Trigonometrie – Berechnungen im Deltoid
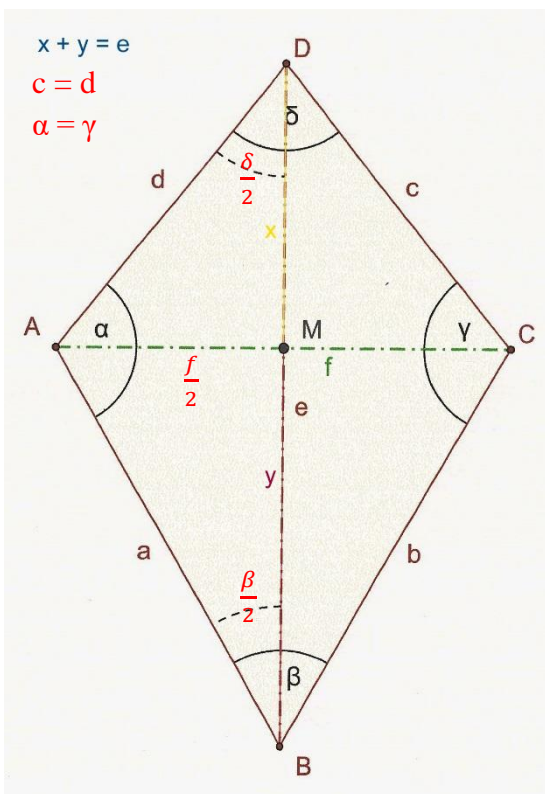
Lösungsblatt

Berechnen Sie in folgenden Beispielen die gesuchten Größen!

$x + y = e$
$c = d$
$\alpha = \gamma$

Deltoid ABCD:
$e = 253$ m, $f = 170$ m, $a = b = 177$ m, $\beta = 60°$;
Zu berechnen sind: $c = d$, δ, $\alpha = \gamma$, A und U!

▲ ABM:

$y^2 = a^2 - (\frac{f}{2})^2$

$y^2 = 177^2 - 85^2$

$y = \sqrt{24101}$

$\underline{y = 155{,}254 \text{ m}}$

$x = e - y$

$x = 253 - 155{,}254$

$\underline{x = 97{,}745 \text{ m}}$

▲ ADM:

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

$d^2 = 97{,}745^2 + 85^2$

$d = \sqrt{16779{,}08}$

$\underline{d = c = 129{,}534 \text{ m}}$

$\sin\frac{\delta}{2} = (\frac{f}{2}) : d$

$\sin\frac{\delta}{2} = \frac{85}{129{,}534}$ → $\sin\frac{\delta}{2} = 0{,}6561\ldots$

$\frac{\delta}{2} = 41{,}01°$ → $\underline{\delta \sim 82°}$

▲ ABD:

$\alpha = 180° - \frac{\beta}{2} - \frac{\delta}{2}$

$\alpha = 180° - 30° - 41°$

$\underline{\alpha = 109°}$

$U = a + b + c + d$

$U = 2 \cdot (177 + 129{,}534)$

$\underline{U = 613{,}086 \text{ m}}$

$A = \frac{1}{2} \cdot e \cdot f$ $A = \frac{1}{2} \cdot 253 \cdot 170$

$\underline{A = 21505 \text{ m}^2}$

▲ ADM:

$\sin\frac{\delta}{2} = (\frac{f}{2}) : d$ $\| x^2 = d^2 - (\frac{f}{2})^2$

$d = (\frac{f}{2}) : \sin\frac{\delta}{2}$ $\| x^2 = 132{,}23^2 - 85^2$

$d = \frac{85}{\sin 40°}$ $\| x = \sqrt{10259{,}77}$

$d = \frac{85}{0{,}6427\ldots}$ $\| \underline{x = 101{,}29\text{m}}$

$\underline{d = 132{,}23 \text{ m}}$

Deltoid ABCD: $f = 170$ m, $\beta = 50°$; $\delta = 80°$;
Zu berechnen sind: $a = b$, $c = d$, $\alpha = \gamma$, e, A und U!

▲ ABM:

$\sin\frac{\beta}{2} = (\frac{f}{2}) : a$ $\| y^2 = a^2 - (\frac{f}{2})^2$

$a = (\frac{f}{2}) : \sin\frac{\beta}{2}$ $\| y^2 = 201{,}12^2 - 85^2$

$a = \frac{85}{\sin 25°}$ $\| y = \sqrt{33224{,}25}$

$a = \frac{85}{0{,}4226\ldots}$ $\| \underline{y = 182{,}27\text{m}}$

$\underline{a = 201{,}12 \text{ m}}$

▲ ABD:

$e = x + y$

$e = 101{,}29 + 182{,}27$

$\underline{e = 283{,}56 \text{ m}}$

$\alpha = 180° - \frac{\beta}{2} - \frac{\delta}{2}$

$\alpha = 180° - 25° - 40°$

$\underline{\alpha = 115°}$

$A = \frac{1}{2} \cdot e \cdot f$ → $A = \frac{1}{2} \cdot 283{,}56 \cdot 170$ → $\underline{A = 24102{,}6 \text{ m}^2}$

$U = a + b + c + d$ → $U = 2 \cdot (201{,}12 + 132{,}23)$

$\underline{U = 666{,}70 \text{ m}}$