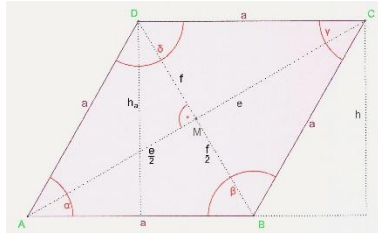


Trigonometrie – Berechnungen in Rauten

Lösungsblatt

Berechnen Sie in folgenden Beispielen die gesuchten Größen!



Raute ABCD: $a = 70 \text{ m}$, $e = 126,883 \text{ m}$;

Zu berechnen sind: f , $\alpha = \gamma$, $\beta = \delta$, h , U und A !

$$\left(\frac{f}{2}\right)^2 = a^2 - \left(\frac{e}{2}\right)^2$$

$$\left(\frac{f}{2}\right)^2 = 70^2 - 63,4415^2$$

$$\frac{f}{2} = \sqrt{875,2395}$$

$$\frac{f}{2} = 29,584$$

$$\underline{f = 59,168 \text{ m}}$$

$$\sin \frac{\alpha}{2} = \frac{f}{2} : a$$

$$\sin \frac{\alpha}{2} = \frac{29,584}{70}$$

$$\sin \frac{\alpha}{2} = 0,4226\dots$$

$$\frac{\alpha}{2} = 25^\circ$$

$$\underline{\alpha = 50^\circ = \gamma}$$

$$\beta = 180^\circ - \alpha$$

$$\beta = 180^\circ - 50^\circ;$$

$$\underline{\beta = 130^\circ = \delta}$$

$$\sin \alpha = \frac{h}{a}$$

$$h = a \cdot \sin \alpha$$

$$h = 70 \cdot \sin 50^\circ$$

$$h = 70 \cdot 0,7660\dots$$

$$\underline{h = 53,62 \text{ m}}$$

$$U = 4 \cdot a \rightarrow 4 \cdot 70$$

$$\underline{U = 280 \text{ m}}$$

$$A = a \cdot h \rightarrow 70 \cdot 53,62$$

$$\underline{A = 3753,67 \text{ m}^2}$$

Raute ABCD: $e = 140 \text{ dm}$, $h = 90 \text{ dm}$; zu berechnen sind: α , β , a , U , A und f !

$$\sin \frac{\alpha}{2} = \frac{h}{e}$$

$$\sin \frac{\alpha}{2} = \frac{90}{140}$$

$$\sin \frac{\alpha}{2} = 0,6428\dots$$

$$\sin \frac{\alpha}{2} = 40^\circ$$

$$\underline{\alpha = 80^\circ = \gamma}$$

$$\beta = 180^\circ - \alpha$$

$$\beta = 180^\circ - 80^\circ;$$

$$\underline{\beta = 100^\circ = \delta}$$

$$\frac{e}{\sin \beta} = a : \sin \frac{\alpha}{2}$$

$$a = \left(e \cdot \sin \frac{\alpha}{2}\right) : \sin \beta$$

$$a = \frac{140 \cdot \sin 40^\circ}{\sin 100^\circ}$$

$$a = \frac{140 \cdot 0,6428\dots}{0,9848\dots}$$

$$\underline{a = 91,37 \text{ dm}}$$

$$U = 4 \cdot a \rightarrow 4 \cdot 91,37$$

$$\underline{U = 365,48 \text{ dm}}$$

$$A = a \cdot h \rightarrow 91,37 \cdot 90$$

$$\underline{A = 8223,30 \text{ dm}^2}$$

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

$$f = \frac{2 \cdot A}{e} \quad f = \frac{2 \cdot 8223,30}{140}$$

$$\underline{f = 117 \text{ dm}}$$

Raute ABCD: $a = \gamma = 90 \text{ cm}$, $\alpha = 42^\circ$; zu berechnen sind: e , f , A , U , h und $\beta = \delta$!

$$\sin \frac{\alpha}{2} = \frac{f}{2} : a$$

$$\frac{f}{2} = a \cdot \sin \frac{\alpha}{2}$$

$$\frac{f}{2} = 90 \cdot \sin 21^\circ$$

$$\frac{f}{2} = 90 \cdot 0,3583\dots$$

$$\frac{f}{2} = 32,25 \text{ cm}; \quad \underline{f = 64,5 \text{ cm}}$$

$$\cos \frac{\alpha}{2} = \frac{e}{2} : a$$

$$\frac{e}{2} = a \cdot \cos \frac{\alpha}{2}$$

$$\frac{e}{2} = 90 \cdot \cos 21^\circ$$

$$\frac{e}{2} = 90 \cdot 0,9335\dots$$

$$\frac{e}{2} = 84,02 \text{ cm}; \quad \underline{e = 168 \text{ cm}}$$

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

$$A = \frac{1}{2} \cdot 168 \cdot 64,5$$

$$\underline{A = 5419,43 \text{ cm}^2}$$

$$U = 4 \cdot a \rightarrow 4 \cdot 90$$

$$\underline{U = 360 \text{ cm}}$$

$$A = a \cdot h$$

$$h = A : a$$

$$h = 5419,43 : 90$$

$$\underline{h = 60,2 \text{ cm}}$$

$$\beta = 180^\circ - \alpha$$

$$\underline{\beta = 138^\circ = \gamma}$$