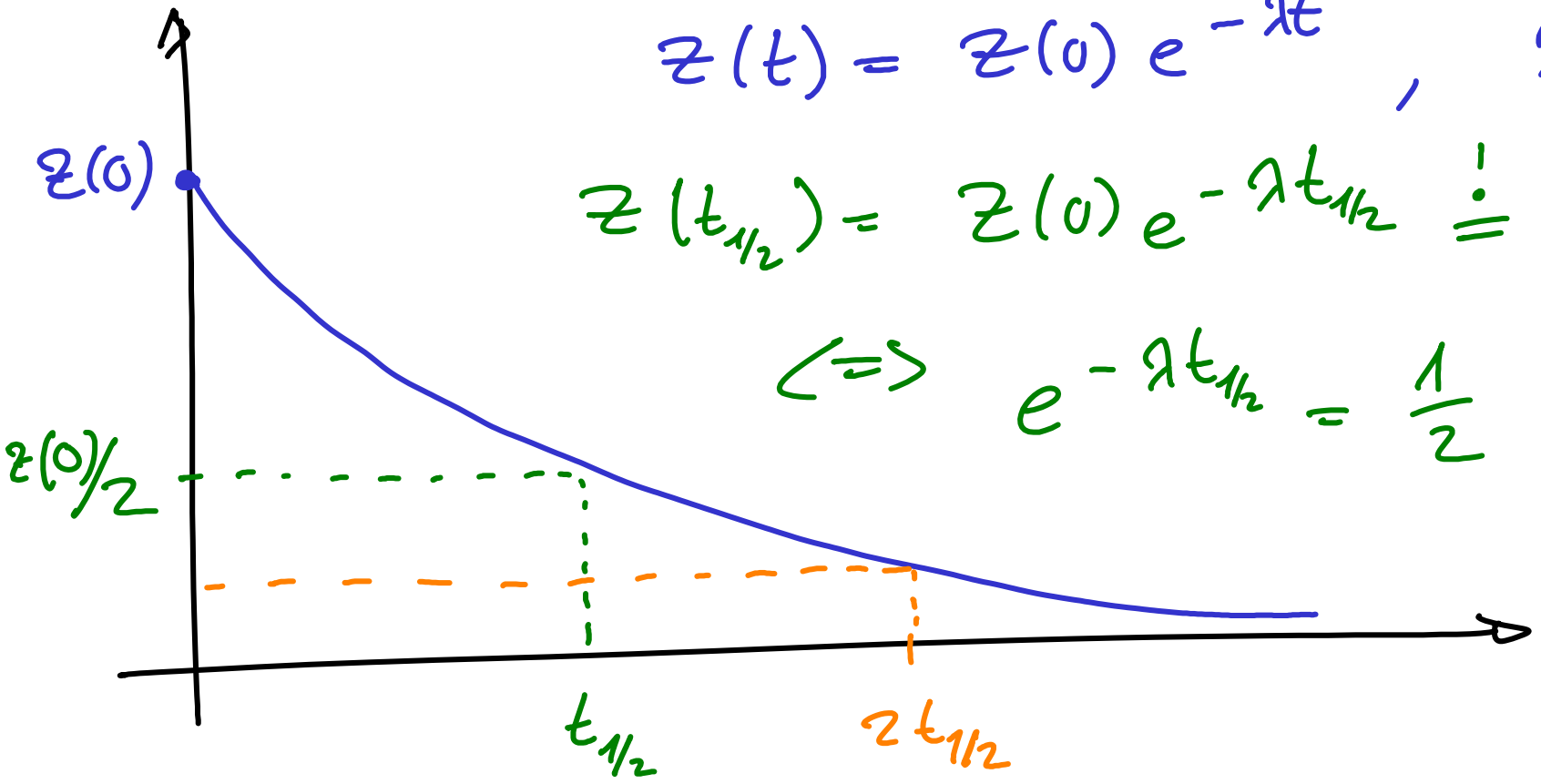


$$z(t) = z(0)\, e^{-\lambda t}, \quad \lambda > 0$$

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

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

Logarithmieren:

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

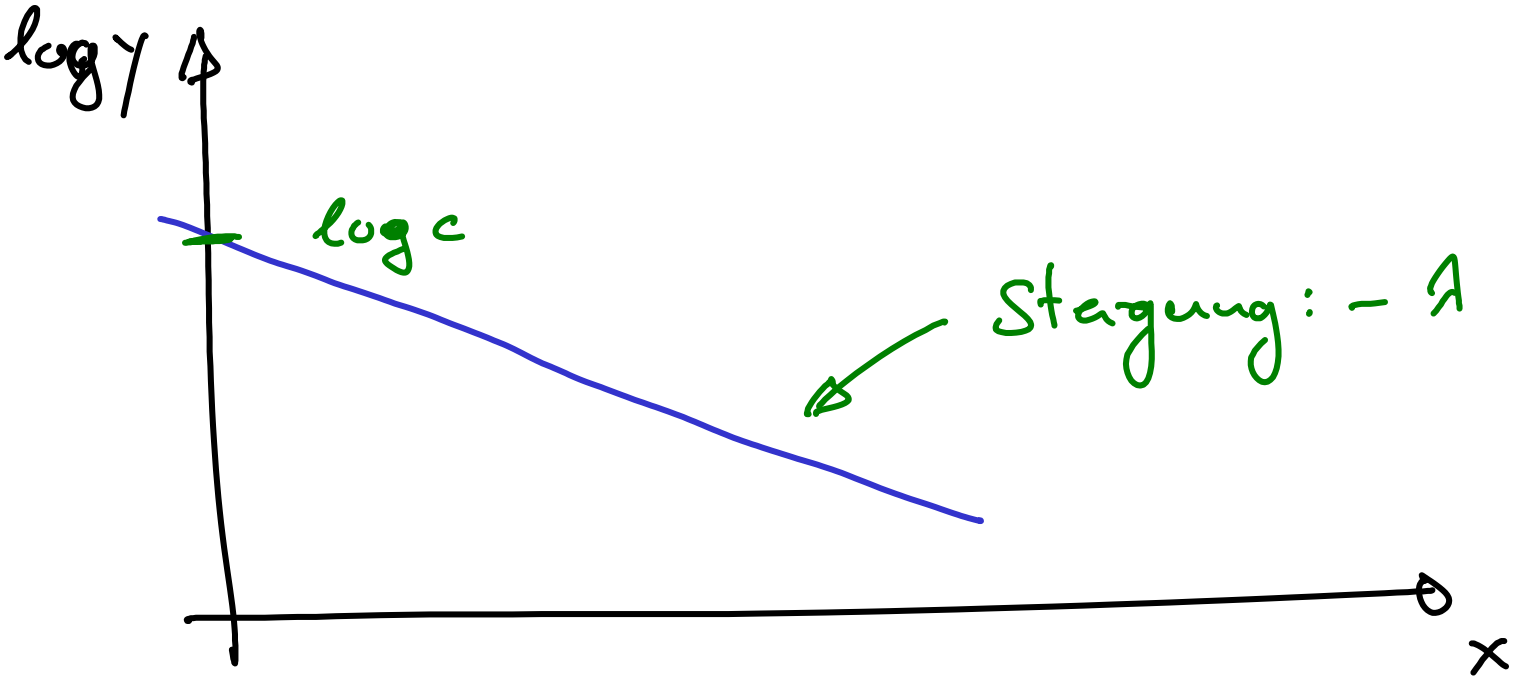
$$\Leftrightarrow \quad t_{1/2} = \frac{\log 2}{\lambda} \quad \text{bzw.} \quad \lambda = \frac{\log 2}{t_{1/2}}$$

logarithmische Skalenaufteilung

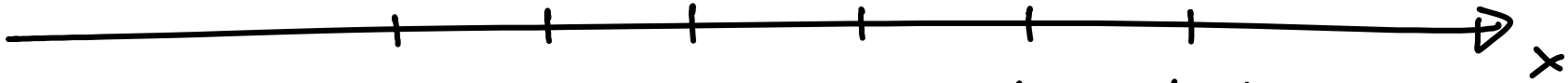
$y = c\, e^{-\lambda x}$

$$\log y = \log\left(c \cdot e^{-\lambda x}\right) = \log c + \log\left(e^{-\lambda x}\right)$$

$$= \log c - \lambda x$$



Achsenbeschriftung



0,01	0,1	1	10	100	1000	
10^{-2}	10^{-1}	10^{0}	10^{1}	10^{2}	10^{3}	
-2	-1	0	1	2	3	$\log_{10} x$
$-2\log 10$	...	0	....	$2\log 10$		$\log x$

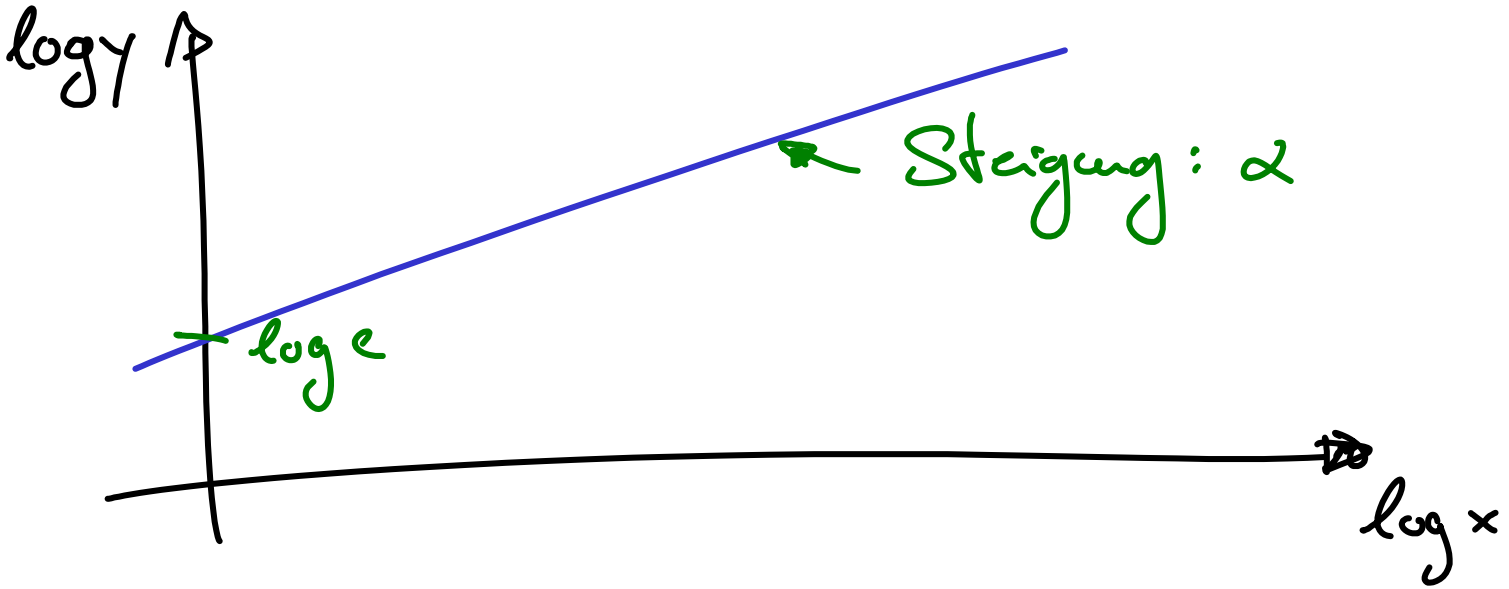
$$\log\left(10^{n}\right) = n \log 10$$

doppelt logarithmisches Diagramm

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

$$\log y = \log\left(c \cdot x^{\alpha}\right) = \log c + \log\left(x^{\alpha}\right)$$

$$= \log c + \alpha \log x$$



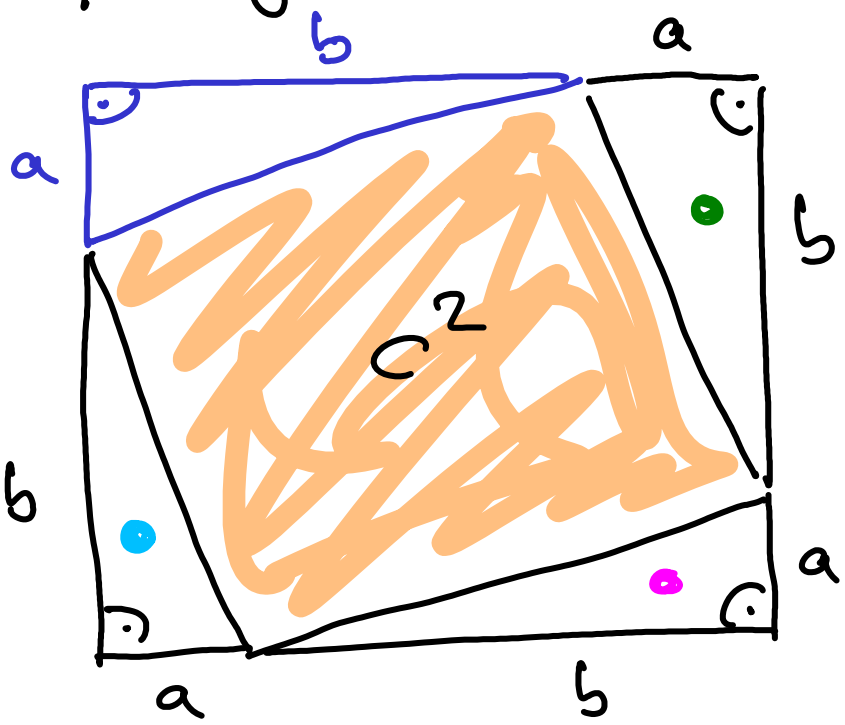
$$\log x = \log\left(\alpha^{\log_\alpha x}\right)$$

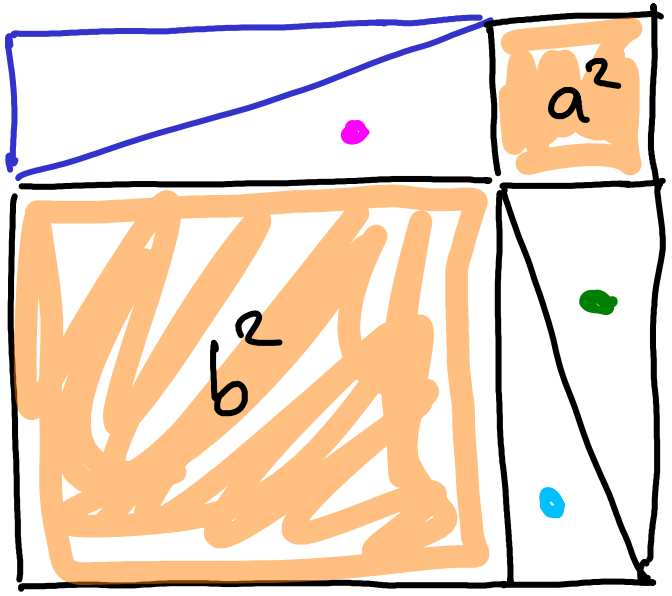
$$= \log_\alpha x \cdot \log\alpha$$

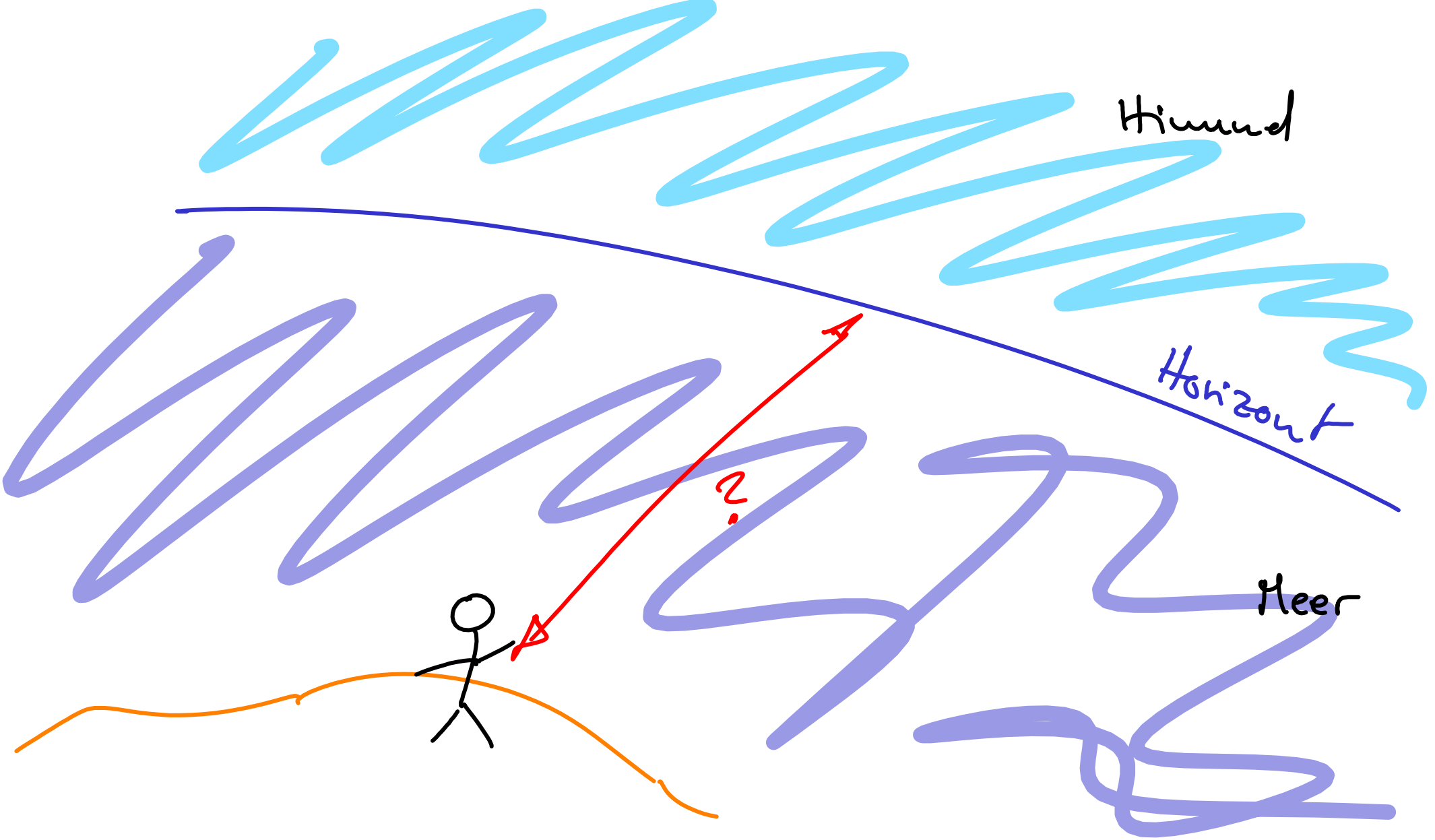
$\Leftrightarrow$ $\alpha \neq 1$

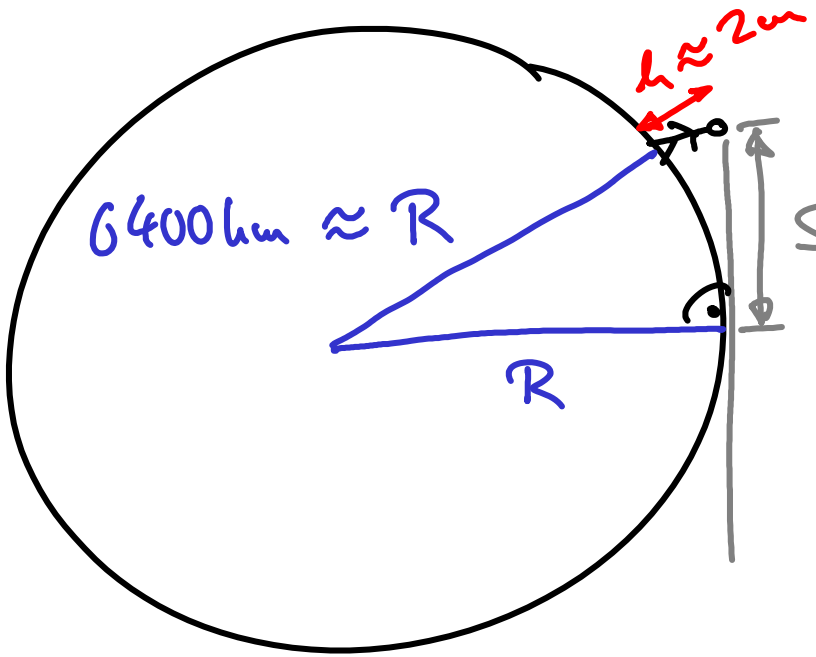
$$\log_\alpha x = \frac{\log x}{\log \alpha}$$

Pythagoras






Himmel
Horizont
?
Meer



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

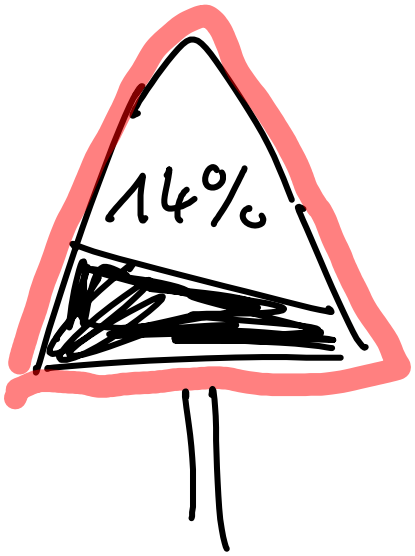
auflösen nach s, oder ...

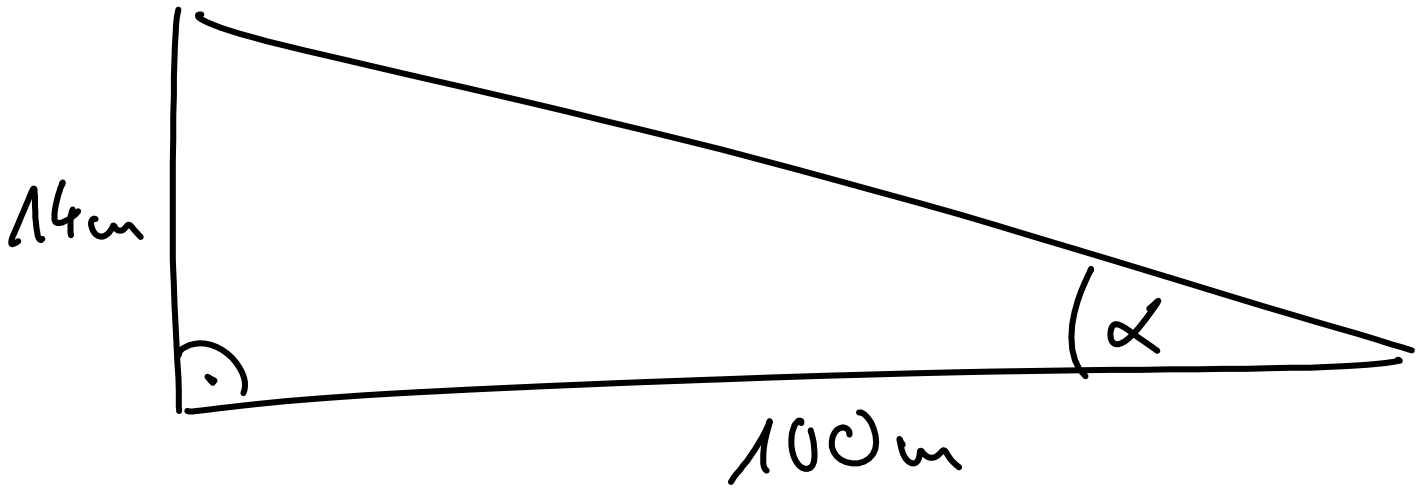
$$\Leftrightarrow \quad \cancel{R^2} + 2Rh + h^2 = \cancel{R^2} + s^2$$

$$\Rightarrow \quad s^2 \approx 2Rh \quad \text{da} \quad h \ll R$$

$$\text{also} \quad s = \sqrt{2Rh} = \sqrt{2 \cdot 6400\,\text{km} \cdot 2\text{m}}$$

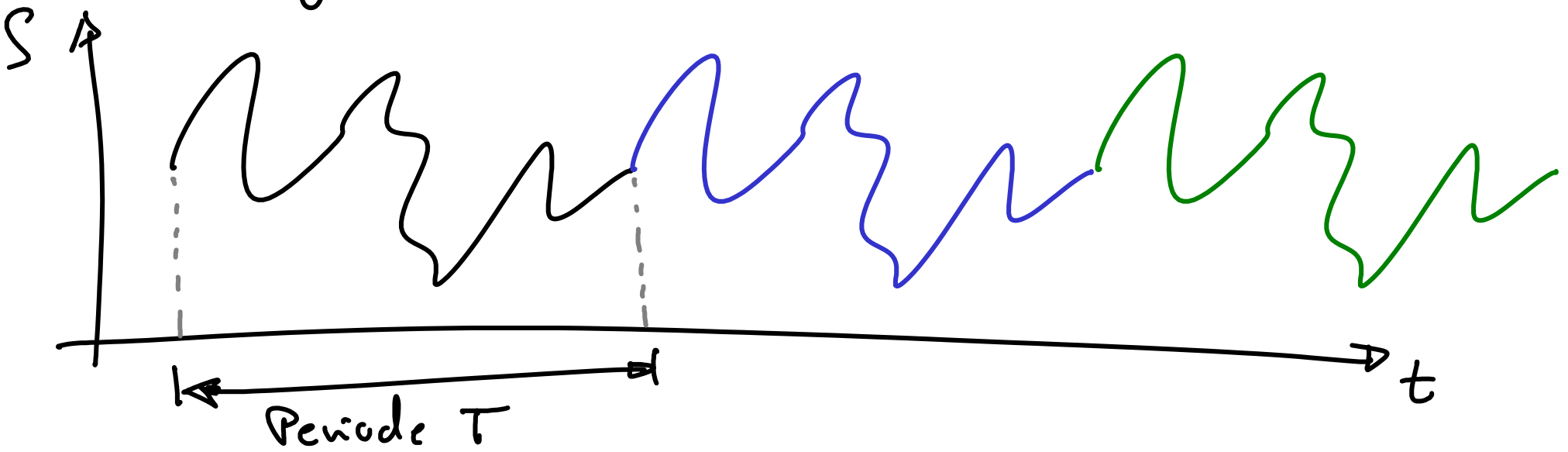
$$\approx 5\,\text{km}$$





$$\tan \alpha = \frac{14\,\text{m}}{100\,\text{m}} = 0{,}14 = 14\,\%$$

Schwingungsphänomen



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

$$S(t) = C \cdot \sin(\omega t + \alpha)$$

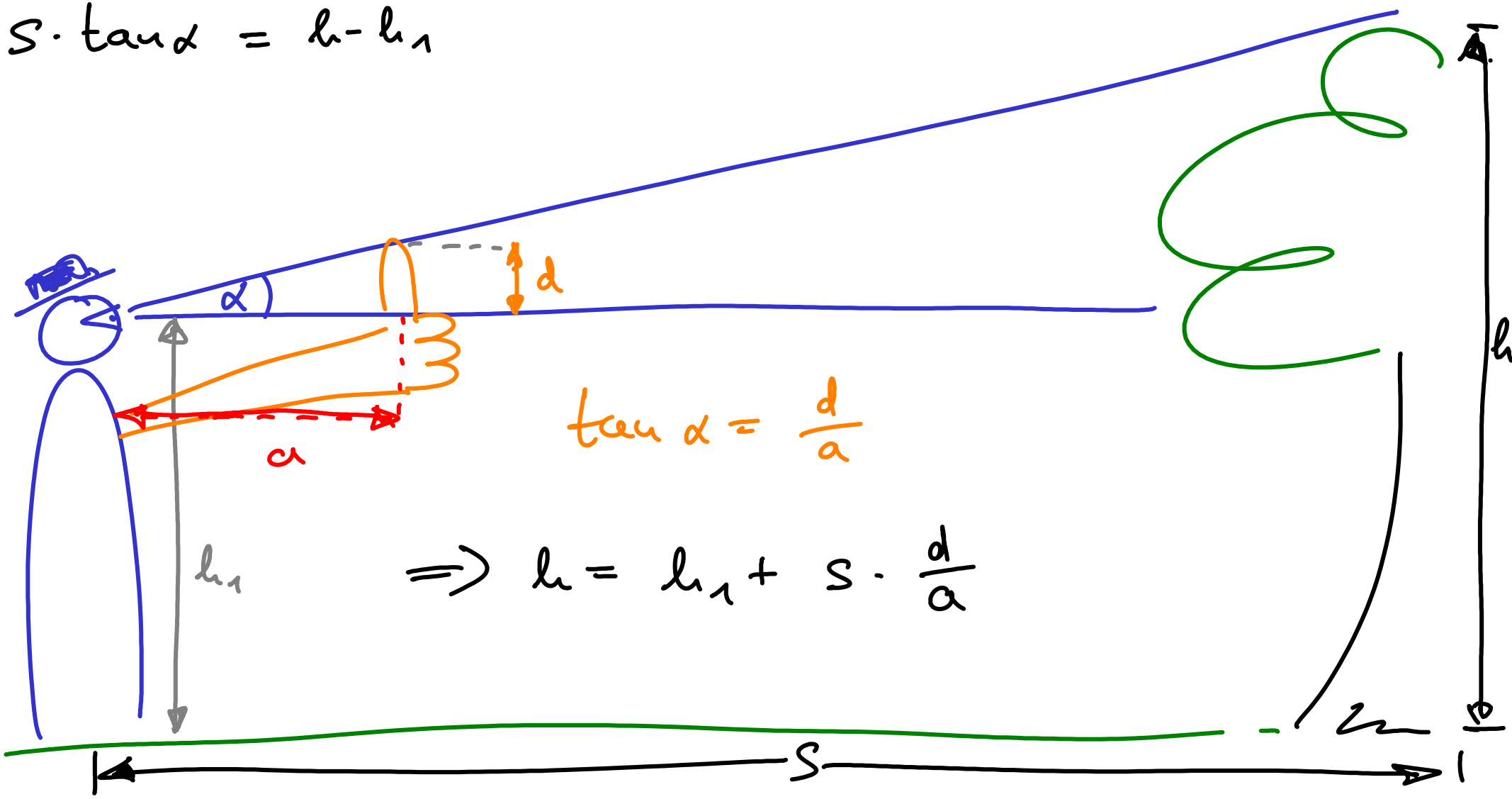
Bed.: periodisch mit Periode $T = \frac{2\pi}{\omega}$

$$S\left(t + \frac{2\pi}{\omega}\right) = C \sin\left(\omega\left(t + \frac{2\pi}{\omega}\right) + \alpha\right)$$

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

$$= C \sin(\omega t + \alpha) = S(t)$$

$s \cdot \tan\alpha = h - h_1$



$$\tan\alpha = \frac{d}{a}$$

$$\Rightarrow h = h_1 + s \cdot \frac{d}{a}$$