TBU 8A, 27.3.2015

1. ⋮

173. Tag: 12.5 %
174. Tag: 25 %
175. Tag: 50 %
176. Tag: 100 %

} 3 Tage

2. $20d \longrightarrow 32$-fach

$4d$: 4 Tage sind $\frac{1}{5}$ von 20 Tagen

$q_1 = 32^{1/5} = (2^5)^{1/5} = 2^1 = \underline{\underline{2}}$

$2d$: Hälfte von 4 Tagen

$q_2 = (q_1)^{1/2} = \underline{\underline{\sqrt{2}}}$

3. $q = \frac{1}{2}$; $\tau = 8.0207d$

Setze $N_0 = 1g$

$\Rightarrow N(t) = 1 \cdot \left(\frac{1}{2}\right)^{t/8.0207}$

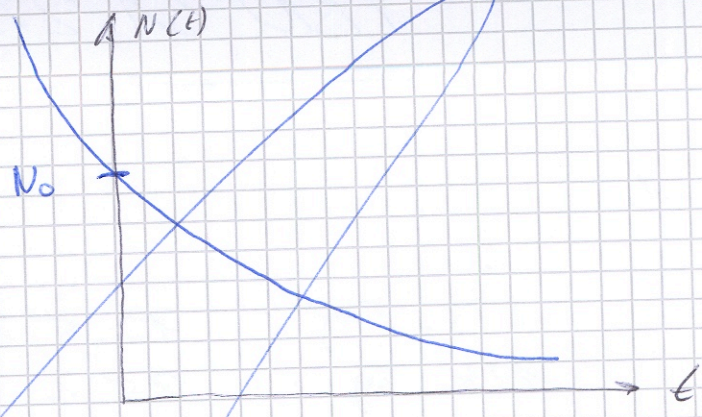
$N(t=1) = 1 \cdot \left(\frac{1}{2}\right)^{\frac{1}{8.0207}} \cong 0.91721g$

Abnahme $= 1g - 0.91721g = 0.08279g$

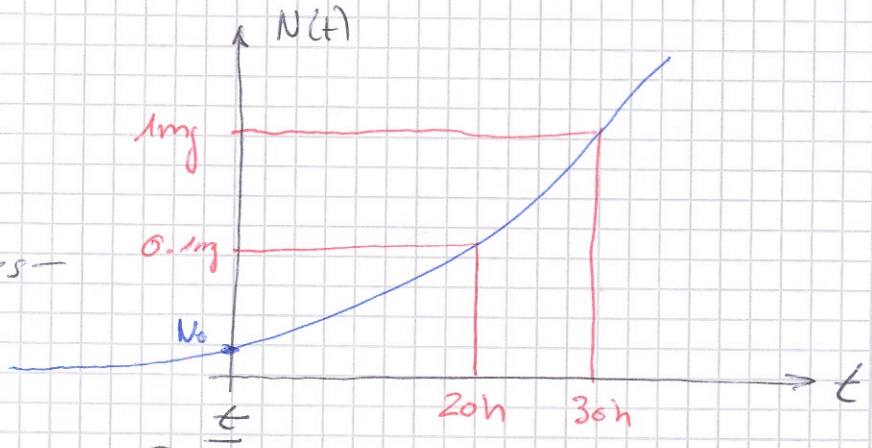
$\hookrightarrow$ Abnahme ist $\underline{\underline{-8.28\,\%}}$

(8.279088)

4



(4)



Nehme Menge bei $t = 20h$ als Anfangsmenge N_0:

$$N(t) = 0.1\,mg \cdot 2^{\frac{t}{\tau}}$$

Von $t = 20h$ (neuer Nullpunkt) bis 30h dauert es 10h:

$$N(t = 10h) = 0.1\,mg\, 2^{\frac{10}{\tau}} = 1\,mg \;/ : 0.1$$

$$2^{\frac{10}{\tau}} = 10 \;/\; \log$$

$$\log\left(2^{\frac{10}{\tau}}\right) = \log 10$$

$$\frac{10}{\tau} \cdot \log 2 = \log 10 \;/ \cdot \tau \;/ : \log 10$$

$$\frac{10 \cdot \log 2}{\log 10} = \tau \approx \underline{3.0103h}$$

Die tatsächliche Anfangsmenge liegt bei $t = -20h$ bez. des neu gezählten Nullpunktes:

$$N_0 = N(t = -20h) = 0.001\,mg$$

$$= \underline{1\,\mu g}$$

$$\longrightarrow N(t) = 1\,\mu g \cdot 2^{\frac{t}{\tau}}$$

$$N(t) = 1\mu g \cdot 2^{\frac{t}{\tau}}$$

$$N(t) = 1\mu g \cdot 2^{\frac{t}{\tau}} = 10^6 \mu g$$

$$2^{\frac{t}{\tau}} = 10^6 \quad / \log$$

$$\frac{t}{\tau} \cdot \log 2 = \log 10^6 = 6$$

$$t = \frac{6 \cdot \tau}{\log 2} = \underline{\underline{60\,h}}$$

(5) $1880 \longrightarrow 2012$: 132 Jahre

$13.75°C \rightarrow 14.6°C$: $13.75 \cdot q = 14.6°$

$$q = \frac{14.6}{13.75} \approx 1.06182$$

$$T(t) = 14.6 \cdot q^{\frac{t}{132}}$$

a) $T(t) = 14.6 \cdot q^{\frac{t}{132}} = 16 \quad / : 14.6$

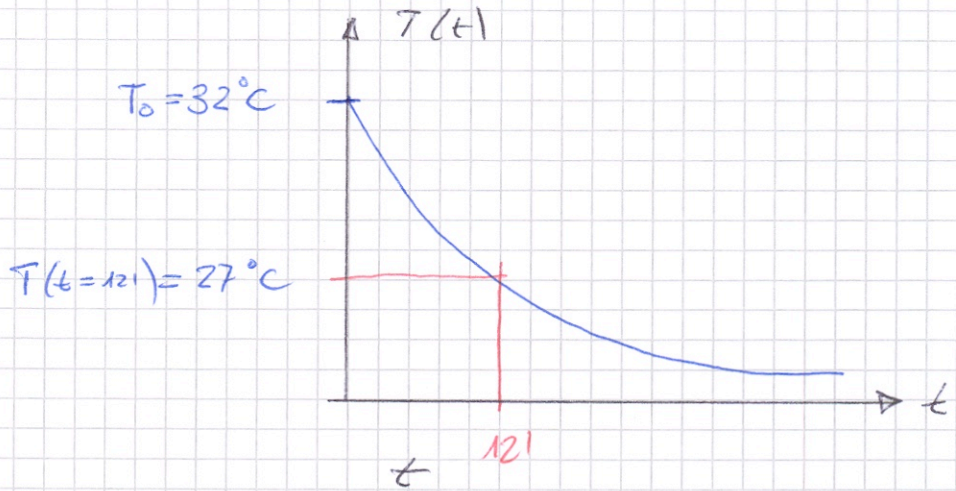
$$q^{\frac{t}{132}} = \frac{16}{14.6} \quad / \log$$

$$\frac{t}{132} \cdot \log q = \log\left(\frac{16}{14.6}\right)$$

$$t = \frac{132 \cdot \log\left(\frac{16}{14.6}\right)}{\log q} \approx \underline{\underline{201.506\,J}}$$

b) $$t = \frac{132 \cdot \log\left(\frac{20}{14.6}\right)}{\log q} \approx \underline{\underline{692.563\,J}}$$

(6)



$$T(t) = 32 \cdot \left(\frac{1}{2}\right)^{\frac{t}{\tau}}$$

$$T(t=12') = 32 \cdot \left(\frac{1}{2}\right)^{\frac{12}{\tau}} = 27 \quad / : 32$$

$$\left(\frac{1}{2}\right)^{\frac{12}{\tau}} = \frac{27}{32} \quad / \log$$

$$\frac{12}{\tau} \cdot \log\left(\frac{1}{2}\right) = \log(\;) \quad / \cdot \tau \; : \log(\;)$$

$$\frac{12 \cdot \log(1/2)}{\log\left(\frac{27}{32}\right)} = \tau \cong 48.9571' \cong 48.96' \cong 49'$$

$$T(t) = 32 \cdot \left(\frac{1}{2}\right)^{\frac{t}{\tau}} = 7 \quad / : 32$$

$$\left(\frac{1}{2}\right)^{\frac{t}{\tau}} = \frac{7}{32} \quad / \log$$

$$\frac{t}{\tau} \cdot \log(1/2) = \log(7/32)$$

$$t = \frac{\tau \cdot \log(7/32)}{\log(1/2)} \cong 107.34557' \cong 107.35'$$