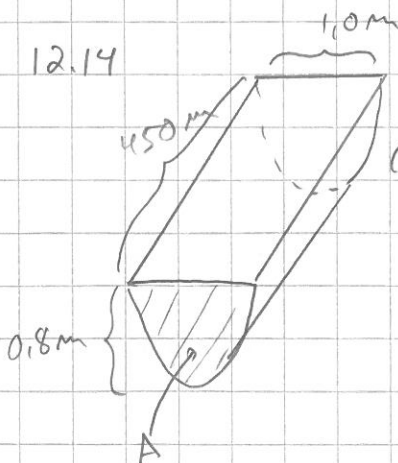
$$A = - \int_{-2}^8 x dy = - \int_{-2}^8 (y^2 - 6y - 16) dy$$

$$= - \left[ \frac{1}{3} y^3 - 6 \cdot \frac{1}{2} y^2 - 16y \right]_{-2}^8$$

$$= - \left[ \left( \frac{1}{3} \cdot 8^3 - 3 \cdot 8^2 - 16 \cdot 8 \right) - \left( \frac{1}{3} \cdot (-2)^3 - 3 \cdot (-2)^2 - 16 \cdot (-2) \right) \right]$$

$$= \frac{500}{3}$$

12.14



3 tuntematonta ( $a, b, c$ )  
→ tarvitaan 3 yhtälöä

$$\begin{cases} (0.5; 0): a \cdot 0.5^2 + b \cdot 0.5 + c = 0 \\ (-0.5; 0): a \cdot (-0.5)^2 + b \cdot (-0.5) + c = 0 \\ (0; -0.8): a \cdot 0^2 + b \cdot 0 + c = -0.8 \end{cases}$$

$$\Rightarrow \begin{cases} 0.25a + 0.5b + c = 0 \\ 0.25a - 0.5b + c = 0 \\ c = -0.8 \end{cases}$$

$$\Rightarrow \begin{cases} a = 3.2 \\ b = 0 \\ c = -0.8 \end{cases}$$

$$\Rightarrow y = 3.2x^2 - 0.8 \quad \text{symmetria } y(x) = y(-x)$$

$$A = - \int_{-0.5}^{0.5} (3.2x^2 - 0.8) dx = -2 \int_0^{0.5} (3.2x^2 - 0.8) dx = -2 \left[ 3.2 \cdot \frac{1}{3} x^3 - 0.8x \right]_0^{0.5}$$