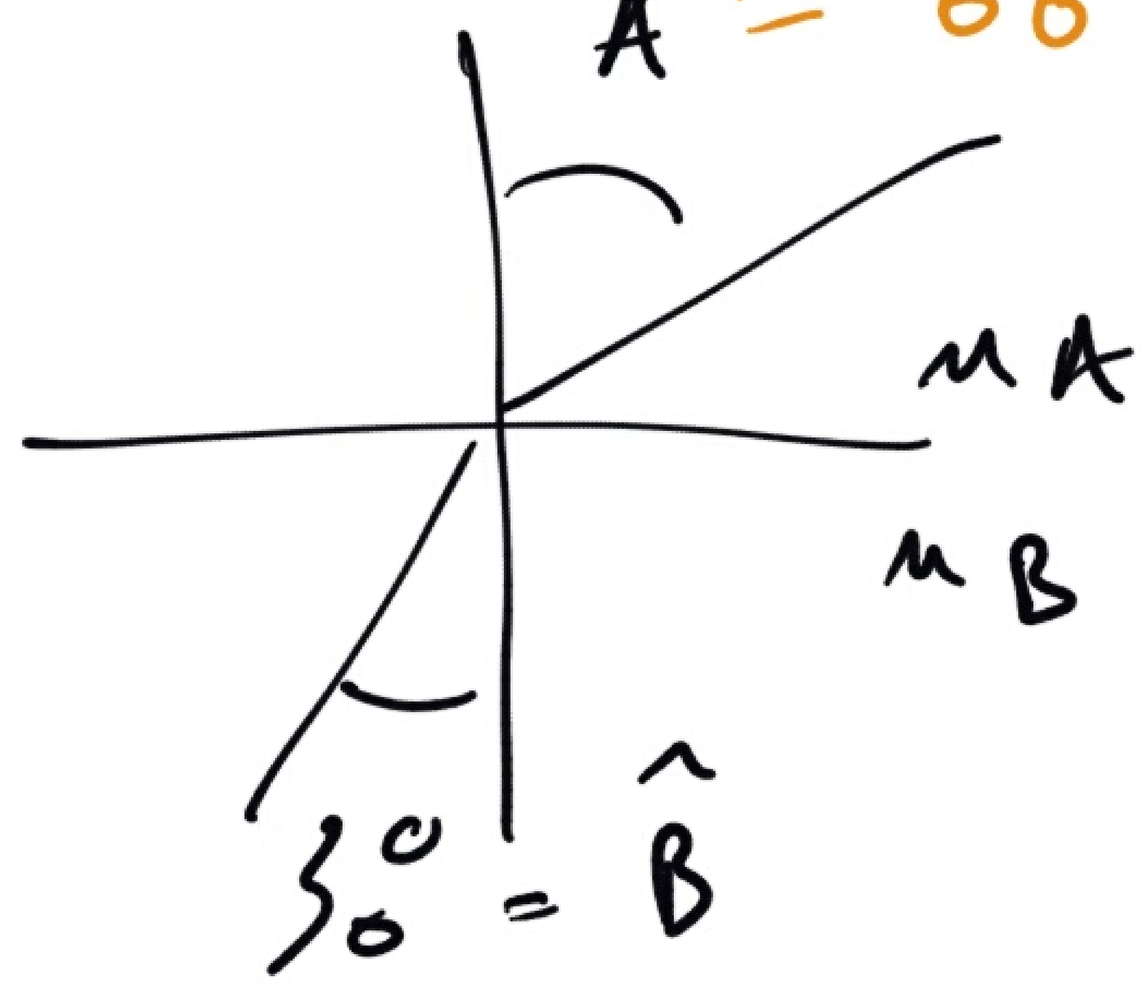
(1)

$\hat{A} = 60°$



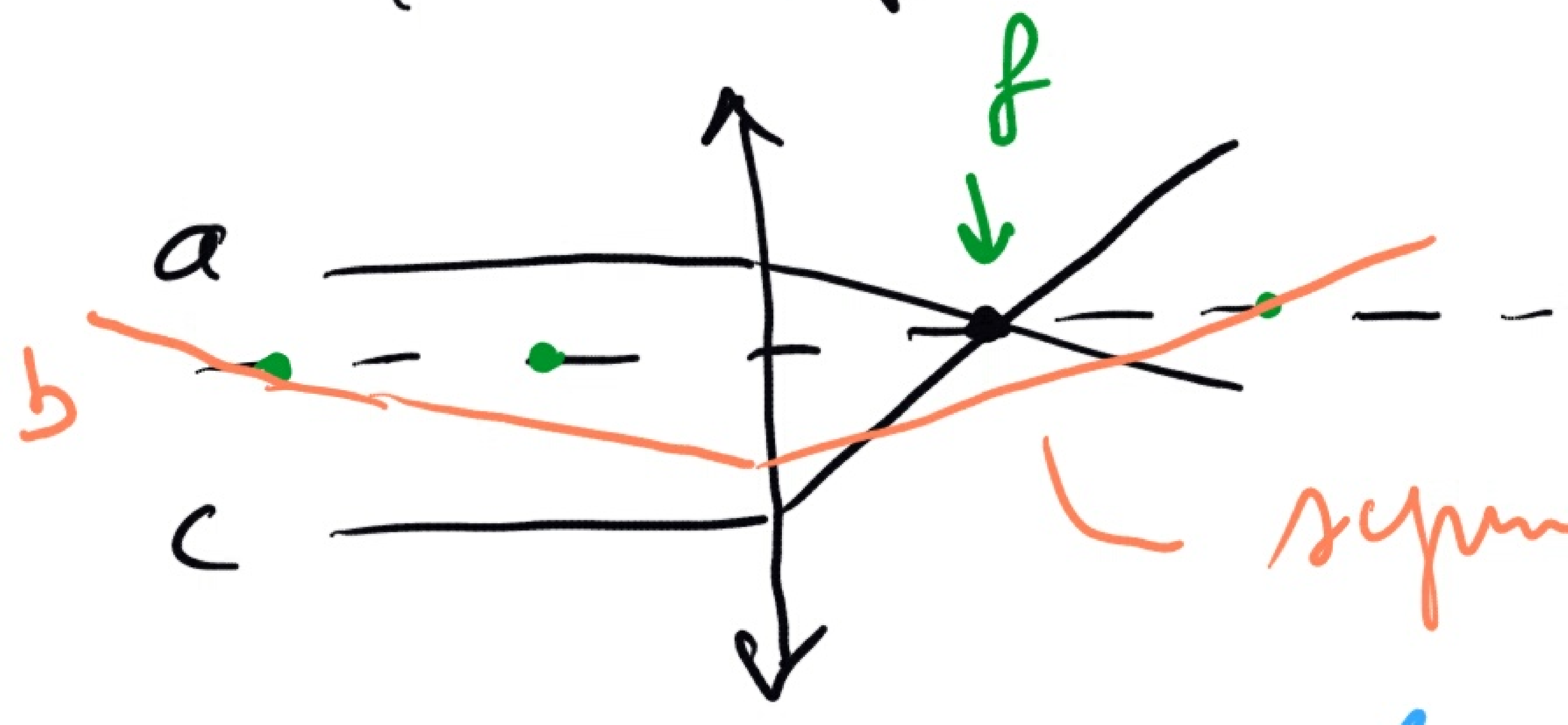
$$n_A \cdot \sin \hat{A} = n_B \cdot \sin \hat{B}$$

$$1 \cdot \sin \hat{A} = \sqrt{3} \cdot \frac{1}{2}$$

$$\Rightarrow \boxed{\sin \hat{A} = 60°}$$

C

② a en c ⇒ vallen in evenwijdig en gaan bijgevolg door het brandpunt f



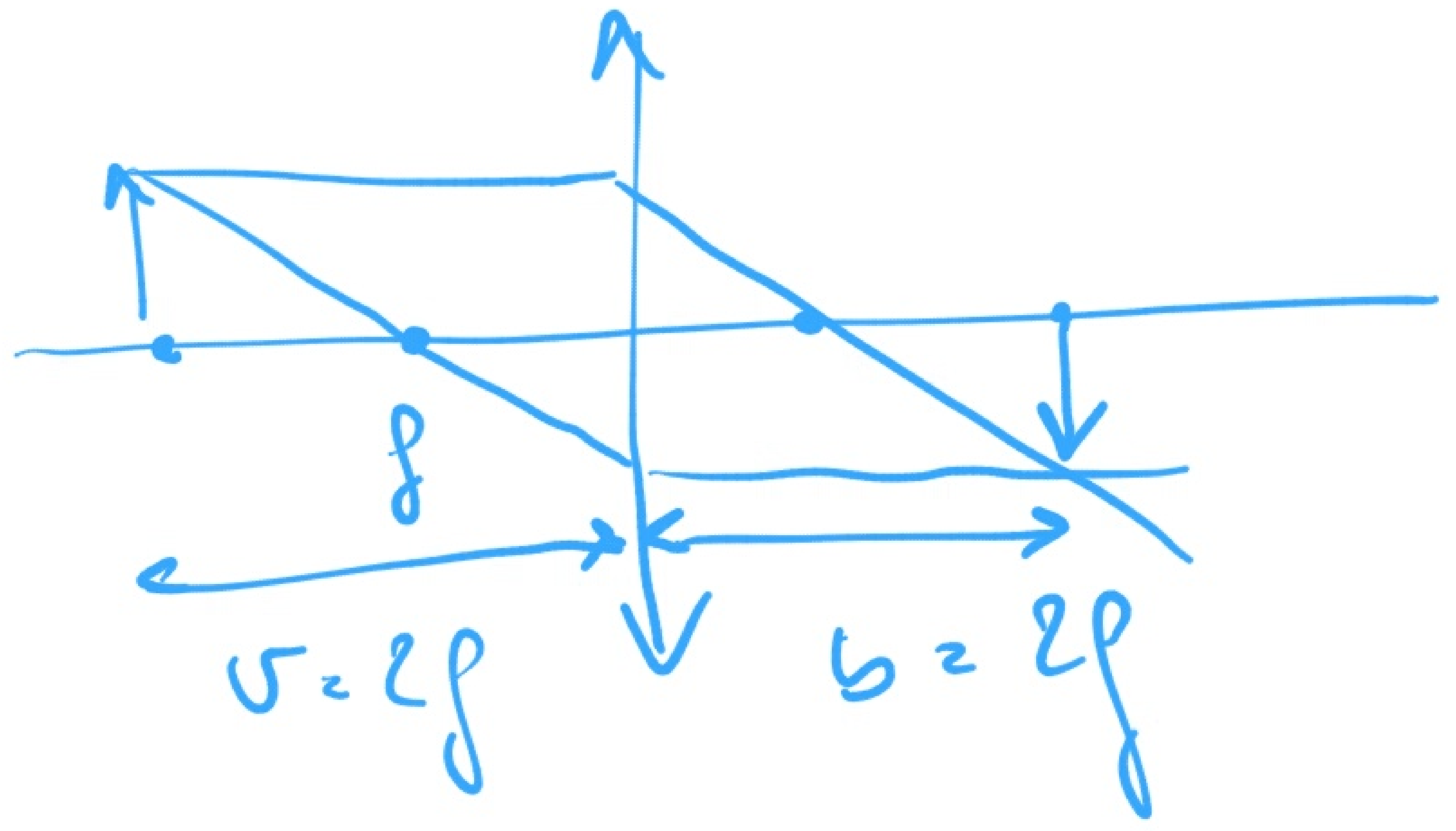
lenzenmakers formule : $\frac{1}{v} + \frac{1}{b} = \frac{1}{f}$

⇒ straal b start ongeveer op 2.f op de tekening : $v = 2f$

$$\frac{1}{2f} + \frac{1}{b} = \frac{1}{f} \Rightarrow \frac{1}{b} = \frac{1}{f} - \frac{1}{2f} = \frac{1}{2f}$$

of afstand $\boxed{b = 2f}$

B



3 Waterdruk $(g = 10\,m/s^2,\ \rho_{H_2O} = 1000\,kg/m^3)$

$= \rho \cdot g \cdot h = 1000 \cdot 10 \cdot (40+10) \cdot 10^{-2}$

$= 10^3 \cdot 500 \cdot 10^{-2} = 5000\,Pa = 5\,kPa$

Luchtdruk $= 100\,kPa$

Samen: $100 + 5 = \boxed{105\,kPa}$

D

(4) $$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$

$$\Rightarrow T_2 = \frac{p_2 V_2}{p_1 V_1} \cdot T_1$$

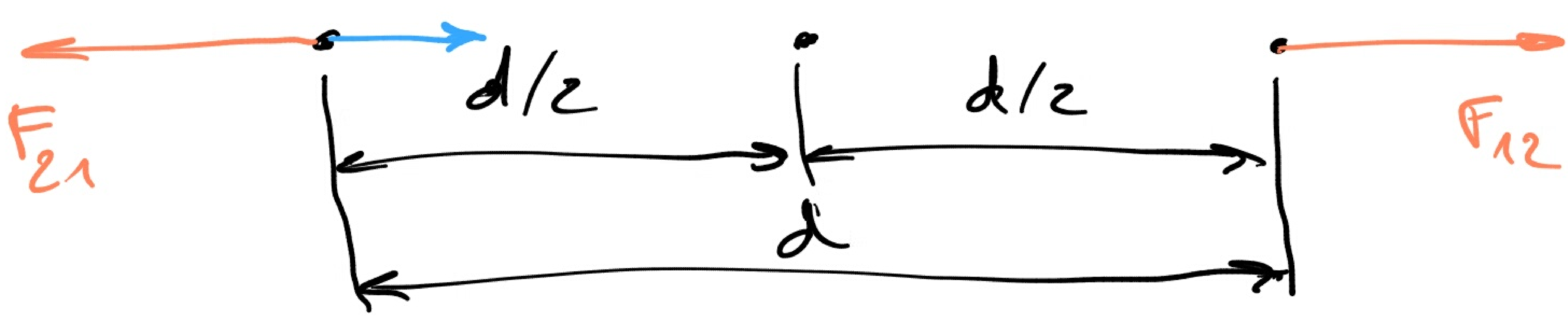
grafiek bij $V = 100$

$$T_2 = \frac{100 \cdot 400}{100 \cdot 200} \cdot 293$$

$$= 2 \cdot 293 = \boxed{586\ K}$$

C

5



$F_{31} = -\frac{1}{2} F_{21}$ want $R = \frac{1}{2} F_{21}$

$$F_{21} = \frac{Q_1 Q_2}{4\pi\varepsilon_0 d^2} \qquad F_{31} = \frac{Q_1 Q_3}{4\pi\varepsilon_0 \left(\frac{d}{2}\right)^2}$$

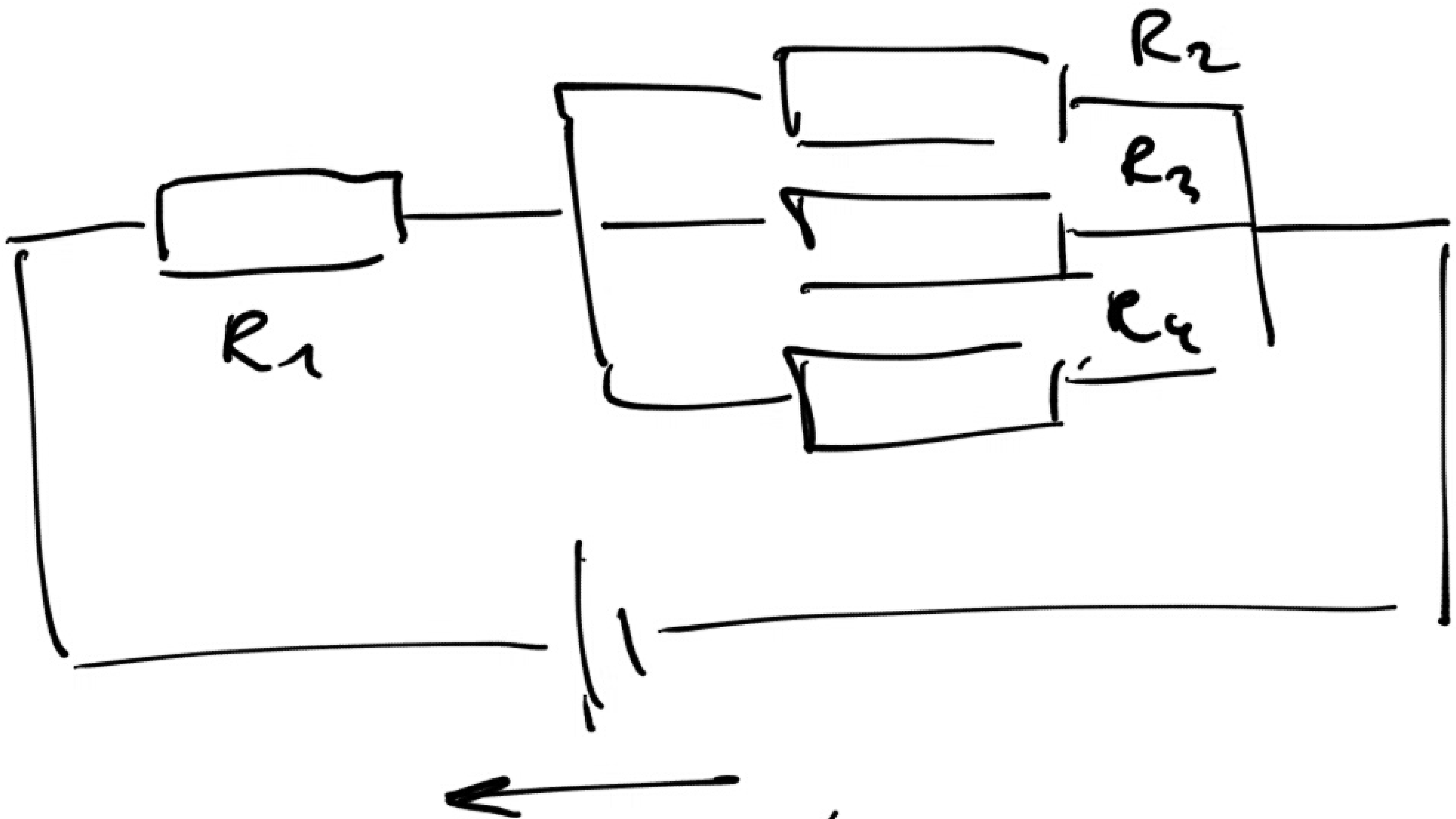
$$\frac{F_{31}}{F_{21}} = \frac{\dfrac{\cancel{Q_1} Q_3}{\cancel{4\pi\varepsilon_0} (\cancel{d}/2)^2}}{\dfrac{\cancel{Q_1} Q_2}{\cancel{4\pi\varepsilon_0}\, \cancel{d^2}}} = -\frac{1}{2}$$

$$\frac{\dfrac{Q_3}{1/4}}{Q_2} = \frac{4 Q_3}{Q_2} = -\frac{1}{2}$$

$$\Rightarrow Q_3 = -\frac{Q_2}{8} = \frac{|Q|}{8}$$

D

6 $R = 200\,\Omega$ (alle R), $U = 24\,V$



24 V

$$I = I_1 \qquad I_4 = \frac{1}{3} I_1$$

$$R_{234} = \frac{1}{\frac{1}{200} + \frac{1}{200} + \frac{1}{200}} = \frac{200}{3}\,\Omega$$

$$U_{234} = I \cdot R_{234} = \frac{200}{3} \cdot I_1 = U_4$$

$$\frac{P_1}{P_4} = \frac{U_1 \cdot I_1}{U_4 \cdot I_4} = \frac{(\cancel{200} \cdot \cancel{I_1}) \cdot \cancel{I_1}}{\left(\frac{\cancel{200}}{3} \cdot \cancel{I_1}\right) \cdot \frac{\cancel{I_1}}{3}} = \frac{1}{\frac{1}{9}}$$

$$\boxed{\frac{P_1}{P_4} = 9}$$

D

7 $\mu = 4\pi . 10^{-7}$

Uit grafiek $\rightarrow$ $I = 4A$

$B = 16.\pi.10^{-3}\,T$

$$B = \mu \frac{N.I}{l} \Rightarrow N = \frac{B.l}{\mu.I}$$

$$N = \frac{\cancel{16}\cancel{\pi}.10^{-3}.10.10^{-2}}{\cancel{4}\cancel{\pi}10^{-7}.\cancel{4}} = \frac{10^{-3}.10^{-1}}{10^{-7}}$$

$$= \frac{1}{10^{-3}} = 10^{3} = \boxed{1000}$$

C

8

$$ {}^{235}_{92}U + {}^{1}_{0}n \longrightarrow {}^{A}_{Z}X + {}^{143}_{56}Ba + 3\,{}^{1}_{0}n $$

? ${}^{A}_{Z}X$?

$$ 235 + 1 = A + 143 + 3.1 \Rightarrow A = 90 $$
$$ 92 + 0 = Z + 56 + 3.0 \Rightarrow Z = 36 $$

$$ \Rightarrow {}^{90}_{36}Kr $$

D

⑨ Eenparig veranderlijke rechtlijnige beweging.

$a = \text{constant}$

$v = v_0 + a \cdot t$

$$s - \underbrace{s_0}_{= 0} = \int_0^t v\,dt = \int_0^t (v_0 + at)\,dt$$

$$= \underbrace{v_0}_{= 0} \cdot t + \frac{1}{2} a t^2$$

$s = \frac{1}{2} a t^2$ na $1\,s \Rightarrow 0{,}2 = \frac{1}{2} \cdot a \cdot 1^2$

$\Rightarrow a = 0{,}4\ m/s^2$

na $3\,s \Rightarrow s = \frac{1}{2} \cdot 0{,}4 \cdot 3^2$

$= 0{,}2 \cdot 9$

$= \boxed{1{,}8\ m}$

(D)

(10) $y(x,t) \rightarrow$ rechtslopend

$v = 20 \ m/s$ $\qquad T = \frac{\lambda}{v}$

A en B $\rightarrow \lambda = 4 \ m \rightarrow T = \frac{4}{20} = 0{,}2 \ s$

C en D $\rightarrow \lambda = 0{,}4 \ m \rightarrow T = \frac{0{,}4}{20} = \cancel{0{,}02 \ s}$

De golf verschuift naar rechts:

per $0{,}1 \ s \rightarrow 2 \ m$

per $0{,}05 \ s \rightarrow 1 \ m$

na $0{,}05 \ s \rightarrow \boxed{y = -1}$

B