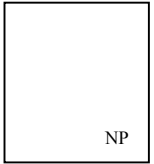


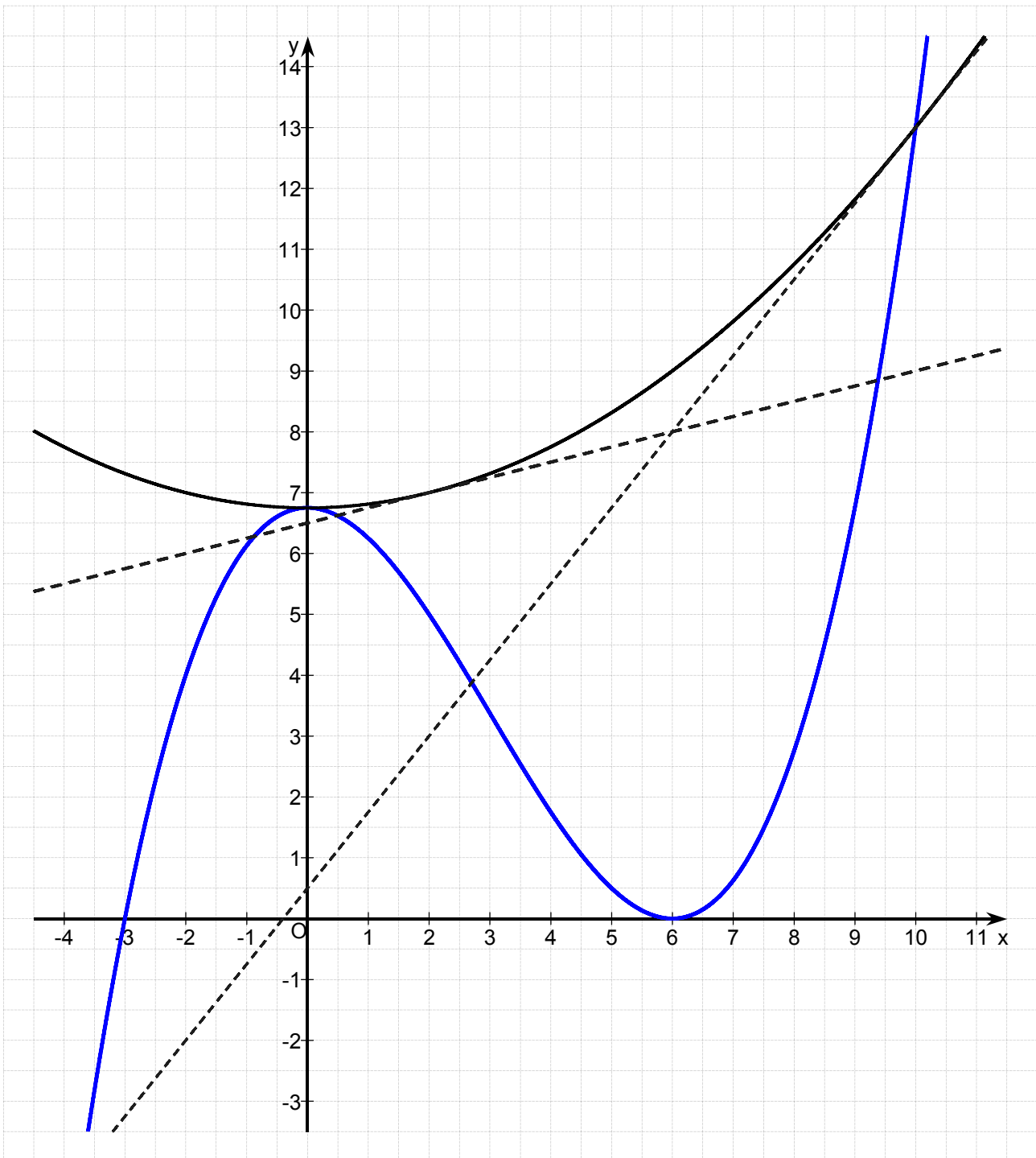
**Klasse BVKT1**  
**2. Schulaufgabe aus der Mathematik am 12.03.2010**



Name: .....

1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	3.1	3.2	Σ

**Zu 1.3, 2.2 und 3.2**



## 2. Schulaufgabe am 12.03.2010 BVKT1

② 1.1.  $f_a(6) = 0 \Rightarrow \frac{1}{16}(6^3 - 9 \cdot 6 + a) = 0 \Leftrightarrow a = 324 - 216 \Leftrightarrow \underline{a = 108}$

⑥ 1.2  $(x^3 - 9x^2 + 0x + 108) : (x - 6) = x^2 - 3x - 18 = (x - 6)(x + 3)$

$$\begin{array}{r}
 x^3 - 9x^2 + 0x + 108 \\
 - (x^3 - 6x^2) \\
 \hline
 -3x^2 + 0x + 108 \\
 - (-3x^2 + 18x) \\
 \hline
 -18x + 108 \\
 - (-18x + 108) \\
 \hline
 0
 \end{array}$$

$\underline{f(x) = \frac{1}{16}(x-6)^2(x+3)}$

$\underline{x_1 = 6}$        $\underline{x_2 = -3}$

$\underline{\text{do.}}$        $\underline{1-f}$

④ 1.3  $G_f$

1.4  $\frac{1}{16}(x^3 - 9x^2 + 108) = mx + t$  ;  $(x+2)^2 = x^2 + 4x + 4$

$\Leftrightarrow x^3 - 9x^2 - 16mx - 16t + 108 = 0 \checkmark$

⑦  $(x^3 - 9x^2 - 16mx - 16t + 108) : (x^2 + 4x + 4) = x - 13$

$$\begin{array}{r}
 x^3 - 9x^2 - 16mx - 16t + 108 \\
 - (x^3 + 4x^2 + 4x) \\
 \hline
 -13x^2 - 4x - 16mx - 16t + 108 \\
 - (-13x^2 - 52x - 52) \\
 \hline
 48x - 16mx - 16t + 160
 \end{array}$$

$\downarrow$

$x_3 = 13$

$$\left. \begin{array}{l}
 48 - 16m = 0 \Leftrightarrow m = \frac{48}{16} = 3 \\
 160 - 16t = 0 \Leftrightarrow t = \frac{160}{16} = 10
 \end{array} \right\} \underline{t(x) = 3x + 10}$$

Berührpkt B(2|4) ; Schnittpkt S(13|t(13)) = S(13|49)

1.5 a bewirkt Verschiebung n. oben/unten

④ Vergrößerung von  $a = 108$  : N(6|0) "verschwindet"

Verkleinerung von  $a = 108$  : 3 NST bis HOP(0|6.75)

"unterhalb" der x-Achse liegt. Das ist der Fall für  $a \leq 0$  (Für  $a = 0$ :  $f(0) = 0$ ) also :

Mindestens zwei NST für  $a \in [0; 108]$

2. Schulaufgabe am 12.03.2010 BVKT1

$$\begin{array}{cccc|cccc}
 36 & -6 & 1 & 9 & 36 & -6 & 1 & 9 \\
 4 & 2 & 1 & 7 & 32 & -8 & 0 & 2 \\
 100 & 10 & 1 & 13 & 64 & 16 & 0 & 4
 \end{array}$$

①  $\left. \begin{array}{l} \text{I} - \text{II} \\ \text{III} - \text{I} \end{array} \right\}$   $\left. \begin{array}{l} \cdot 2 \\ \text{II} + \text{III} \end{array} \right\}$

$$36 \quad -6 \quad 1 \quad 9 \Rightarrow 36 \cdot \frac{1}{16} + c = 9 \Leftrightarrow c = \frac{27}{4}$$

$$32 \quad -8 \quad 0 \quad 2 \Rightarrow 32 \cdot \frac{1}{16} - 8b = 2 \Leftrightarrow b = 0$$

$$128 \quad 0 \quad 0 \quad 8 \Rightarrow a = \frac{8}{128} = \frac{1}{16} \quad p(x) = \frac{1}{16}x^2 + \frac{27}{4}$$

Scheitel  $S(0 | \frac{27}{4}) + G_p$  2.2

$$\frac{1}{16}(x^3 - 9x^2 + 108) = \frac{1}{16}x^2 + \frac{27}{4} \quad | \cdot 16$$

$$\Leftrightarrow x^3 - 9x^2 - x + 108 - 108 = 0 \Leftrightarrow x^3 - 10x^2 = 0$$

$$\Leftrightarrow x^2(x - 10) = 0 \quad x_1 = 0 \text{ (do)}; \quad S_1(0 | 6.75)$$

$$x_2 = 10 \text{ (1-f)}; \quad S_2(10 | f(10)) = S_2(10 | 13)$$

$B = ]-\infty; 10[ \setminus \{0\}$

$$\frac{1}{16}x^2 + \frac{27}{4} = kx - 6k + 8 \quad 3.1$$

$$\Leftrightarrow \frac{1}{16}x^2 - kx + 6k + \frac{27}{4} - 8 = 0 \Leftrightarrow \frac{1}{16}x^2 - kx + 6k - \frac{5}{4} = 0$$

$$D = k^2 - 4 \cdot \frac{1}{16} (6k - \frac{5}{4}) = k^2 - \frac{3}{2}k + \frac{5}{16} = 0$$

$$k_{1/2} = \frac{1.5 \pm \sqrt{1.5^2 - 4 \cdot 1 \cdot \frac{5}{16}}}{2} = \frac{1.5 \pm 1}{2} \quad \begin{array}{l} k_1 = 5/4 \\ k_2 = 1/4 \end{array}$$

VZ v. D	+	0	-	0	+
Anz. SP.	2	1	0	1	2

$D < 0$  für  $k \in ]\frac{1}{4}; \frac{5}{4}[$  : k.SP.

$D = 0$  für  $k \in \{\frac{1}{4}; \frac{5}{4}\}$  : 1SP; Tang.

$D > 0$  für  $k \in \mathbb{R} \setminus ]\frac{1}{4}; \frac{5}{4}[$  : 2 SP.

$$k_1 = 1/4; \quad t_1(x) = \frac{1}{4}x - 6 \cdot \frac{1}{4} + 8 = \frac{1}{4}x + 6.5 \quad 3.2$$

$$k_2 = 5/4; \quad t_2(x) = \frac{5}{4}x - 6 \cdot \frac{5}{4} + 8 = \frac{5}{4}x + 0.5$$

$$\tan(\alpha_1) = m_1 \Rightarrow \alpha_1 = \tan^{-1}(1/4) \approx 14,04^\circ$$

$$\tan(\alpha_2) = m_2 \Rightarrow \alpha_2 = \tan^{-1}(5/4) \approx 51,34^\circ$$

$$\left. \begin{array}{l} \alpha = \alpha_2 - \alpha_1 \\ \alpha \approx 37,30^\circ \end{array} \right\}$$