

Quadratische Funktionen / Aufgabe 3

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

A(-2|-4) : $4a + 2b + c = -4$ $\rightarrow 4a - 2b = -2$

B(0|-2) : $0a + 0b + c = -2 \Leftrightarrow \underline{c = -2}$

C(-6|4) : $36a - 6b + c = 4$ $\rightarrow 36a - 6b = 6$

A' : 2 : $2a - b = -1 \Leftrightarrow b = 2a + 1$ in C' (*)

C' : 6 : $6a - b = 1$ $6a - (2a + 1) = 1 \Leftrightarrow 4a = 2$

$\Rightarrow \underline{a = \frac{1}{2}}$ in $b = 2a + 1 = 2 \cdot \frac{1}{2} + 1 \Leftrightarrow \underline{b = 2}$

$f(x) = \frac{1}{2}x^2 + 2x - 2$

b) $f(x) = a(x+2)^2 - 4 = y$; P(1|0,5)

$a(1+2)^2 - 4 = 0,5 \Leftrightarrow 9a = 4,5 \Leftrightarrow \underline{a = \frac{1}{2}}$

$f(x) = \frac{1}{2}(x+2)^2 - 4 = \frac{1}{2}x^2 + 2x - 2$

c) $f(x) = a(x+6)(x-4)$; Q(1|-3,5)

$a(1+6)(1-4) = -3,5 \Leftrightarrow -21a = -3,5 \Leftrightarrow \underline{a = \frac{1}{6}}$

$f(x) = \frac{1}{6}(x+6)(x-4) = \frac{1}{6}x^2 + \frac{1}{3}x - 4$

d) A(2|0) : $4a + 2b + c = 0$ $\cdot (-1)$

B(-1|0,25) : $a - b + c = 0,25$ $\downarrow +$

C(3|6,25) : $9a + 3b + c = 6,25$ $\downarrow +$

A' : $4a - 2b + c = 0$

B' : $-3a + b = 0,25$ $\cdot (-5)$

C' : $5a + 5b = 6,25$ $\downarrow +$

$20a = 5 \Leftrightarrow \underline{a = \frac{1}{4}}$ in B'

B' : $b = 0,25 + 3 \cdot \frac{1}{4} \Leftrightarrow \underline{b = 1}$ in A

A : $c = 2b - 4a = 2 \cdot 1 - 4 \cdot \frac{1}{4} \Leftrightarrow \underline{c = 1}$

$f(x) = \frac{1}{4}x^2 + x + 1$

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e) $f(x) = a(x-5)^2 + 2$; $P(8|1)$

$$a(8-5)^2 + 2 = 1 \Leftrightarrow 9a = -1 \Leftrightarrow \underline{a = -\frac{1}{9}}$$

$$\underline{f(x) = -\frac{1}{9}(x-5)^2 + 2}$$

f) $f(x) = a(x-2)(x-4)$; $Q(1|-3)$

$$a(1-2)(1-4) = -3 \Leftrightarrow 3a = -3 \Leftrightarrow a = -1$$

$$\underline{f(x) = -(x-2)(x-4) = -x^2 + 6x - 8}$$

g) $A(-6|3)$: $\begin{array}{ccc|c} -36 & 6 & -1 & -3 \\ 36 & -6 & 1 & 3 \end{array} \cdot (-1)$
 $B(-2|-5)$: $\begin{array}{ccc|c} 4 & -2 & 1 & -5 \\ 4 & -2 & 1 & -5 \end{array} \begin{array}{l} + \\ + \end{array}$
 $C(4|13)$: $\begin{array}{ccc|c} 16 & 4 & 1 & 13 \\ 16 & 4 & 1 & 13 \end{array} \begin{array}{l} + \\ + \end{array}$

$$A' : \begin{array}{ccc|c} 36 & -6 & 1 & 3 \\ 8 & -1 & 0 & 2 \end{array}$$

$$B' : \begin{array}{ccc|c} -32 & 4 & 0 & -8 \\ -2 & 1 & 0 & 10 \end{array} \begin{array}{l} | : (-4) \\ | : (10) \end{array} : B''$$

$$C : \begin{array}{ccc|c} -20 & 10 & 0 & 10 \end{array} \begin{array}{l} | : (10) \\ | : (10) \end{array}$$

$$6a = 3 \Leftrightarrow \underline{a = \frac{1}{2}} \text{ in } B''$$

$$8 \cdot \frac{1}{2} - b = 2 \Leftrightarrow \underline{b = 2} \text{ in } A$$

$$36 \cdot \frac{1}{2} - 6 \cdot 2 + c = 3 \Leftrightarrow \underline{c = -3}$$

$$\underline{f(x) = \frac{1}{2}x^2 + 2x - 3}$$

h) $f(x) = a(x-5)^2 + 4$; $P(7|16)$

$$a(7-5)^2 + 4 = 16 \Leftrightarrow 4a = 12 \Leftrightarrow \underline{a = 3}$$

$$\underline{f(x) = 3(x-5)^2 + 4 = 3x^2 - 30x + 79}$$

i) $f(x) = a(x+6)(x-6)$; $Q(0|9)$

$$a \cdot 6 \cdot (-6) = 9 \Leftrightarrow \underline{a = -\frac{1}{4}}$$

$$\underline{f(x) = -\frac{1}{4}(x+6)(x-6) = \frac{1}{4}x^2 + 9}$$