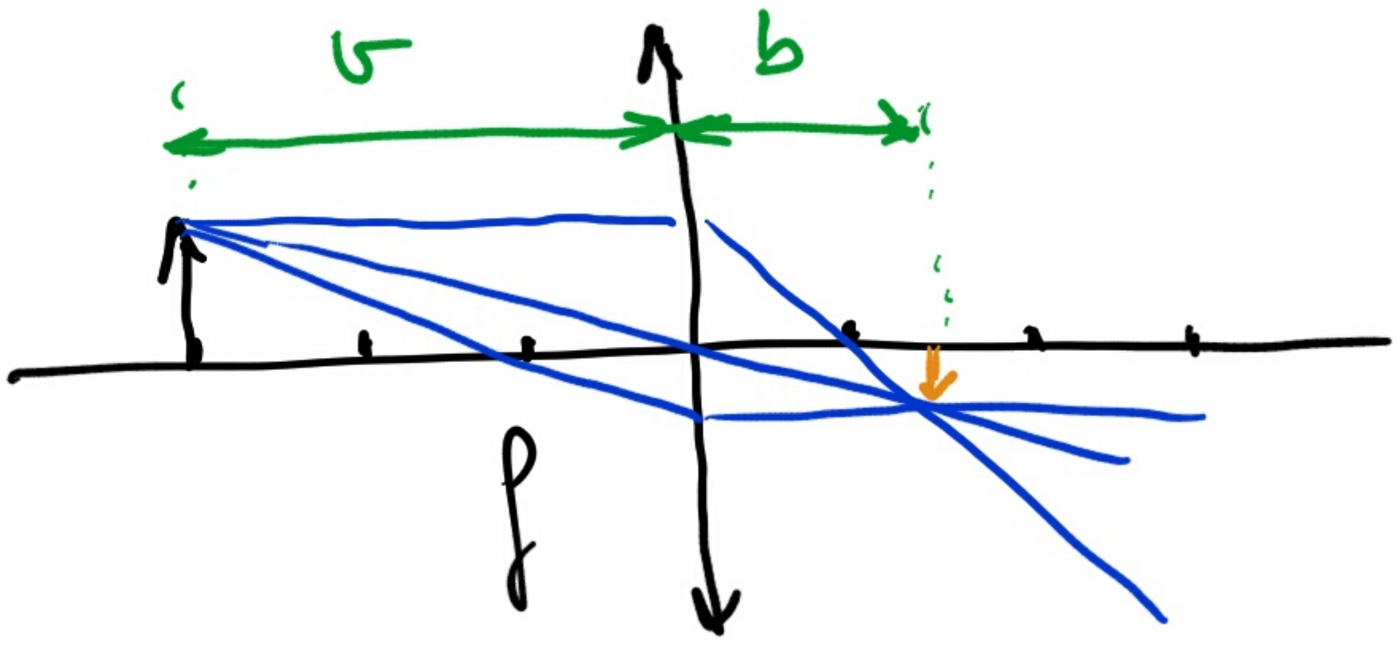
① $\frac{1}{s} + \frac{1}{b} = \frac{1}{f}$




$\frac{1}{30} + \frac{1}{b} = \frac{1}{10}$

$\frac{1}{b} = \frac{1}{10} - \frac{1}{30} = \frac{3-1}{30} = \frac{2}{30}$

$\Rightarrow b = \frac{30}{2} = \boxed{15}$

↳ reëel, omgekeerd, kleiner

↳ (C)

② Oppervlaktewarmte = afgegeven warmte

$$\left.\begin{array}{l} \text{of } Q_A + Q_B + Q_C = 0 \\ \Rightarrow -Q_A = Q_B + Q_C \end{array}\right\} \quad Q = m \cdot c \cdot \Delta\theta$$

$$\Rightarrow -m\, c_A (\theta_A - \theta) = m\, c_B (\theta_B - \theta) + m\, c_C (\theta_C - \theta)$$

$$-c_A\theta_A + c_A\theta = c_B\theta_B - c_B\theta + c_C\theta_C - c_C\theta$$

$$\theta(c_A + c_B + c_C) = c_A\theta_A + c_B\theta_B + c_C\theta_C$$

$$\Rightarrow \theta = \frac{c_A\theta_A + c_B\theta_B + c_C\theta_C}{c_A + c_B + c_C}$$

C

(3) $\rho_{H_2O} = 1000\ kg/m^3$

Opwaartse kracht $F = \rho_{H_2O} \cdot V_{H_2O} \cdot g$

$\shortparallel$

Neerwaartse kracht $F = m_K \cdot g$

$\rho_{H_2O} \cdot V_{H_2O} \cdot g = m_K \cdot g$

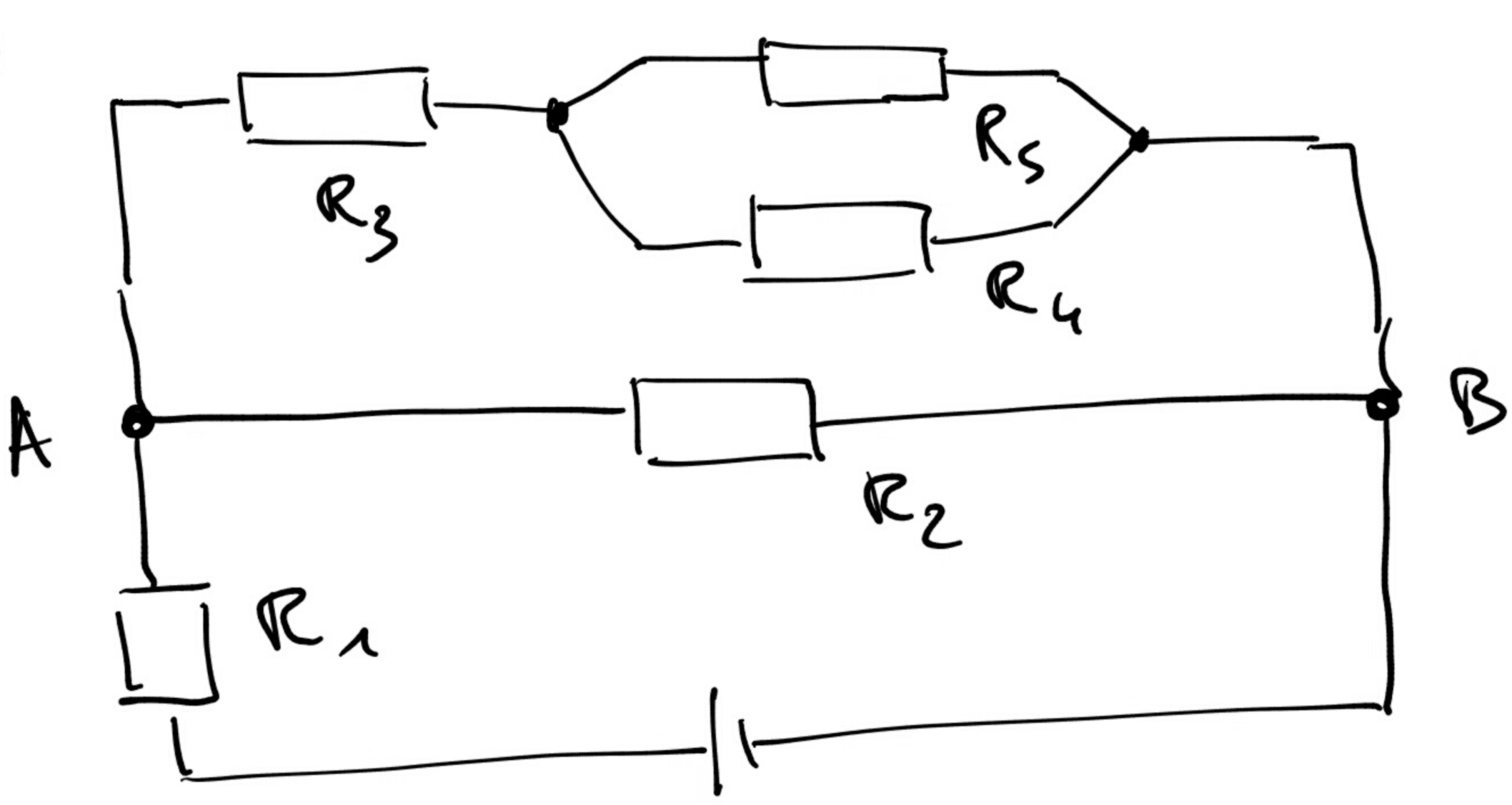
$1000 \cdot \frac{3}{4} V_K = m_K$

$m_K = 750\ V_K = \rho_K \cdot V_K$

$\Rightarrow \rho_K = 750\ kg/m^3$

(D)

4




Alle weerstanden R zo groot mogelijk?

$R_1$ = R in serie met $R_{AB}$

Parallelschakeling $R_{tot} < R_x$

$$\frac{1}{R_{tot}} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}$$

↳ stel $R_1$ = kleinste

$\frac{1}{R_1}$ = grootste

$$\Rightarrow \frac{1}{R_{tot}} > \frac{1}{R_1} \Rightarrow R_{tot} < R_1$$

Dus $R_{AB} < R_2 \Rightarrow R_2 = R = R_1$

$R_{AB} < R_1 \Rightarrow$ grootste spanning over $R_1$!

(A)

⑤ $\alpha = 2n + 2p \rightarrow {}^{4}_{2}\alpha$ $\left\{ {}^{n+p}_{p} X \right.$

$${}^{14}_{7}N + {}^{4}_{2}\alpha \rightarrow {}^{b}_{a}X + {}^{1}_{1}p$$

$14 + 4 = b + 1 \rightarrow b = 17$

$7 + 2 = a + 1 \rightarrow a = 8$

B

⑥ $X \rightarrow A$ op $r=0$, $t_{1/2} = 12\,h$

$Y \rightarrow A$ op $r_2 0$, $t_{1/2} = 8\,h$

$N = N_0 \cdot e^{-\lambda t}$

$\lambda$ = vervalconstante

Halveringstijd:

$$\frac{1}{2} N_0 = N_0 \cdot e^{-\lambda t_{1/2}} \Rightarrow \ln\left(\frac{1}{2}\right) = -\lambda t_{1/2}$$

$$\ln\left(\frac{1}{2}\right) = \ln\left(2^{-1}\right) = -1 \ln(2) = -\lambda t_{1/2}$$

$$\Rightarrow \lambda = \frac{\ln(2)}{t_{1/2}} \quad \begin{cases} \lambda_X = \dfrac{\ln(2)}{12} \\ \lambda_Y = \dfrac{\ln(2)}{8} \end{cases}$$

$$N_X = A e^{-\frac{\ln(2)}{12} \cdot 24} = A e^{-2\ln(2)}$$

$$= A e^{\ln\left(\frac{1}{4}\right)} = \frac{1}{4} A$$

$$N_Y = A \cdot e^{-\frac{\ln(2)}{8} \cdot 24} = A \cdot e^{-3\ln(2)}$$

$$= A \cdot e^{\ln\left(\frac{1}{8}\right)} = \frac{1}{8} A$$

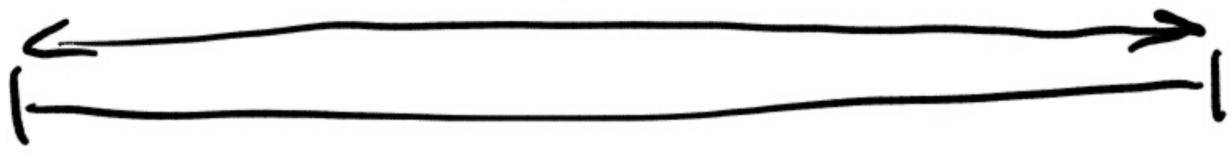
$$N_X + N_Y = \left(\frac{1}{4} + \frac{1}{8}\right) A = \left(\frac{2}{8} + \frac{1}{8}\right) A = \frac{3}{8} A$$ ©

OF

| $t \rightarrow$ | 0 | 8 | 12 | 16 | 24 | |
|---|---|---|---|---|---|---|
| 12 u — $N_X$ | | | 1/2 | | 1/4 | x A |
| 8 u — $N_Y$ | | 1/2 | | 1/4 | 1/8 | x A |

$$N_X + N_Y = \left(\frac{1}{4} + \frac{1}{8}\right) A = \frac{3}{8} A$$ C

⑦ Jan




Ine = 0,2 s ($t_R$)

$v_e = 360\ m/s$ ← Stef = 3 s ($t_e$)

? $v_R$ ?

Stef : $x = v_e \cdot t_e = 360 \cdot 3 = 1080\ m$

Ine : $x = v_R \cdot t_R \Rightarrow v_R = \frac{x}{t_R}$

$= \frac{1080}{\frac{2}{10}}$

$= \frac{1080}{\frac{2}{10}} \cdot 10$

$= 5400\ m/s$

D

(6) $E_p = \frac{1}{2} k x^2$ $\quad E_k = \frac{1}{2} m v^2$

Geen verliezen $\Rightarrow$ $E_p = E_k$

$\frac{1}{2} k x^2 = \frac{1}{2} m v^2$

$\Rightarrow x^2 = \left(\frac{m}{k}\right) \cdot v^2$

$\left(\frac{m}{k}\right)$ → constant!

$\Rightarrow x^2$ r.e. $v^2$ $\Rightarrow$ $x$ r.e. $v$

Of $\frac{v_1}{v_2} = \frac{x_1}{x_2}$

$\Rightarrow v_2 = \frac{x_2}{x_1} \cdot v_1 = \frac{2 \cdot 10^{-2}}{1 \cdot 10^{-2}} \cdot 1 = 2 \text{ m/s}$

(C)

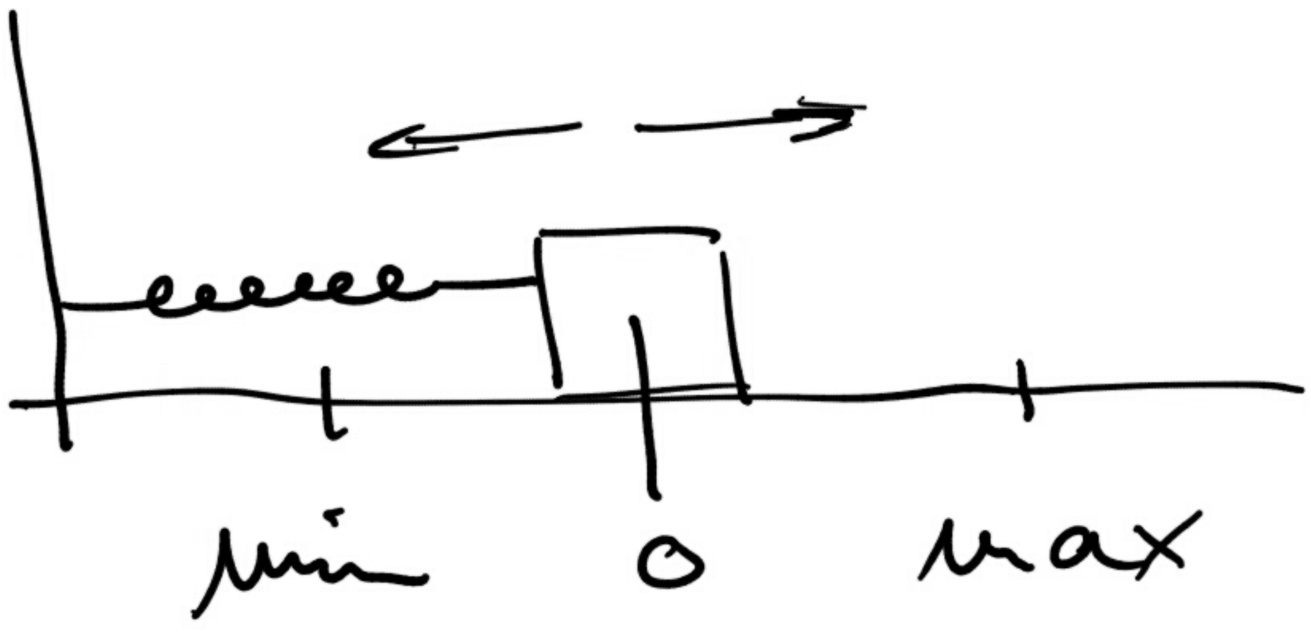
⑨ $\lambda = \frac{v}{f}$

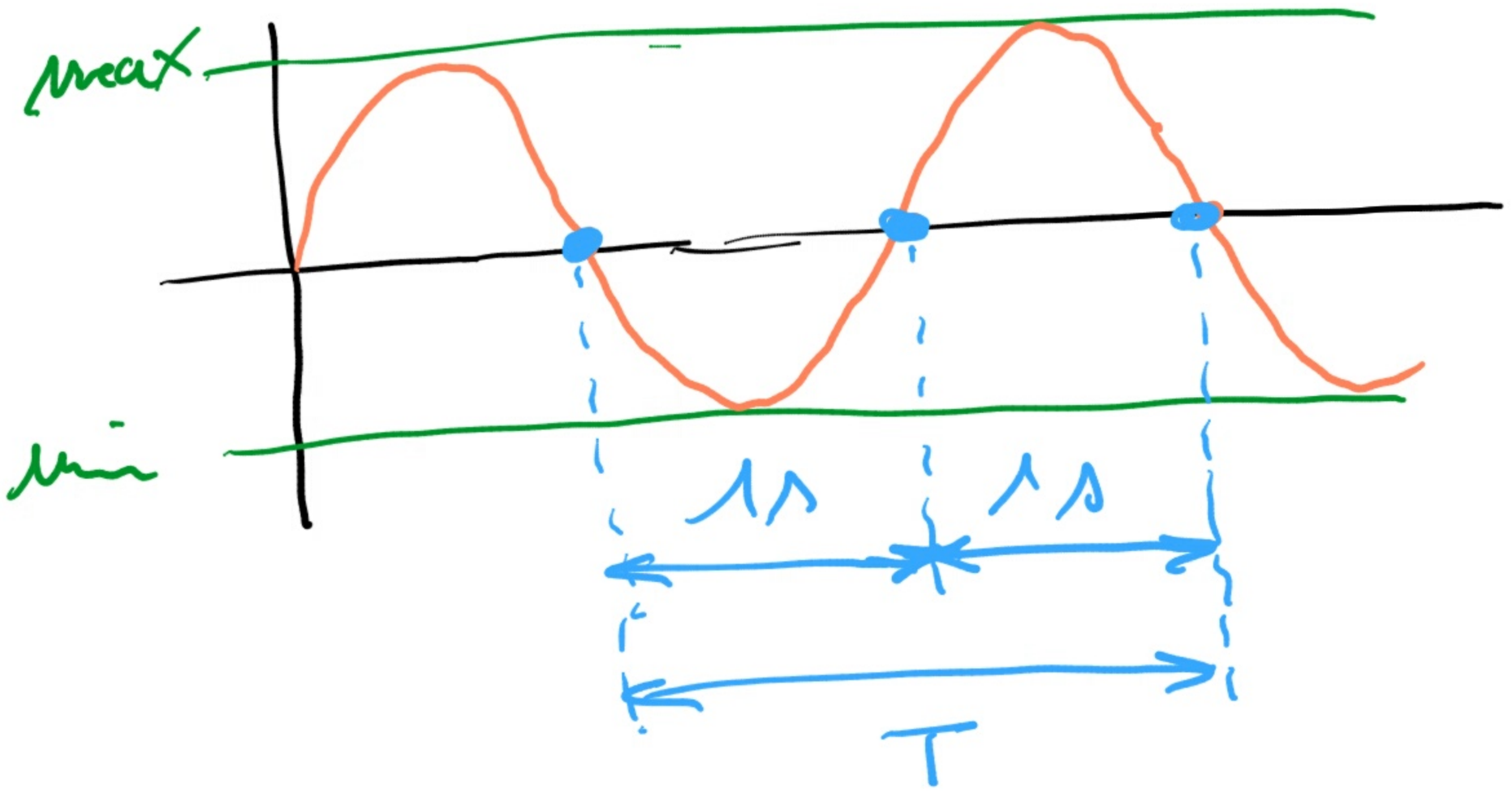
fig 1 $\rightarrow$ $\lambda = 4\ cm$

fig 2 $\rightarrow$ $f = \frac{1}{1} = \frac{1}{2}\ Hz$

$v = \lambda \cdot f = 4 \cdot \frac{1}{2} = \boxed{2\ cm/s}$ (C)

10




$T \Rightarrow$ 2 opeenvolgende doorgangen door nul $= 1\,s \Rightarrow \underline{T = 2\,s}$

$$T = 2\pi\sqrt{\frac{m}{k}} \Rightarrow \left(\frac{T}{2\pi}\right)^2 = \frac{m}{k}$$

$$\Rightarrow k = m\left(\frac{2\pi}{T}\right)^2$$

$$= 0{,}2\left(\frac{2\pi}{2}\right)^2$$

$$= 0{,}2\,\pi^2 \ N/m$$

8