

31. Schulübung

578 a) $M(-4|2)$

(1) $r=2$: $(x+4)^2 + (y-2)^2 = 4$

(2) $r=4$: $(x+4)^2 + (y-2)^2 = 16$

(3) $r = |\vec{OM}| = \left| \begin{pmatrix} -4 \\ 2 \end{pmatrix} \right| = \sqrt{16+4} = \sqrt{20}$
 $(x+4)^2 + (y-2)^2 = 20$

582 a) $r=13$, berührt x -Achse $\Rightarrow M$ liegt auf der Geraden $y=13$

$\Rightarrow M(x_m|13)$

Da $r=13$ und $P(10|1) \in k \Rightarrow \overline{MP} = 13$

$$|\vec{MP}| = \left| \begin{pmatrix} 10-x_m \\ -12 \end{pmatrix} \right| = \sqrt{(10-x_m)^2 + 12^2} =$$
$$= \sqrt{100 - 20x_m + x_m^2 + 144} = \sqrt{x_m^2 - 20x_m + 244}$$

$$\sqrt{x_m^2 - 20x_m + 244} = 13 \quad |^2$$

$$x_m^2 - 20x_m + 244 = 169$$

$$x_m^2 - 20x_m + 75 = 0$$

$$x_{m1} = 15$$

$$M_1(15|13)$$

$$x_{m2} = 5$$

$$M_2(5|13)$$

b) $P(3|5)$ $r=5$, berührt y -Achse $\Rightarrow M(5|m_y)$

$$|\vec{MP}| = \left| \begin{pmatrix} 4 \\ 5-m_y \end{pmatrix} \right| = \sqrt{16 + 25 - 10m_y + m_y^2}$$

$$m_y^2 - 10m_y + 41 = 25$$

$$m_y^2 - 10m_y + 16 = 0$$

$$m_{y1} = 2$$

$$M_1(5|2)$$

$$m_{y2} = 8$$

$$M_2(5|8)$$

$$585 \text{ a) } A(-9|-1) \quad B(6|-6) \quad C(3|5)$$

$$(1) \vec{AB} = \begin{pmatrix} 15 \\ -5 \end{pmatrix} \parallel \begin{pmatrix} 3 \\ -1 \end{pmatrix} \quad M_{AB} = \left(-\frac{3}{2} \mid -\frac{3}{2}\right)$$

$$\Delta_{AB}: 3x - y = -1$$

$$\vec{AC} = \begin{pmatrix} 12 \\ 6 \end{pmatrix} \parallel \begin{pmatrix} 2 \\ 1 \end{pmatrix} \quad M_{AC} = (-3 \mid 2)$$

$$\Delta_{AC}: 2x + y = -4$$

$$\Delta_{AB} \cap \Delta_{AC}: \left. \begin{array}{l} 3x - y = -1 \\ 2x + y = -4 \end{array} \right\} +$$

$$\hline 5x = -5$$

$$x = -1 \Rightarrow y = -2$$

$$\underline{M(-1|-2)}$$

$$r = |\vec{MA}| = \left| \begin{pmatrix} -8 \\ 1 \end{pmatrix} \right| = \sqrt{65}$$

$$\underline{(x+1)^2 + (y+2)^2 = 65}$$

$$(2) \text{ Allg. } (x - m_x)^2 + (y - m_y)^2 = r^2$$

$$A \rightarrow h: (-9 - m_x)^2 + (-1 - m_y)^2 = r^2$$

$$B \rightarrow h: (6 - m_x)^2 + (-6 - m_y)^2 = r^2$$

$$C \rightarrow h: (3 - m_x)^2 + (5 - m_y)^2 = r^2$$

$$A \quad 81 + 18m_x + m_x^2 + 1 + 2m_y + m_y^2 = r^2$$

$$B \quad 36 - 12m_x + m_x^2 + 36 + 12m_y + m_y^2 = r^2$$

$$C \quad 9 - 6m_x + m_x^2 + 25 - 10m_y + m_y^2 = r^2$$

$$A-B: 45 + 30m_x \quad -35 - 10m_y = 0$$

$$A-C: 72 + 24m_x \quad -24 + 12m_y = 0$$

$$30m_x - 10m_y + 10 = 0 \quad | : 10$$

$$24m_x + 12m_y + 48 = 0 \quad | : 12$$

$$\left. \begin{array}{l} 3m_x - m_y + 1 = 0 \\ 2m_x + m_y + 4 = 0 \end{array} \right\} +$$

$$\hline 5m_x + 5 = 0 \Rightarrow m_x = -1$$