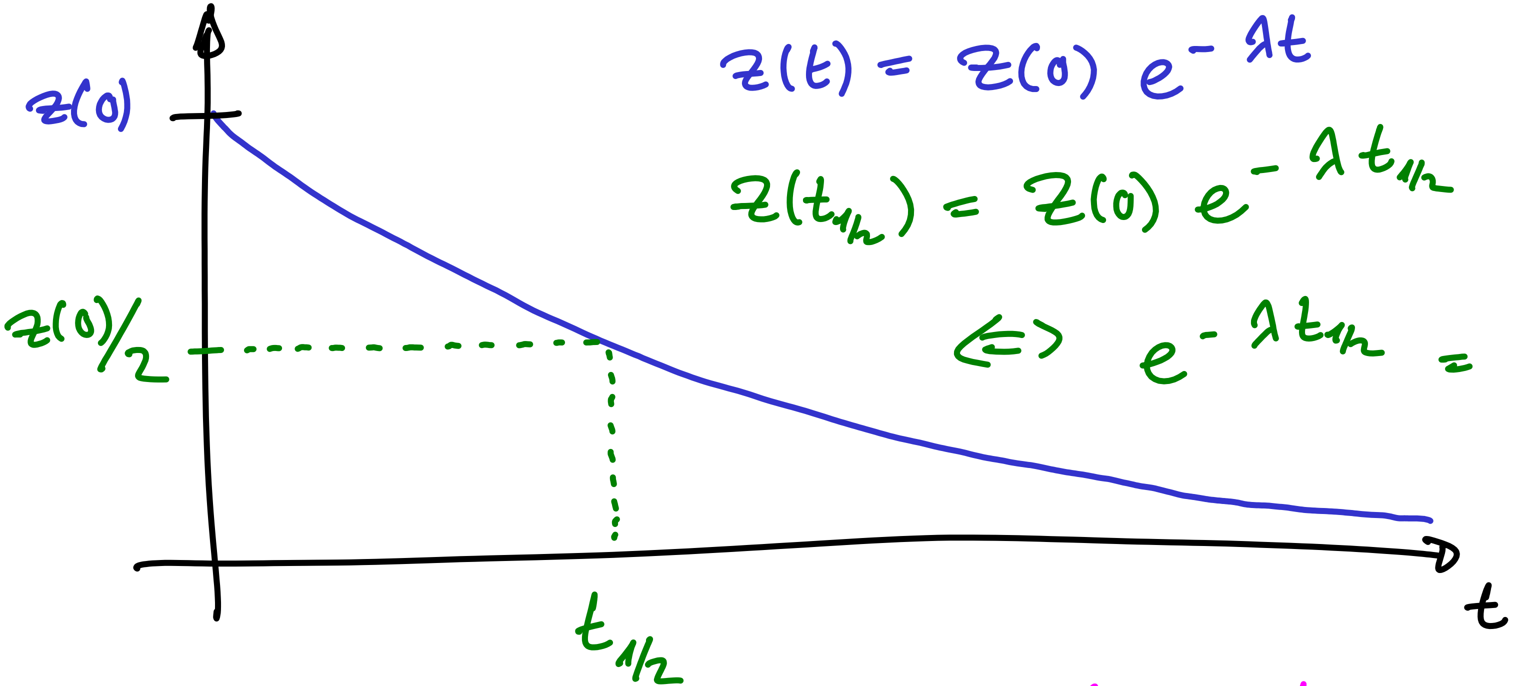


$$z(t) = z(0)\, e^{-\lambda t}$$

$$z(t_{1/2}) = z(0)\, e^{-\lambda t_{1/2}} \overset{!}{=} \frac{z(0)}{2}$$

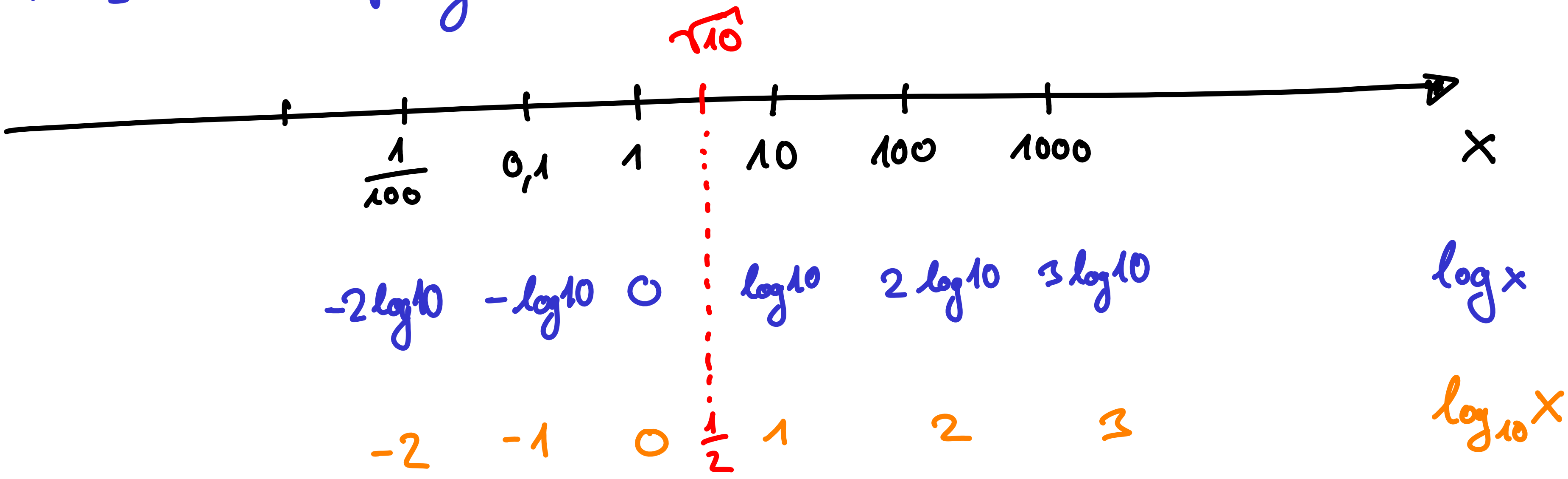
$$\Leftrightarrow \quad e^{-\lambda t_{1/2}} = \frac{1}{2}$$

Logarithmiere von $e^{-\lambda t_{1/2}} = \frac{1}{2}$

$$-\lambda\, t_{1/2} = \log\left(\tfrac{1}{2}\right) = -\log 2$$

$$\Leftrightarrow \quad t_{1/2} = \frac{1}{\lambda} \log 2 \qquad \left(\Leftrightarrow \quad \lambda = \frac{1}{t_{1/2}} \log 2 \right)$$

Achsenbeschriftung

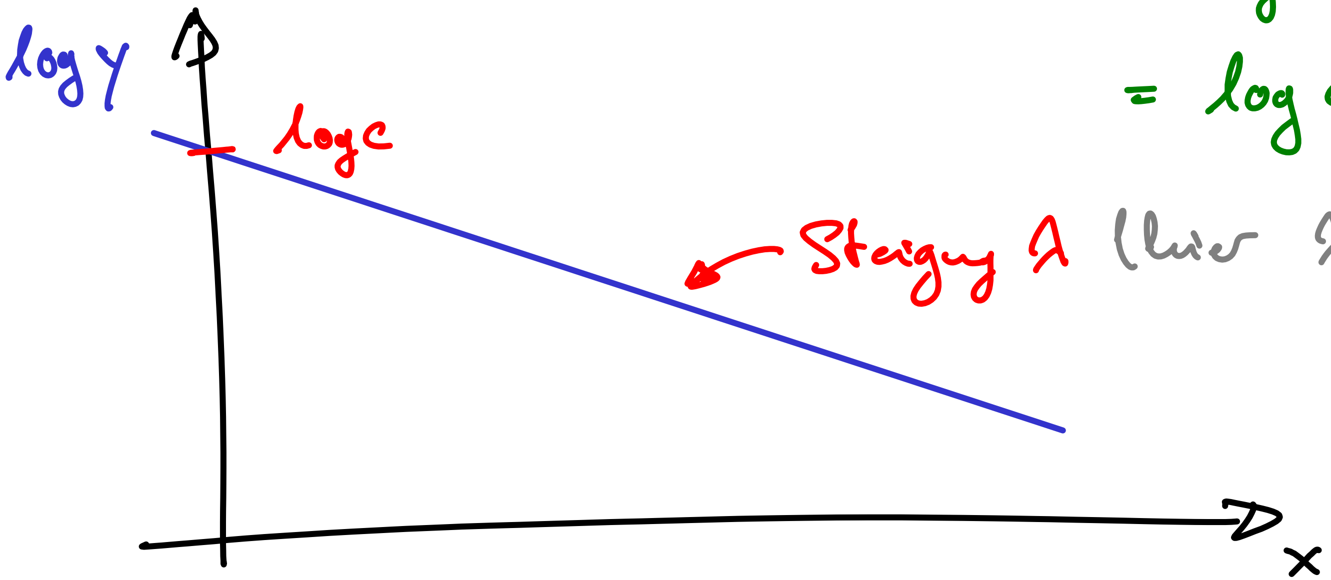


$$\text{schwarze Zahl} = 10^{\text{orange Zahl}}$$

erwartete expon. ZusHg.

$$y = c\,e^{\lambda x}$$

$$\Leftrightarrow \log y = \log(c\,e^{\lambda x})$$
$$= \log c + \log(e^{\lambda x})$$
$$= \log c + \lambda x$$

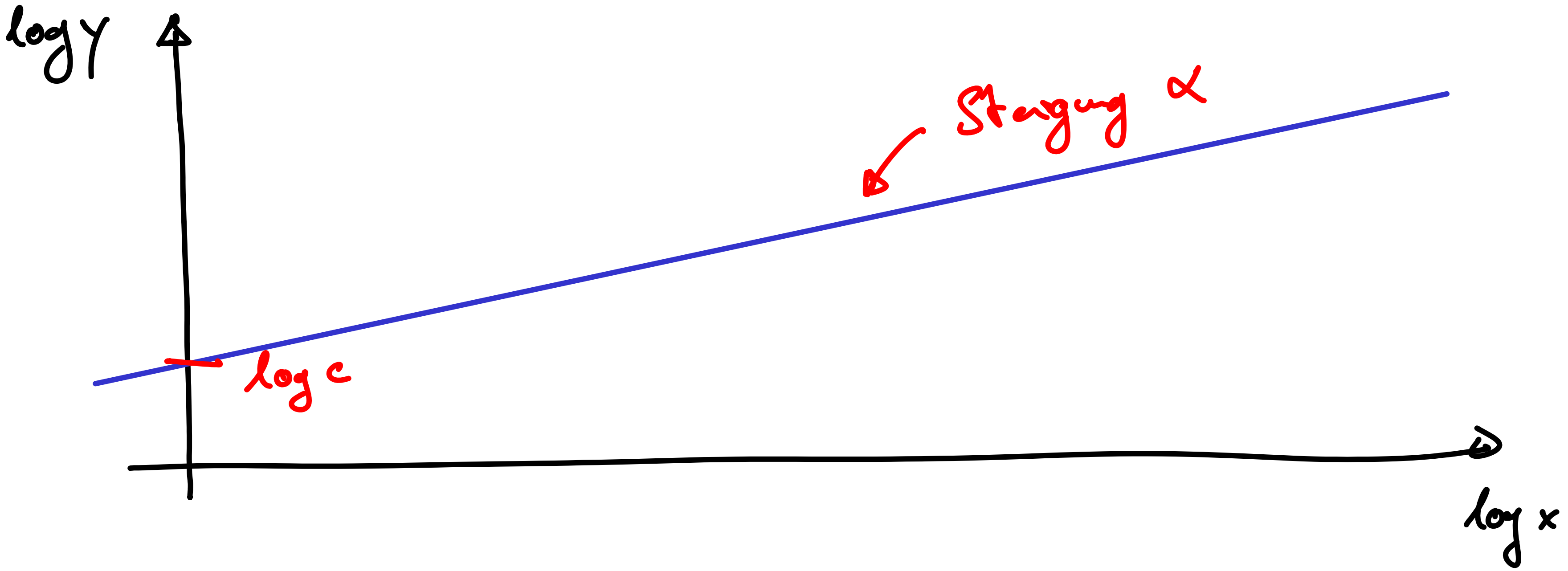


(logarithmische y-Achse)

bei Potenzgesetzen (doppelt logarithm. Diagramm)

$$y = c \cdot x^{\alpha}$$

$$\Leftrightarrow \log y = \log c + \log(x^{\alpha}) = \log c + \alpha \log x$$

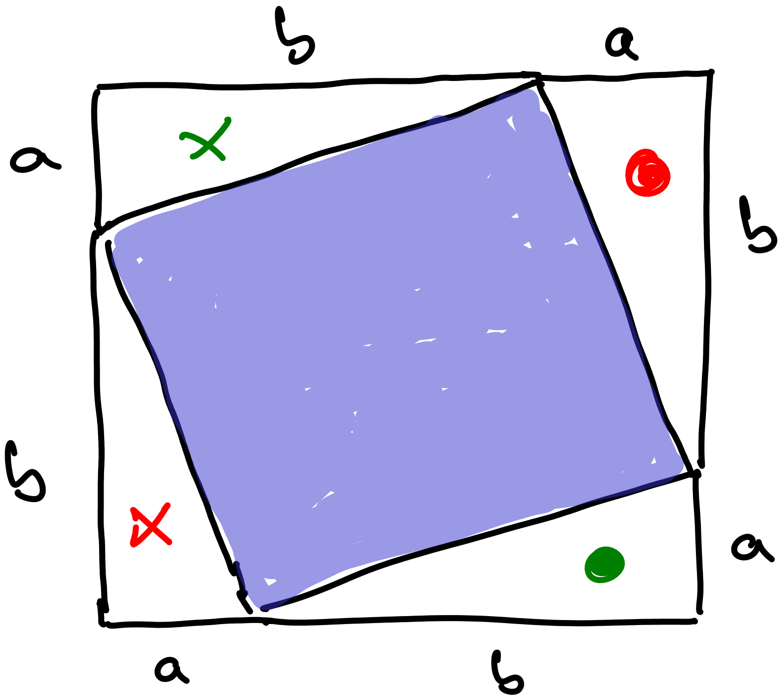


$$\alpha^{\log_\alpha x} = x$$

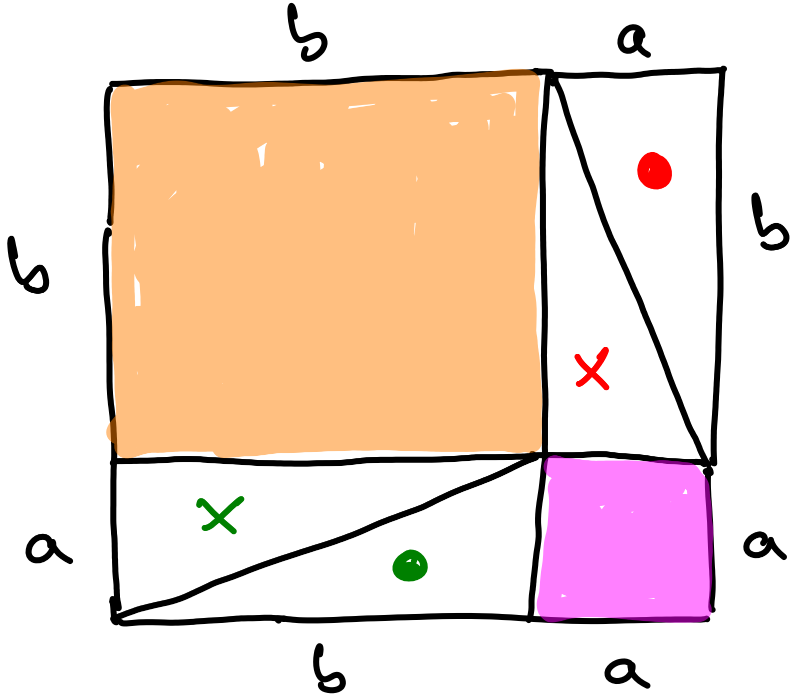
$$\log\left(\alpha^{\log_\alpha x}\right) = \log x$$

$$= \log_\alpha x \cdot \log \alpha$$

$$\Rightarrow \log_\alpha x = \frac{\log x}{\log \alpha}$$

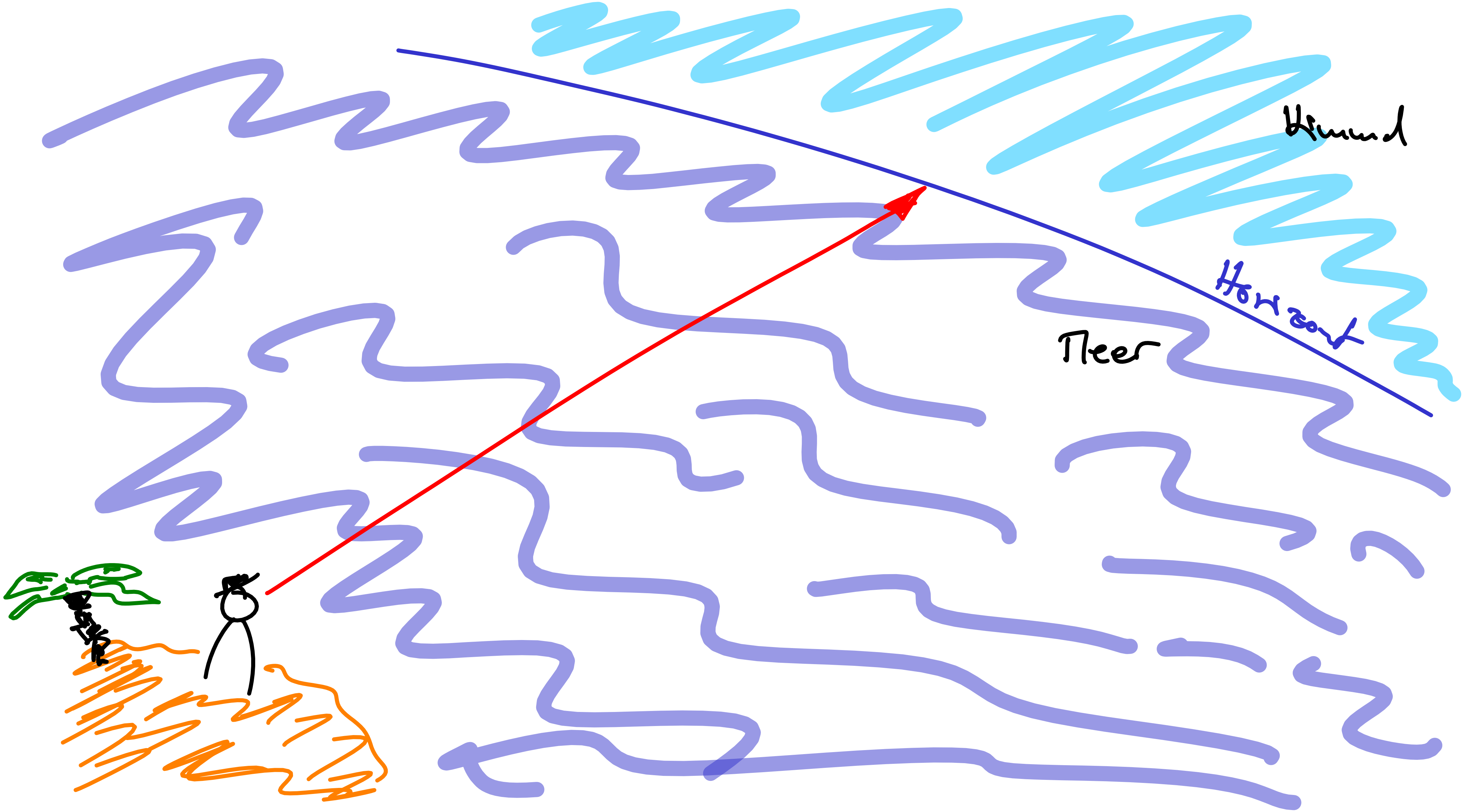


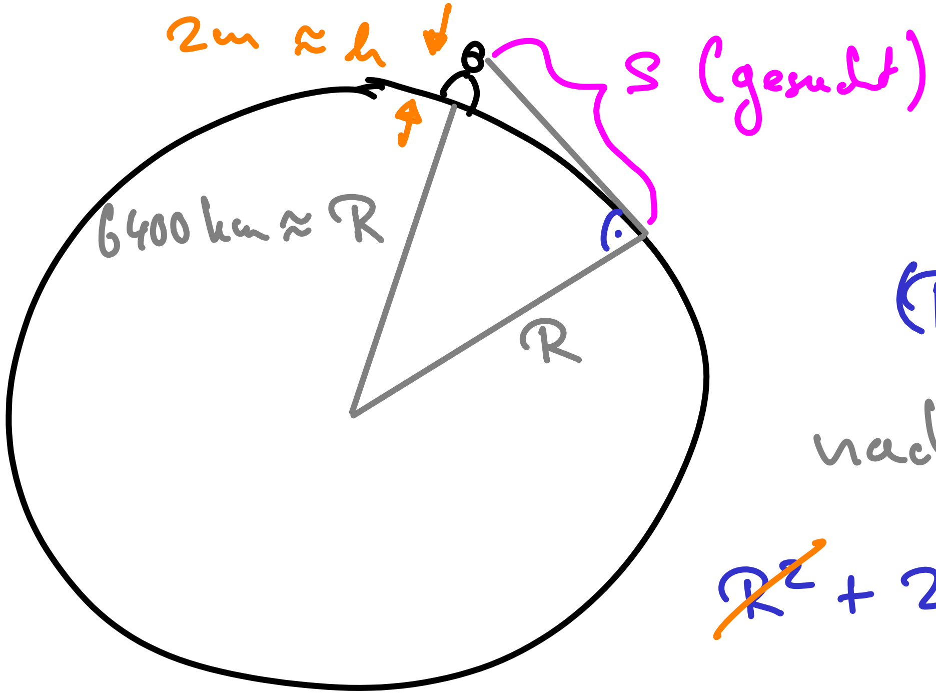
c^2



$b^2, \quad a^2$

$$\Rightarrow \quad c^2 = a^2 + b^2$$


Himmel
Horizont
Meer



Pythagoras

$$(R+h)^2 = R^2 + s^2$$

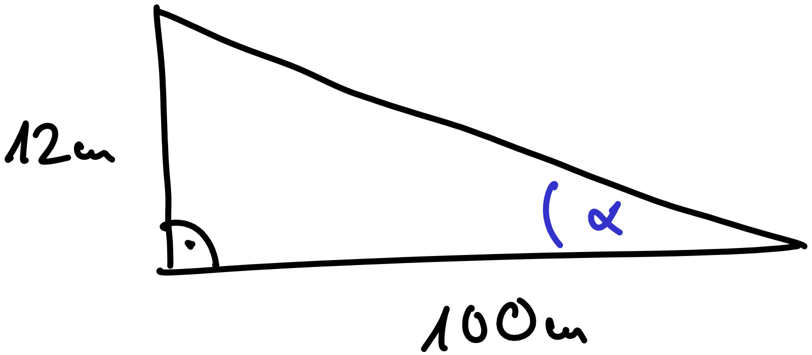
nach s auflösen

$$\cancel{R^2} + 2Rh + h^2 = \cancel{R^2} + s^2$$

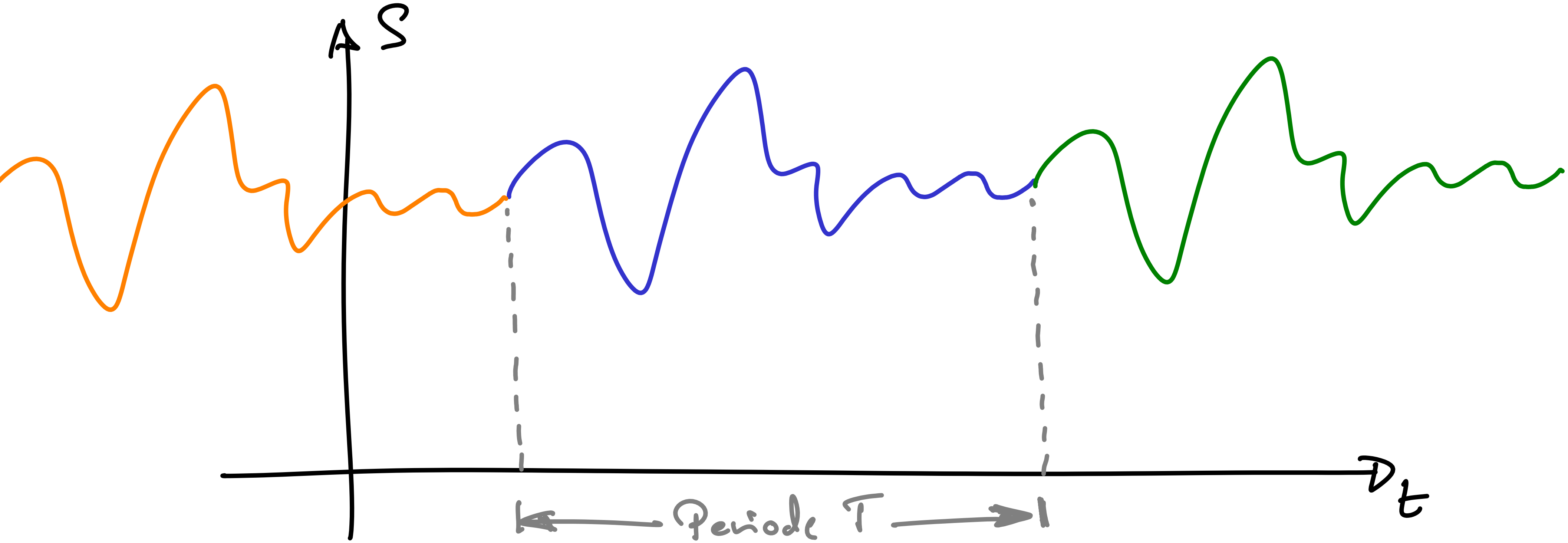
winzig gegenüber 2Rh

$$\Rightarrow \quad s \approx \sqrt{2Rh} \quad (\text{da } h \ll R)$$

also $s \approx \sqrt{2 \cdot 6400\,\text{km} \cdot 2\,\text{m}} \approx \sqrt{25\,\text{km}^2} = 5\,\text{km}$



$$\tan\alpha = \frac{12\,m}{100\,m} = 0{,}12 = 12\%$$



$$S(t+T) = S(t)$$

später: $S(t)$ = Summe von Termen aus

$\cos\left(\frac{2\pi}{T}t\right)$, $\cos\left(2\cdot\frac{2\pi}{T}t\right)$, $\cos\left(n\cdot\frac{2\pi}{T}t\right)$

$\sin(\ldots)$, $\sin(\ldots)$, ...

harmon. Schwingung

$$s(t) = c \sin(\omega t + \alpha)$$

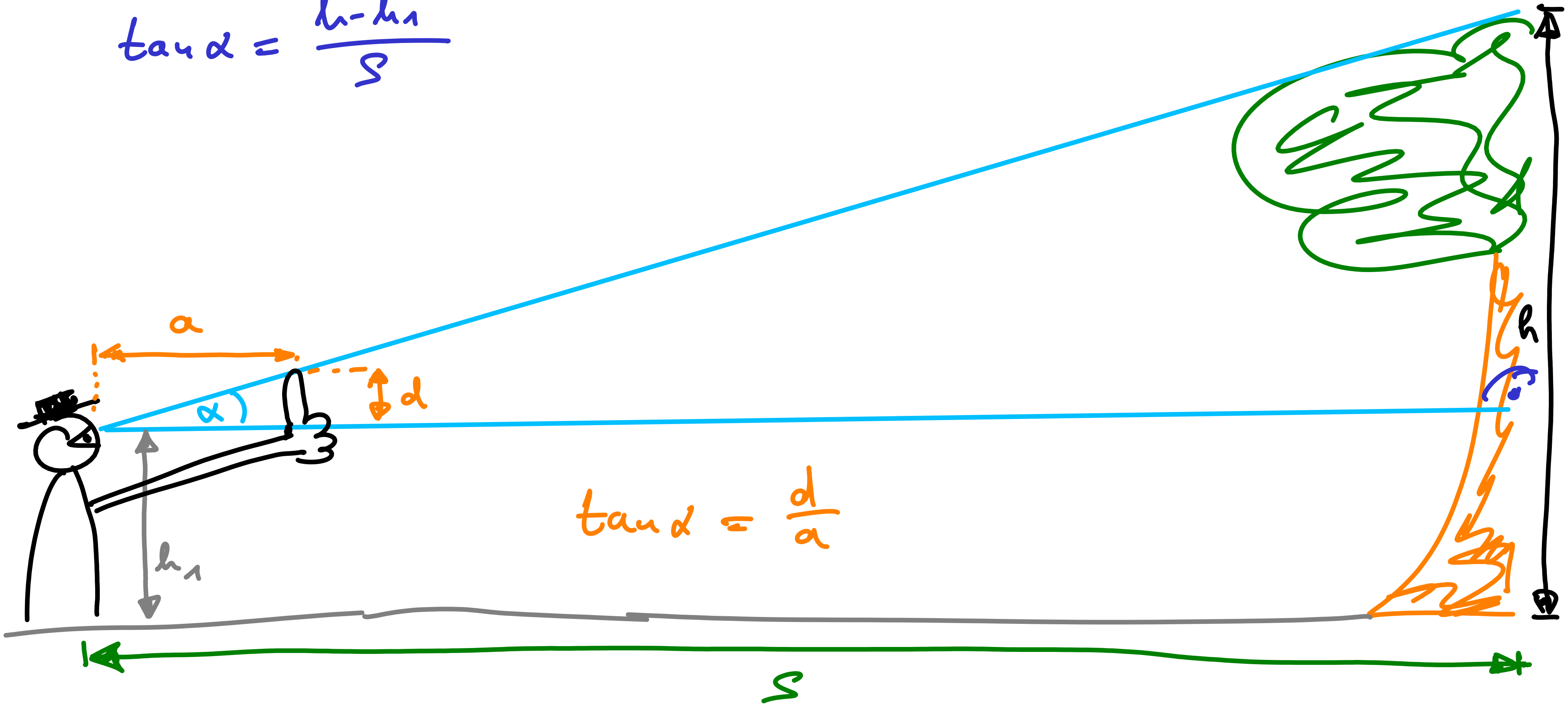
$$s(t+T) = c \sin(\omega t + \omega T + \alpha)$$

$$= c \sin(\omega t + 2\pi + \alpha)$$

$T = \frac{2\pi}{\omega}$

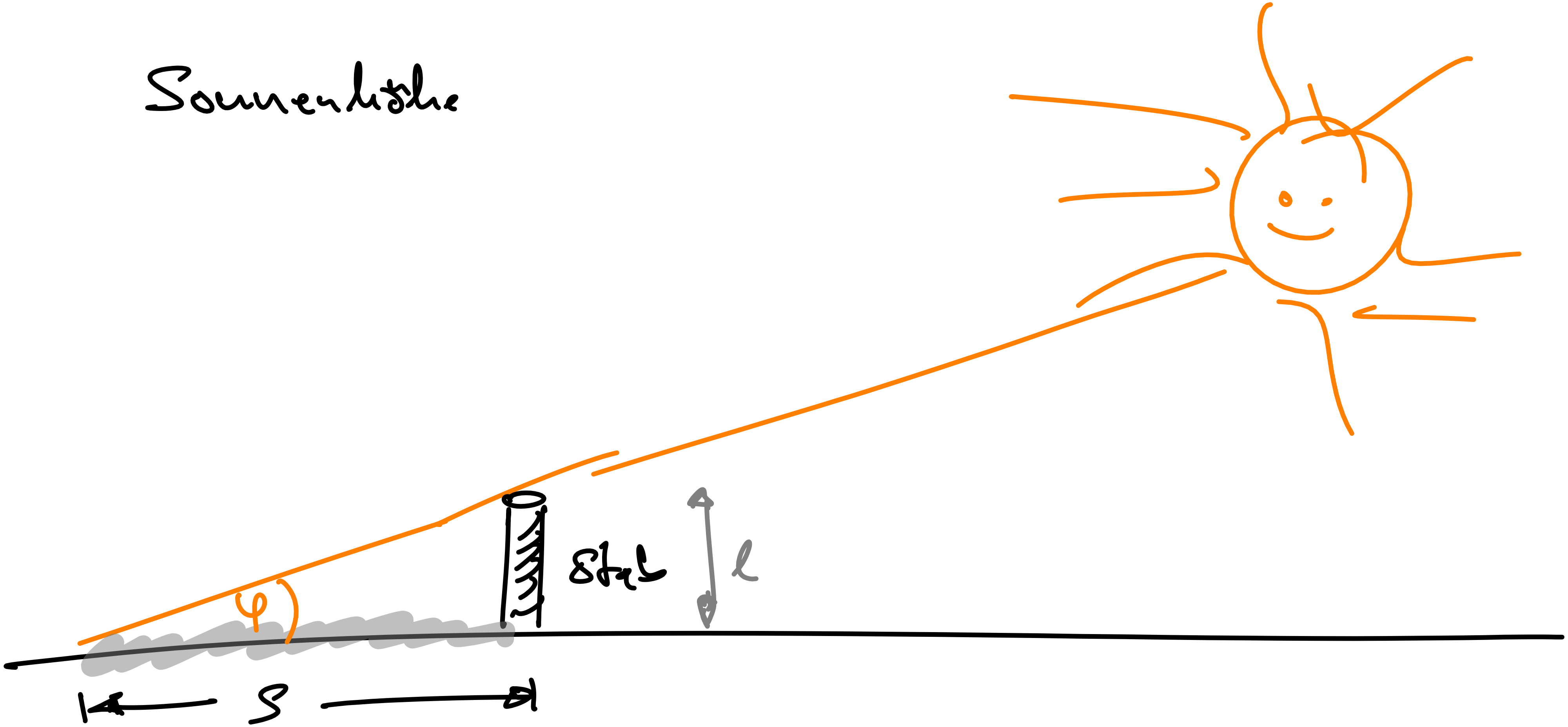
$$= c \sin(\omega t + 2) = s(t)$$

$$\tan\alpha = \frac{h-h_1}{s}$$



$$h = h_1 + s\tan\alpha = h_1 + s\frac{d}{a}$$

Sonnenhöhe



$$\tan\varphi = \frac{\ell}{s} \Rightarrow \varphi = \arctan\left(\frac{\ell}{s}\right)$$