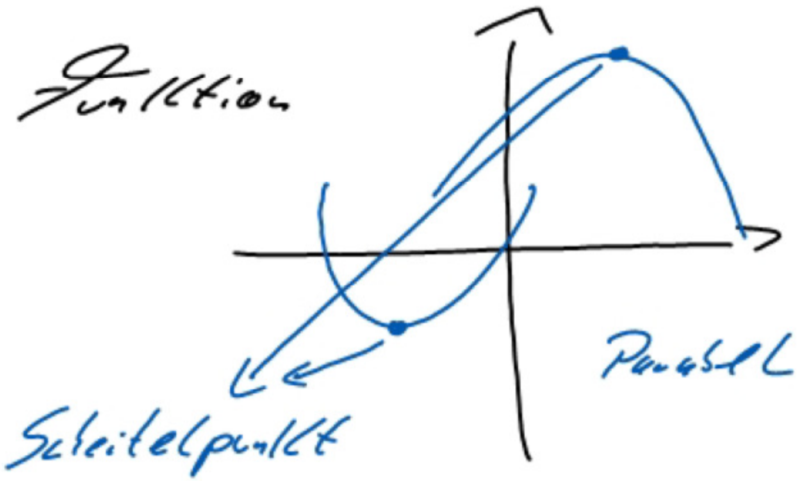
Quadratische Funktion



$f(x) = ax^2 + bx + c$

Scheitelpunktform: $f(x) = (x+a)^2 + b \quad S(-a|b)$

$f(x) = (x-3)^2 + 5 \rightarrow S(3|5)$

$f(x) = x^2 - 6x + 8$

$(x-3)^2 - (-3)^2 + 8 = (x-3)^2 - 1 \quad S(3|-1)$

$x^2 - 6x \underbrace{+9 - 9}_{0} + 8$

$f(x) = x^2 - 3x - 10$ → Scheitelpunkt

$\sqrt{}$ $\quad | \cdot \frac{1}{2}$ → Nullstellen $(y=0)$

→ Achsenschnittpunkt $(x=0)$

$$f(x) = \left(x - \tfrac{3}{2}\right)^2 - \left(-\tfrac{3}{2}\right)^2 - 10 = \left(x - \tfrac{3}{2}\right)^2 - \tfrac{49}{4}$$

$$\boxed{S\left(\tfrac{3}{2} \,\middle|\, -\tfrac{49}{4}\right)}$$

$f(0) = -10$

$S_y(0 \mid -10)$

$$f(x) = 0 = \left(x - \tfrac{3}{2}\right)^2 - \tfrac{49}{4} \qquad \Big| + \tfrac{49}{4}$$

$$\left(x - \tfrac{3}{2}\right)^2 = \tfrac{49}{4} \qquad \Big| \sqrt{}$$

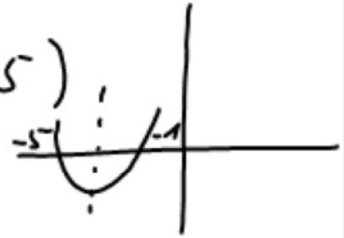
$$x - \tfrac{3}{2} = \pm\sqrt{\tfrac{49}{4}} = \pm \tfrac{7}{2} \qquad \Big| + \tfrac{3}{2}$$

$$x_1 = \tfrac{10}{2} = 5 \quad \vee \quad x_2 = -\tfrac{4}{2} = -2$$

$\mathbb{D} = \mathbb{R}$

$\mathbb{W} = \mathbb{R}^{\geq -\frac{49}{4}}$

$f(x) = x^2 + \boxed{6}x \boxed{+5} = 0 \longrightarrow S_y(0/5)$



Satz von Vieta: $x^2 + p \cdot x + q = (x+a) \cdot (x+b)$

$a + b = p \wedge a \cdot b = q$

1.

a	b
1	5
(-1)	(-5)

2. Σ

$\rightarrow 6$ ✓

$\rightarrow -6$

$f(x) = (x+1)(x+5)$

$x_1 = -1 \vee x_2 = -5$

$S_{x_1}(-1/0)$

$S_{x_2}(-5/0)$

Scheitelpunkt $S(-3/f(-3))$

$S(-3/-4)$

$\mathbb{D} = \mathbb{R}$; $\mathbb{W} = \mathbb{R}^{\geq -4}$

$$f(x) = x^2 + a \cdot x + b = 0$$

$$\left(x + \frac{a}{2}\right)^2 - \left(\frac{a}{2}\right)^2 + b = 0 \qquad \Big/ + \left(\frac{a}{2}\right)^2 - b$$

$$\left(x + \frac{a}{2}\right)^2 = \left(\frac{a}{2}\right)^2 - b \qquad \Big/ \sqrt{}$$

$$x + \frac{a}{2} = \pm\sqrt{\left(\frac{a}{2}\right)^2 - b} \qquad \Big/ - \frac{a}{2}$$

$$x_{1/2} = -\frac{a}{2} \pm \sqrt{\left(\frac{a}{2}\right)^2 - b}$$

$a = p$
$b = q$

$$x_{1/2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$