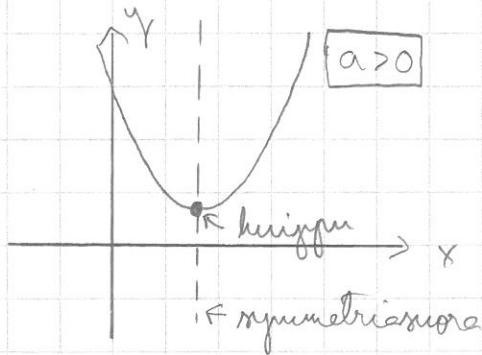
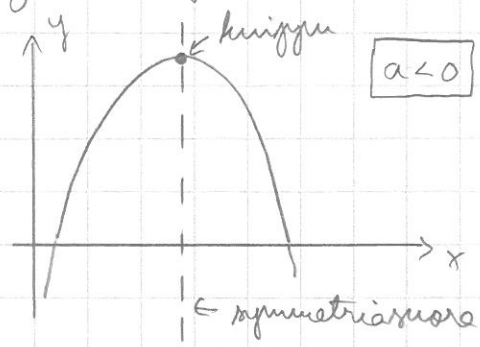


## 10. 2. asteen polynomifunktio

$ax^2 + bx + c$ ,  $a \neq 0$  suoraajana on paraabeli



paraabeli aukeaa ylöspäin



paraabeli aukeaa alaspäin

## 11. 2. asteen yhtälön ratkaisukaava

$$ax^2 + bx + c = 0 \quad (a \neq 0)$$

$$\Leftrightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Esim.  $x^2 = -2x + 3 \quad \Leftrightarrow x^2 + 2x - 3 = 0$

$$\begin{cases} a = 1 \\ b = 2 \\ c = -3 \end{cases}$$

$$\begin{aligned} \Leftrightarrow x &= \frac{-2 \pm \sqrt{2^2 - 4 \cdot 1 \cdot (-3)}}{2 \cdot 1} = \frac{-2 \pm \sqrt{4 + 12}}{2} = \frac{-2 \pm \sqrt{16}}{2} \\ &= \frac{-2 \pm 4}{2} = \begin{cases} \frac{-2+4}{2} = \frac{2}{2} = 1 \\ \frac{-2-4}{2} = \frac{-6}{2} = -3 \end{cases} \end{aligned}$$

Tark.  $x = 1: 1^2 = -2 \cdot 1 + 3 \quad \Leftrightarrow 1 = 1 \%$

$x = -3: (-3)^2 = -2 \cdot (-3) + 3 \quad \Leftrightarrow 9 = 9 \%$

Vast.  $x = -3$  tai  $x = 1$

Esim.  $\frac{1}{2}(x-4)^2 = 3 \quad | \cdot 2$

$$\Leftrightarrow (x-4)^2 = 6$$

$$\Leftrightarrow x^2 - 2 \cdot x \cdot 4 + 4^2 = 6$$

$$\Leftrightarrow x^2 - 8x + 16 = 6 \quad \Leftrightarrow x^2 - 8x + 10 = 0$$

$$\Leftrightarrow x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4 \cdot 1 \cdot 10}}{2 \cdot 1} = \frac{8 \pm \sqrt{64 - 40}}{2}$$

$$\begin{cases} a = 1 \\ b = -8 \\ c = 10 \end{cases}$$