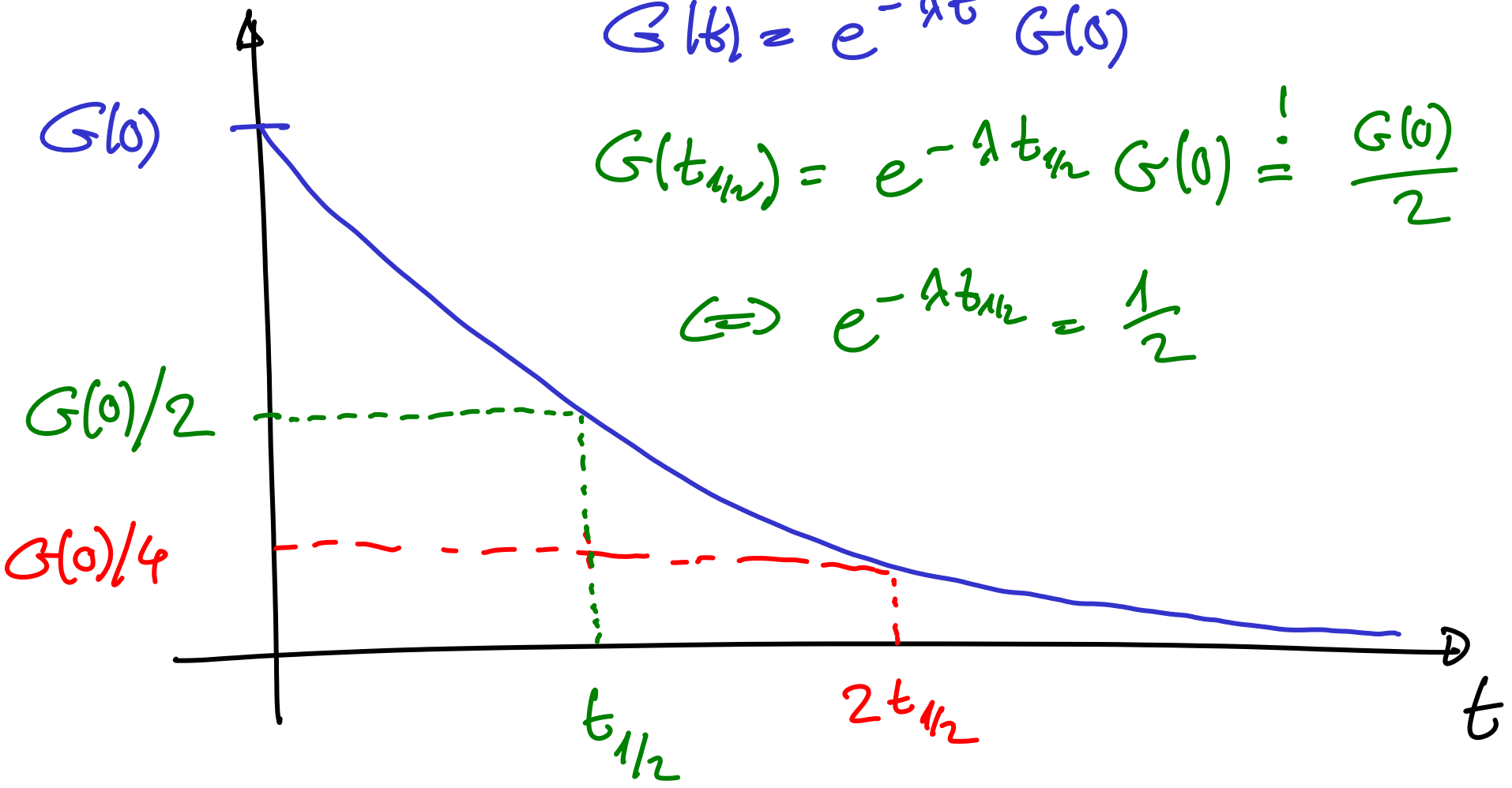


$$G(t) = e^{-\lambda t}\, G(0)$$

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

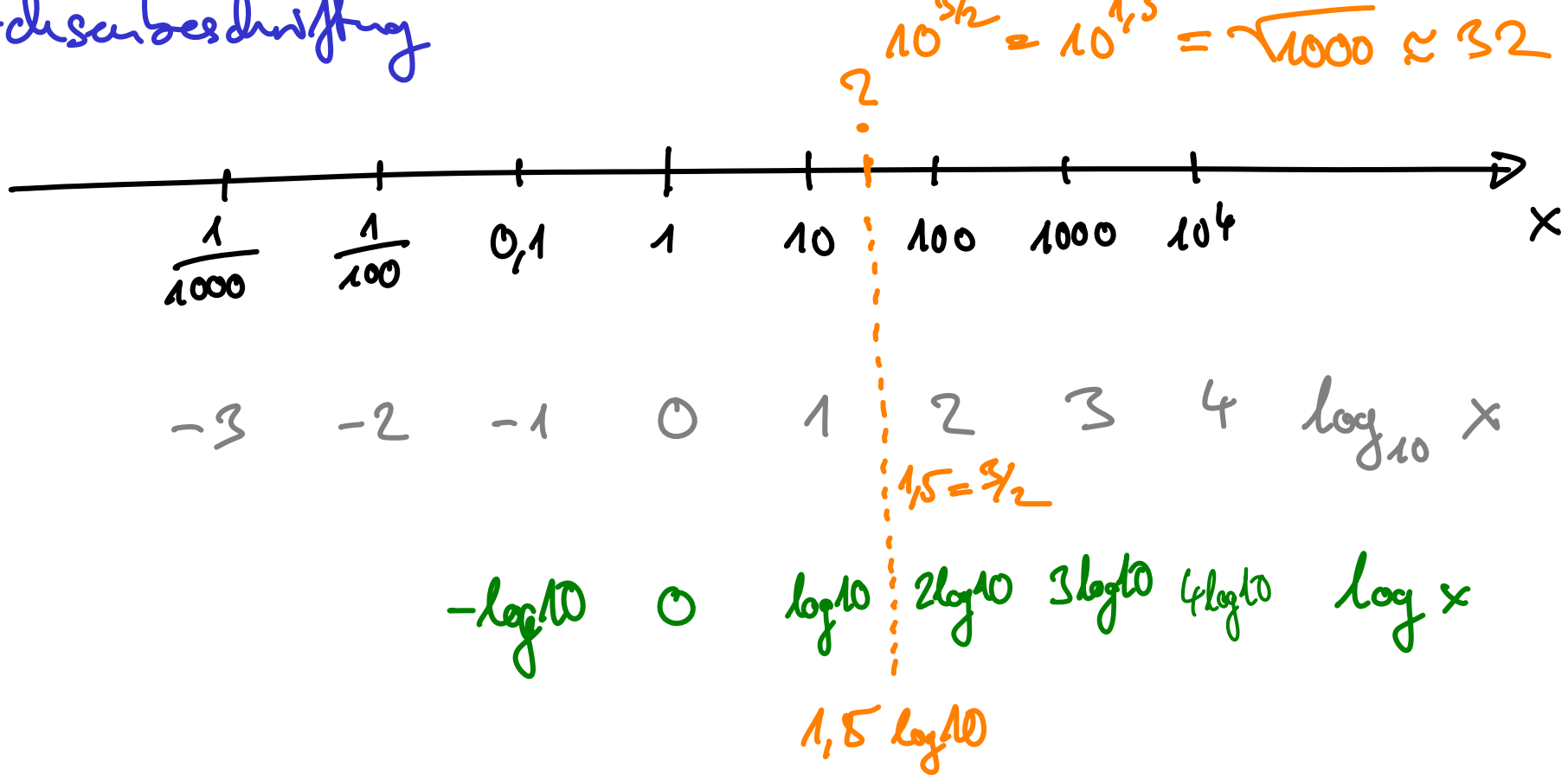
$$\Leftrightarrow\quad e^{-\lambda t_{1/2}} = \frac{1}{2}$$

Logarithmieren: $\log(\dots)$:

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

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

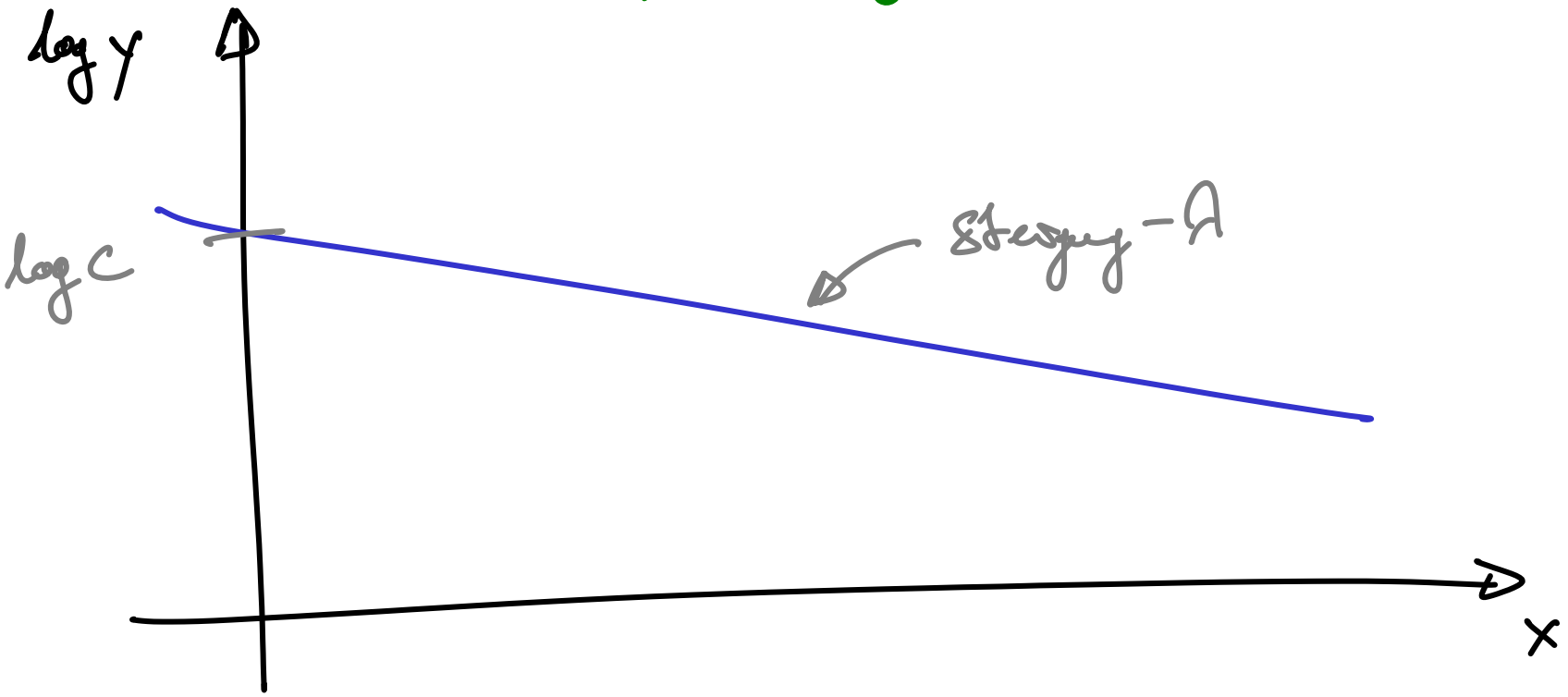
Achsenbeschriftung



Schwarze Zahl = $10^{\text{graue Zahl}}$

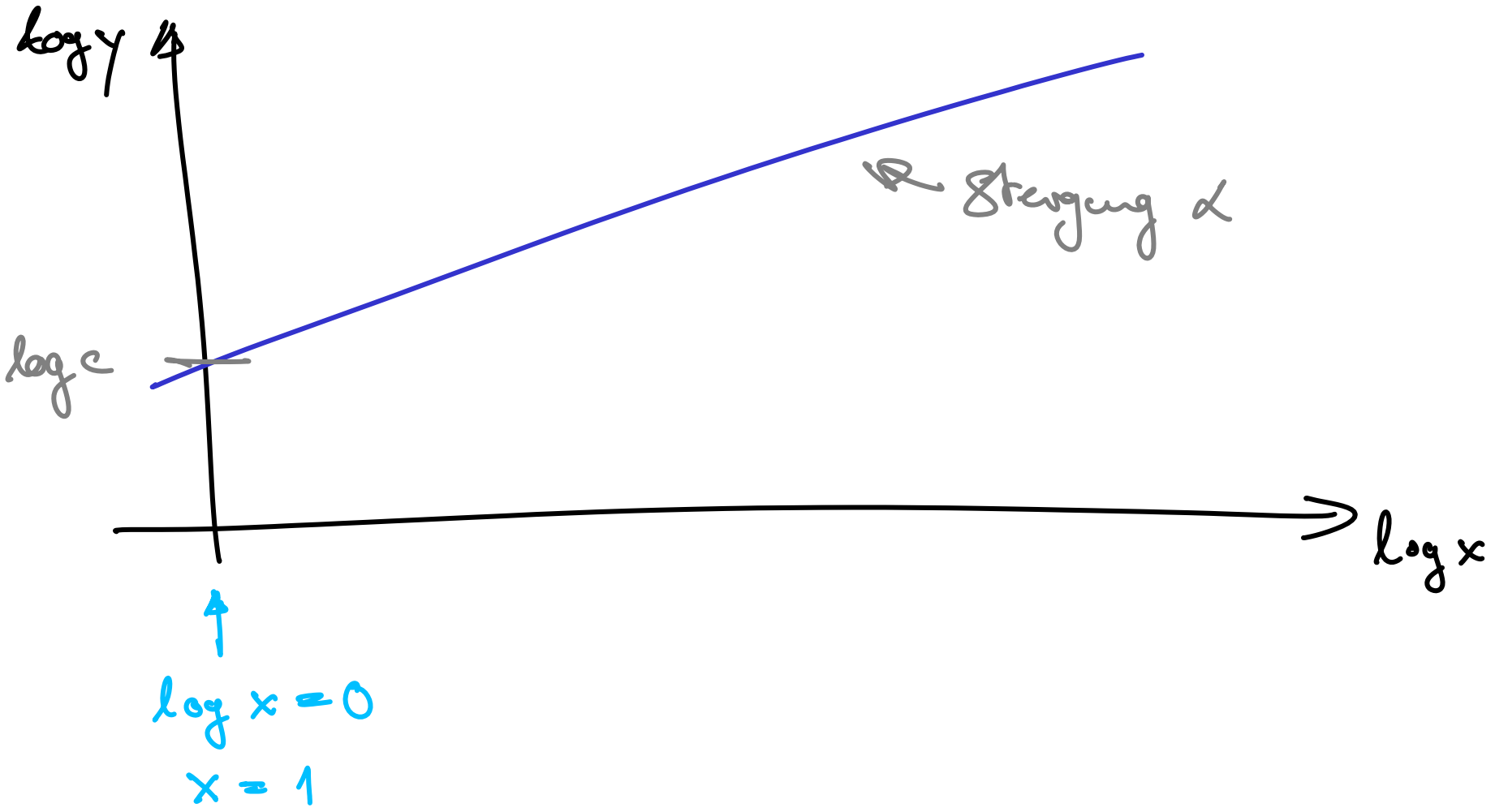
erwarte Lösung der Art $y = c e^{-\lambda x}$

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



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

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

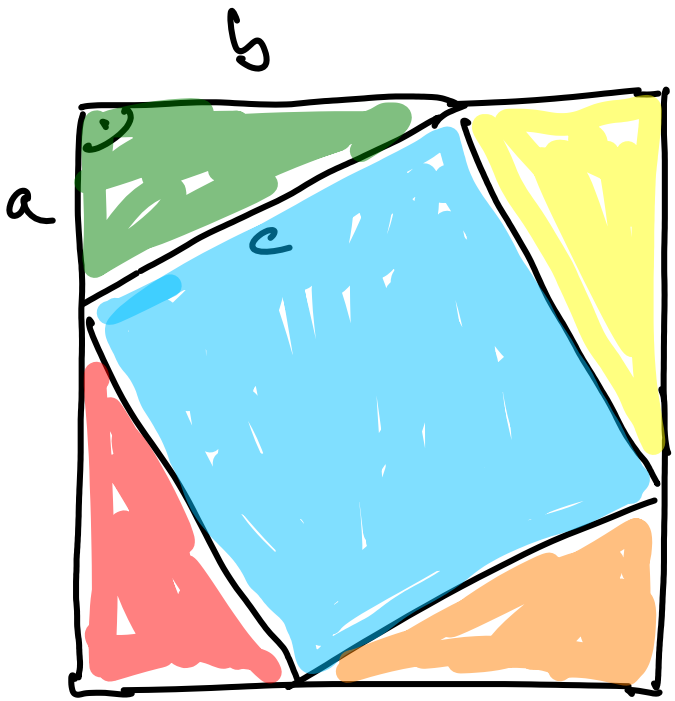


$$x = a^{\log_a x}$$

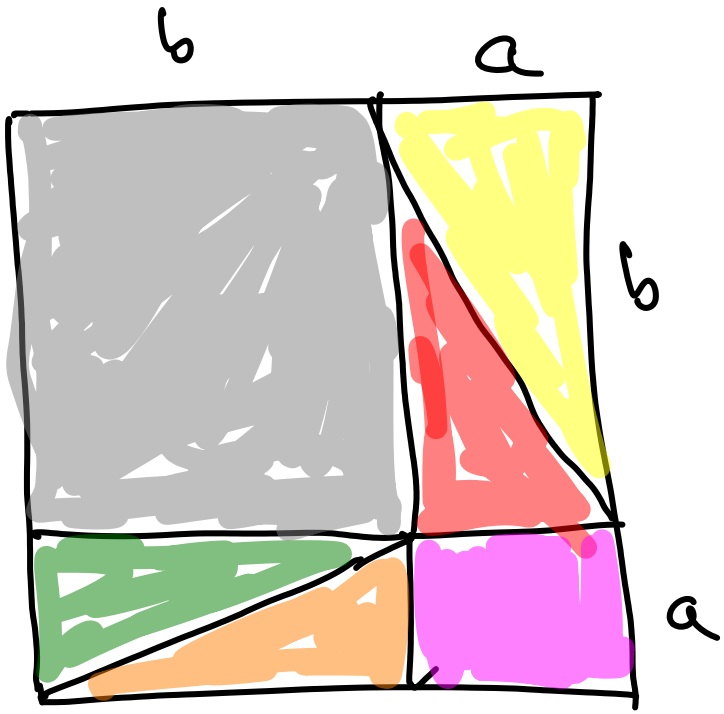
$$\log x = \log\left(a^{\log_a x}\right)$$

$$= \log_a x \cdot \log a$$

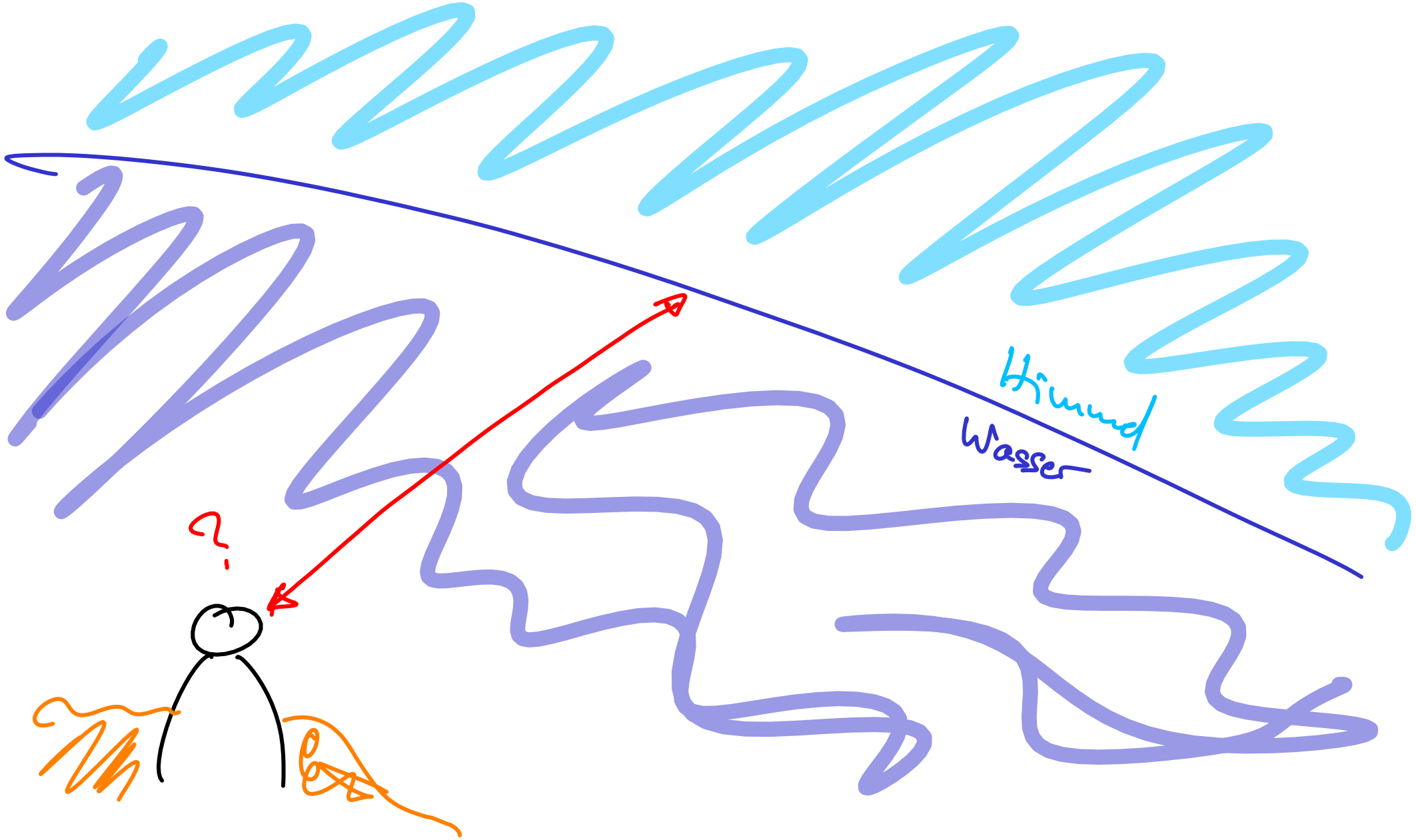
$$\Leftrightarrow \quad \log_a x = \frac{\log x}{\log a}$$

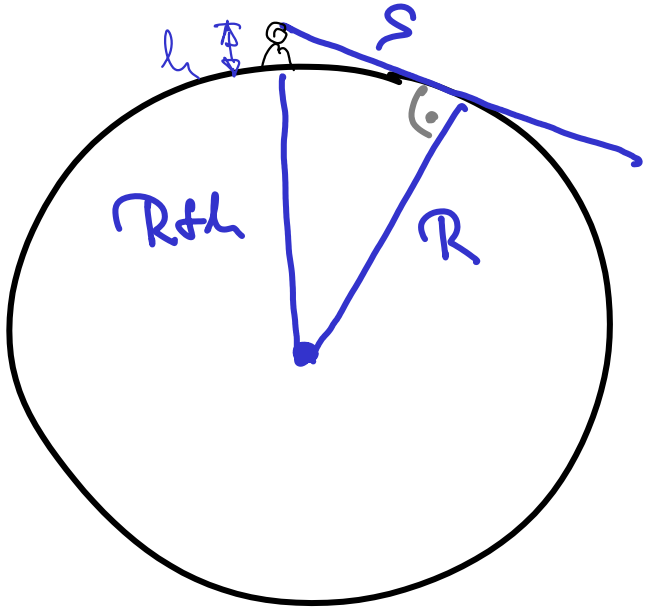


c^2



$b^2 + a^2$


Himmel
Wasser
?



h: Höhe Auge über Erdboden

Pythagoras

s: Entfernung des Horizonts

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

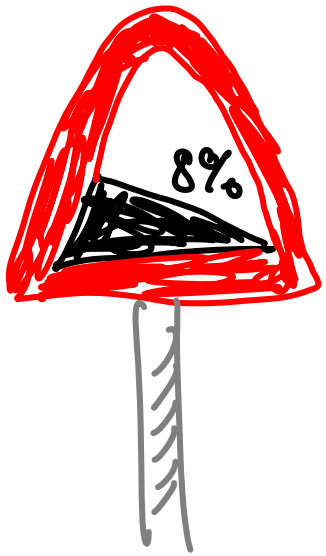
nach s auflösen, oder ...

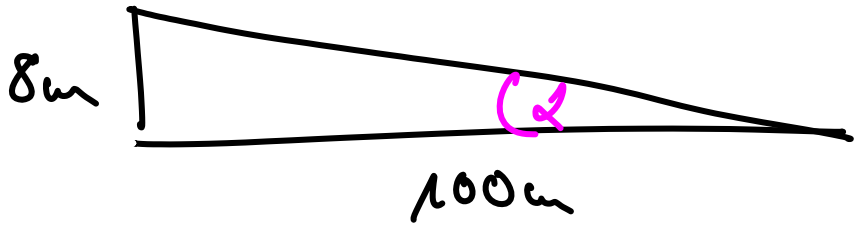
$$R^2 + 2Rh + h^2 = R^2 + s^2$$

h^2 viel kleiner als Rh

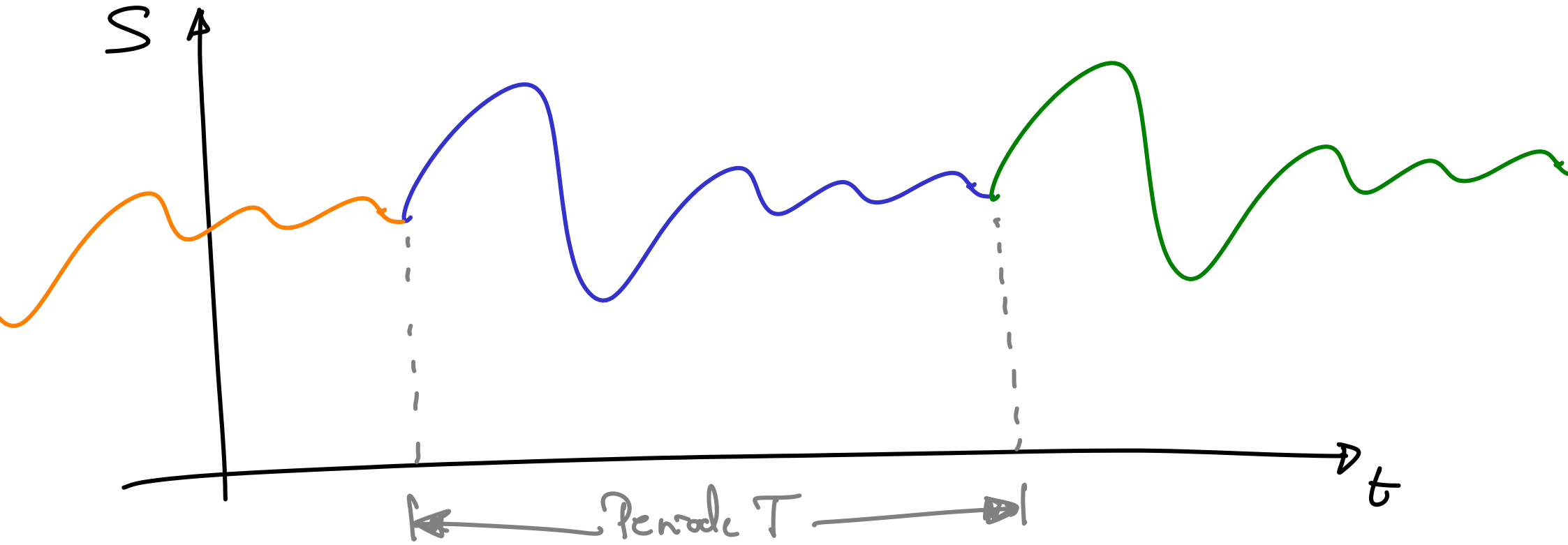
$$\Rightarrow \quad s \approx \sqrt{2Rh} = \sqrt{2 \cdot 6400\,km \cdot 2m} =$$

$$= \sqrt{4 \cdot 6{,}4}\;km \approx 5\,km$$





$$\tan \alpha = \frac{8}{100} = 0{,}08 = 8\%$$



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

später: S ist Summe von viele sin-/cos-Termen

$$\sin\left(\frac{2\pi}{T}t\right),\ \sin\left(2\cdot\frac{2\pi}{T}t\right),\ \sin\left(3\cdot\frac{2\pi}{T}t\right)$$

$$\cos\left(\text{---}\right),\ \cos\left(\text{---}\right),\ \ldots$$

harmon. Schwingung

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

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

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

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

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

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

$$= S(t)$$