

$$1) f(x) = 0,25x^2 + 2x + 1$$

Stichwort: quadratische Ergänzung

$$f(x) = 0,25 \left[x^2 + 8x + 4^2 - 4^2 \right] + 1$$

$$= 0,25 \left[(x + 4)^2 - 16 \right] + 1$$

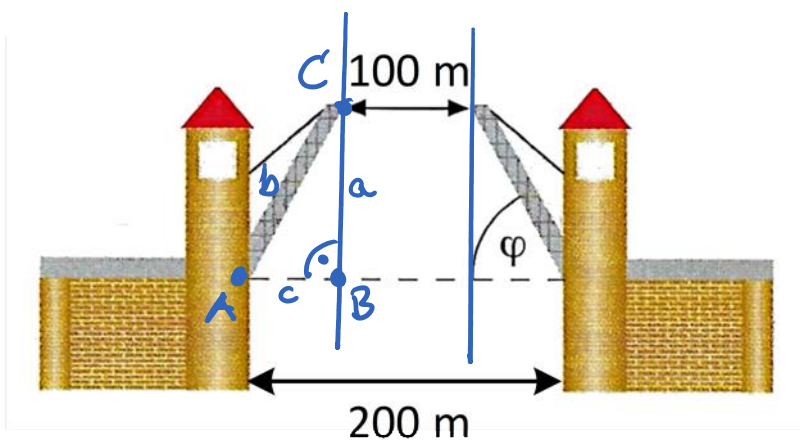
$$= 0,25 (x + 4)^2 - 4 + 1$$

$$= 0,25 (x + 4)^2 - 3$$

Scheitelform: $f(x) = a(x - x_s)^2 + y_s$

$$\Rightarrow S(-4 | -3)$$

2)



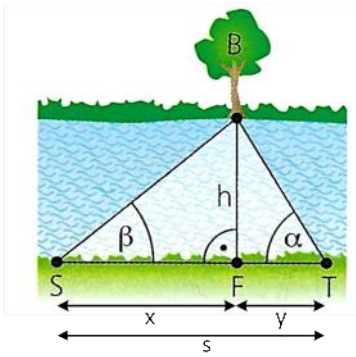
Die beiden Brückenhälften müssen den 200m breiten Fluss überspannen $\Rightarrow b = 100m$

$$c = 50m$$

$$\cos(\varphi) = \frac{c}{a} = \frac{50m}{100m} = \frac{1}{2}$$

$$\Rightarrow \varphi = 60^\circ$$

3)



$$y = s - x$$

$$\tan(\alpha) = \frac{h}{y} = \frac{h}{s-x} \quad (\text{I})$$

$$\tan(\beta) = \frac{h}{x}$$

$$\rightarrow x = \frac{h}{\tan(\beta)} \quad (\text{II})$$

$$(\text{II}) \text{ in } (\text{I}) : \tan(\alpha) = \frac{h}{s - \frac{h}{\tan(\beta)}}$$

$$\Rightarrow \tan(\alpha) \cdot \left(s - \frac{h}{\tan(\beta)} \right) = h$$

$$s \cdot \tan(\alpha) - \frac{h \cdot \tan(\alpha)}{\tan(\beta)} = h \quad | \cdot \tan(\beta)$$

$$s \cdot \tan(\alpha) \cdot \tan(\beta) - h \cdot \tan(\alpha) = h \cdot \tan(\beta)$$

$$s \cdot \tan(\alpha) \cdot \tan(\beta) = h \cdot \tan(\alpha) + h \cdot \tan(\beta)$$

$$s \cdot \tan(\alpha) \cdot \tan(\beta) = h (\tan(\alpha) + \tan(\beta))$$

$$\frac{s \cdot \tan(\alpha) \cdot \tan(\beta)}{\tan(\alpha) + \tan(\beta)} = h$$

$$h = \frac{29 \text{ m} \cdot \tan(52^\circ) \cdot \tan(41^\circ)}{\tan(52^\circ) + \tan(41^\circ)}$$

$$h = 15 \text{ m}$$