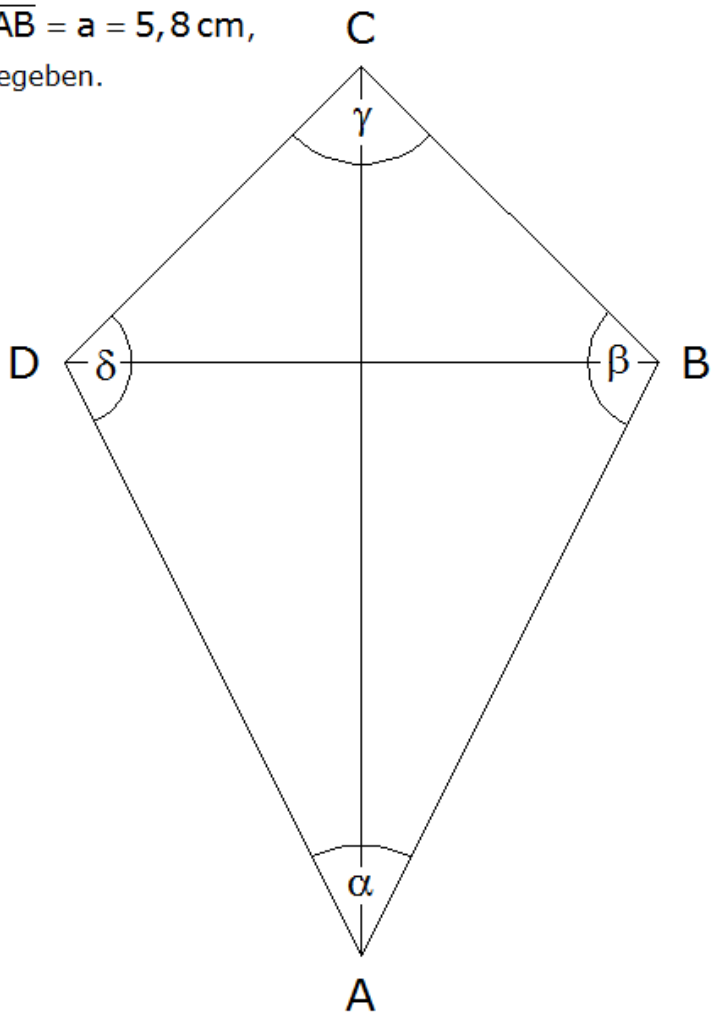
Aufgabe 1981 5d: **3 P**

Der nebenstehende Drachen ABCD ist durch $\overline{AB} = a = 5,8\,cm$, $\overline{AC} = e = 7,2\,cm$ und $\overline{DB} = f = 6,4\,cm$ gegeben.

Berechnen Sie die Winkel des Drachens.



Strategie 1981 5d:

Gegeben:

Drachen

$\overline{AB} = a = 5,8\,cm$

$\overline{AC} = e = 7,2\,cm$

$\overline{DB} = f = 6,4\,cm$

Gesucht:

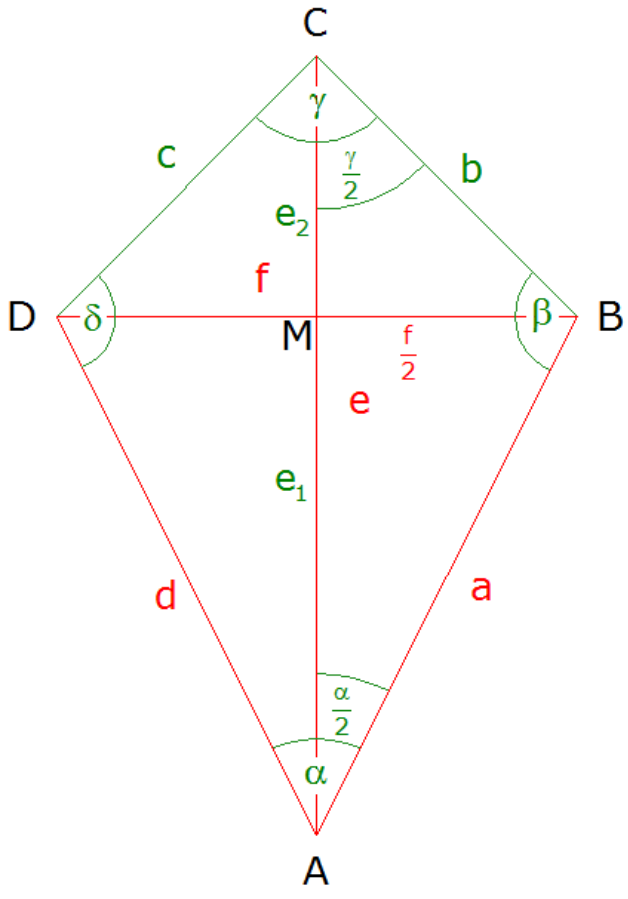
α

β

γ

δ

Skizze:



Lösung 1981 5d:

1. Berechnung des Winkels α:

$$\sin\frac{\alpha}{2} = \frac{\text{Gegenkathete}}{\text{Hypotenuse}} = \frac{\frac{f}{2}}{a}$$

Sinusfunktion im rechtwinkligen gelben Teildreieck ABM

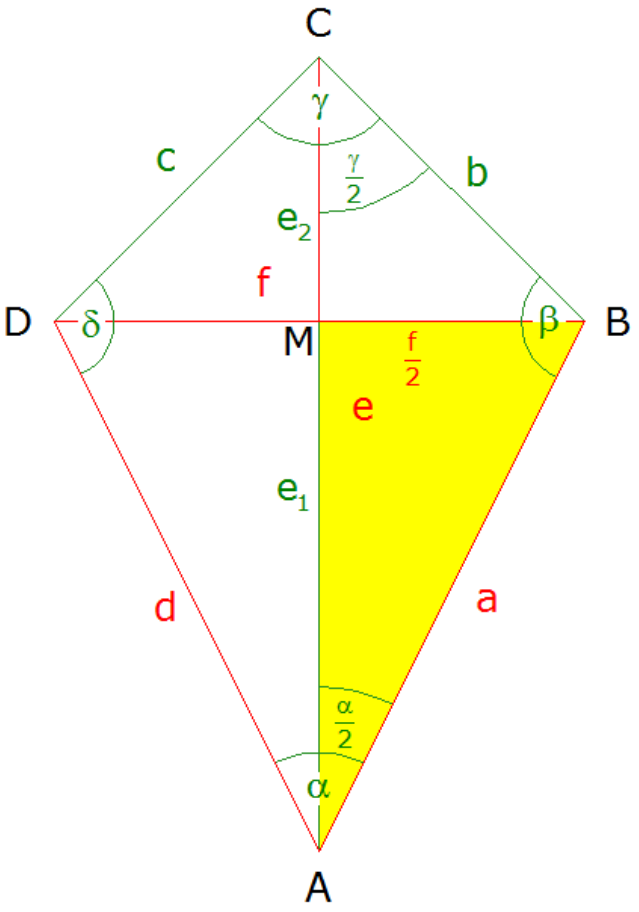
$$\sin\frac{\alpha}{2} = \frac{\frac{6,4}{2}}{5,8}$$

$$\sin\frac{\alpha}{2} = \frac{3,2}{5,8}$$

$$\sin\frac{\alpha}{2} = 0,5517$$

$$\frac{\alpha}{2} = 33,49° \qquad |\cdot 2$$

$$\underline{\underline{\alpha = 67°}}$$



2. Berechnung der Strecke $\overline{AM} = e_1$:

$$e_1^2 + \left(\frac{f}{2}\right)^2 = a^2$$

Pythagoras im rechtwinkligen gelben Teildreieck ABM

$$e_1^2 + \left(\frac{6,4}{2}\right)^2 = 5,8^2$$

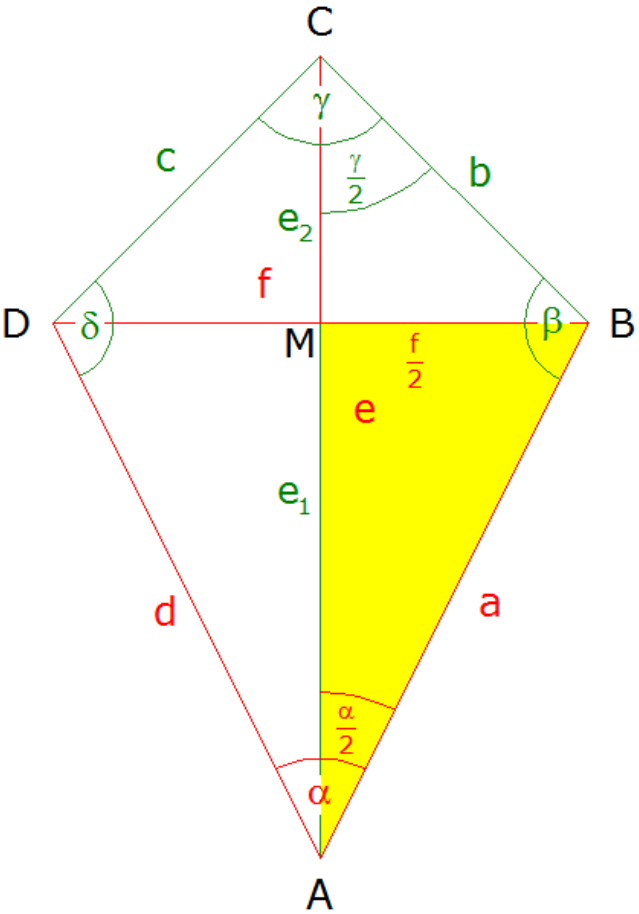
$$e_1^2 + 3,2^2 = 5,8^2$$

$$e_1^2 + 10,24 = 33,64 \qquad |-10,24$$

$$e_1^2 = 23,4 \qquad |\sqrt{\ }$$

$$\underline{e_1 = 4,84\,\text{cm}}$$

$$\underline{\overline{AM} = 4,84\,\text{cm}}$$



Lösung 1981 5d:

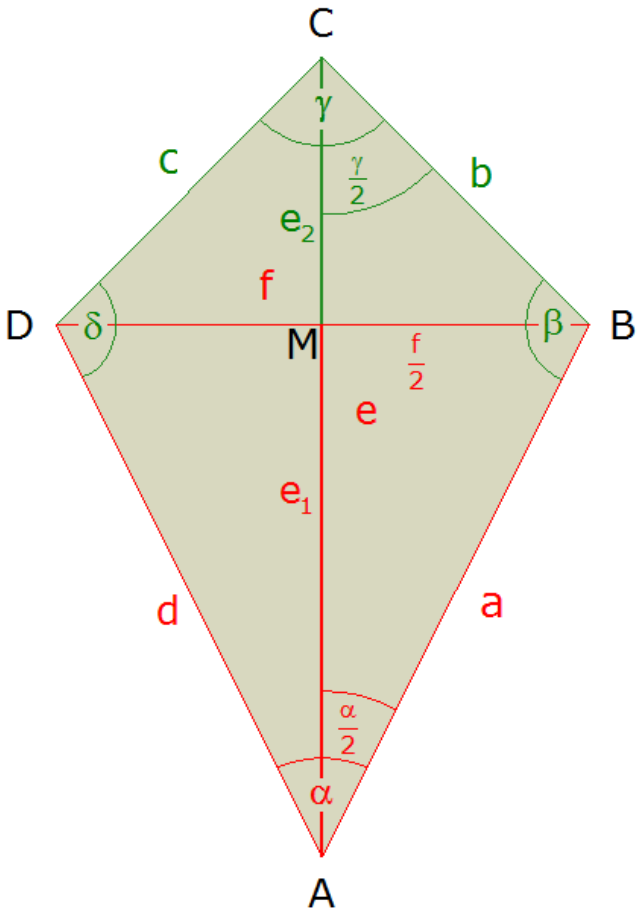
3. Berechnung der Strecke $\overline{CM} = e_2$:

$e_2 = e - e_1$

$e_2 = 7,2 - 4,84$

$e_2 = 2,36\,cm$

$\overline{CM} = 2,36\,cm$



4. Berechnung des Winkels γ:

$\tan\frac{\gamma}{2} = \frac{\text{Gegenkathete}}{\text{Ankathete}} = \frac{\frac{f}{2}}{e_2}$ Tangensfunktion im rechtwinkligen hellblauen Teildreieck MBC

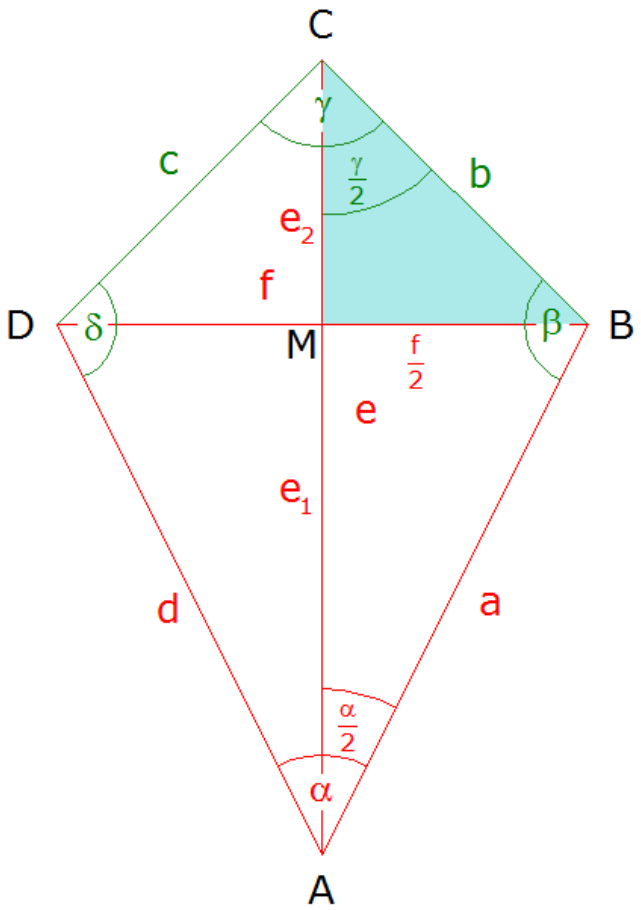
$\tan\frac{\gamma}{2} = \frac{\frac{6,4}{2}}{2,36}$

$\tan\frac{\gamma}{2} = \frac{3,2}{2,36}$

$\tan\frac{\gamma}{2} = 1,3559$

$\frac{\gamma}{2} = 53,59° \quad | \cdot 2$

$\gamma = 107°$



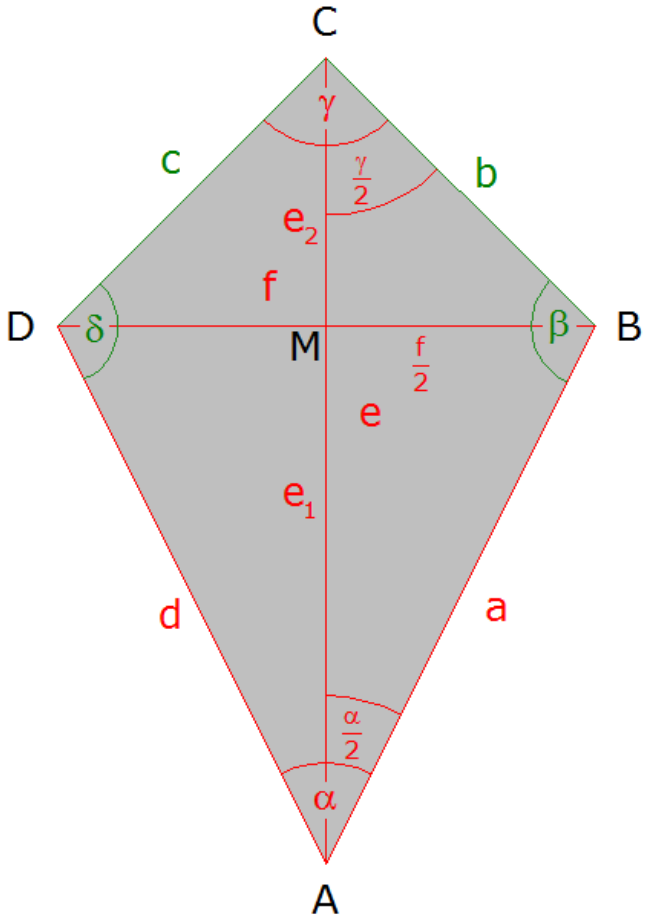
Lösung 1981 5d:

5. Berechnung der Winkel $\beta = \delta$:

$\beta + \delta = 360° - \alpha - \gamma$ Winkelsumme im Drachen

$2 \cdot \beta = 360° - 67° - 107°$

$2 \cdot \beta = 186°$ $\quad | : 2$

$\beta = 93°$

$\delta = 93°$