~~A.~~ ~~4m i 5m~~

~~$\Delta h = 10cm$~~

~~$Q = ?$~~

~~$V = 4m \cdot 5m \cdot 0,1m = 2m^3$~~

~~$\rho = 1000 \frac{kg}{m^3}$~~

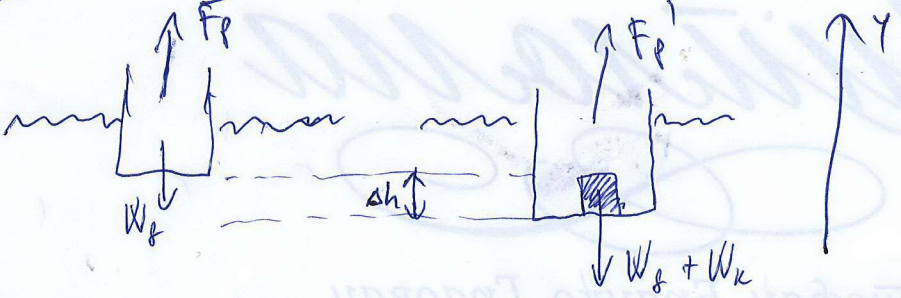
~~$m = \rho \cdot V = 2000 kg$~~

~~$Q = mg = 2000 \cdot 10 = 20000 N$~~

~~Potisak: $\rho_{vode} \cdot V_{vode} \cdot g = m \cdot g = Q$~~

~~$Q = 1000 \frac{kg}{m^3} \cdot 2m^3 \cdot 10 \frac{m}{s^2} = 20\,000 N$~~

9.



$F_p = W_f$

$F_p - W_f = 0$ (1)

$F_p' = W_k + W_f$

$F_p' - W_k - W_f = 0$ (2)

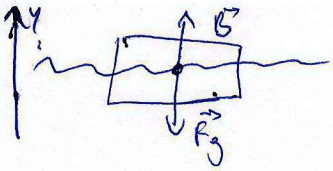
(1) - (2) $\quad F_p - \cancel{W_f} - F_p' + W_k + \cancel{W_f} = 0$

$W_k = F_p' - F_p = \rho g V' - \rho g V = \rho g (V' - V) = \rho g \Delta V =$

$= \rho g \cdot a \cdot b \cdot \Delta h = 1000 \frac{kg}{m^3} \cdot 10 \frac{m}{s^2} \cdot 4m \cdot 5m \cdot 0,1m$

$= 20\,000 N = 20 kN$

2.



$V_{potopljeno} = V - V_{izmad}$

$$B - F_g = 0$$

$$\rho_{vode} \cdot V_{potopljeno} \cdot \cancel{g} - \rho_{leda} \cdot V \cdot \cancel{g} = 0$$

$$\rho_{vode} (V - V_{izmad}) = \rho_{leda} V$$

$$1 - \frac{V_{izmad}}{V} = \frac{\rho_{leda}}{\rho_{vode}}$$

$$1 - \frac{\rho_{leda}}{\rho_{vode}} = \frac{V_{izmad}}{V}$$

$$\frac{V_{izmad}}{V} = 1 - \frac{920}{1030} \approx 11\%$$

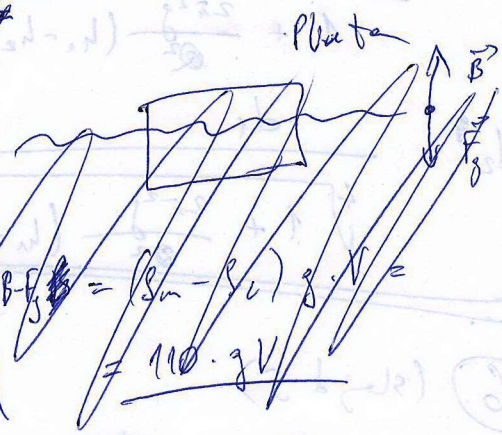
~~2. $\rho_{leda} = 920 \frac{kg}{m^3}$~~

~~$\rho_{morska} = 1030 \frac{kg}{m^3}$~~

~~$\rho_{morska} V_{morska} = \rho_{leda} V_{leda}$~~

~~$\frac{V_{leda}}{V_{morska}} = \frac{\rho_{morska}}{\rho_{leda}} = \frac{1030}{920} = 1{,}12$~~

~~$\Rightarrow 12\%$ iznad površine vode~~



~~$B - F_g = (\rho_m - \rho_l) g V = 110 \cdot gV$~~

3. jednake (slajd 2)

4. (slajd 3)

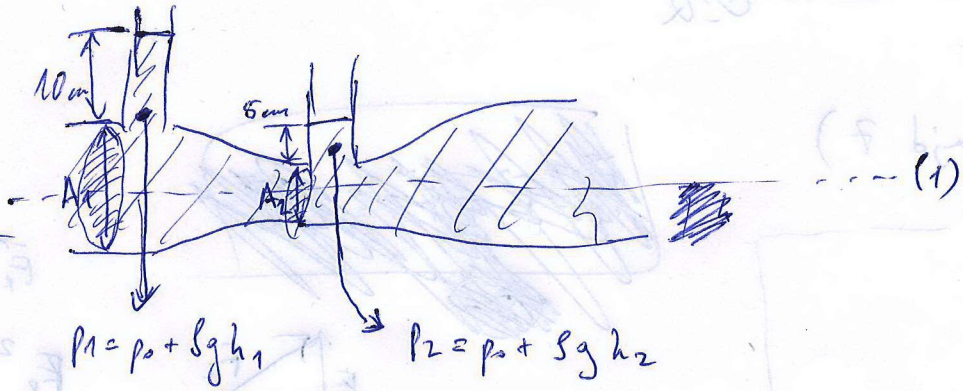
a) Изнад крила. Притисак је изнад крила мањи него испод ⇒ имамо резултујућу силу на горе.

b) Притисак је већи испод крила. Флуид који се креће брзо има мањи притисак него флуид који се креће споро

5. (slajd 4)

$A_1 = 10^{-3} m^2$

$Q = 3 \cdot 10^{-4} \frac{m^3}{s}$



---- (1)

$A_1 = d_1^2 \pi$

$A_2 = d_2^2 \pi$

$A_1 v_1 = A_2 v_2 = Q$

$d_1^2 \pi v_1 = d_2^2 \pi v_2 = Q$

$\Rightarrow \boxed{v_1 = \frac{Q}{d_1^2 \pi}} \quad \boxed{v_2 = \frac{Q}{d_2^2 \pi}}$

(1) Bernulijeva jednačina

$$\frac{\rho v_1^2}{2} + p_1 + \cancel{\rho g h} = \frac{\rho v_2^2}{2} + p_2 + \cancel{\rho g h}$$

$$\frac{\rho}{2} \frac{Q^2}{d_1^4 \pi^2} + \cancel{p_0} + \rho g h_1 = \frac{\rho}{2} \frac{Q^2}{d_2^4 \pi^2} + \cancel{p_0} + \rho g h_2$$

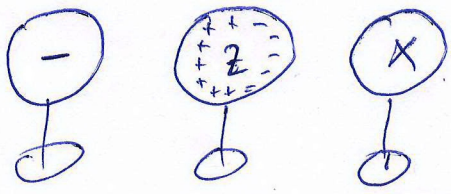
$$\frac{Q^2}{2 d_1^4 \pi^2} + g h_1 - g h_2 = \frac{Q^2}{2 d_2^4 \pi^2}$$

$$d_2^4 = \frac{Q^2}{2\pi^2}\,\frac{1}{\frac{Q^2}{2d_1^4\pi^2} + g(h_1-h_2)\cdot\frac{d_1^4}{d_1^4}} = \frac{d_1^4}{\frac{2\pi^2}{Q^2}\left(\frac{Q^2}{2\pi^2} + g(h_1-h_2)d_1^4\right)}$$

$$d_2^4 = \frac{d_1^4}{1 + \frac{2\pi^2 g}{Q^2}(h_1-h_2)\,d_1^4}$$

$$d_2 = \frac{d_1}{\sqrt[4]{1 + \frac{2\pi^2 g}{Q^2}(h_1-h_2)\,d_1^4}}$$ (izračunajte sami)

(6.) (slajd 5)

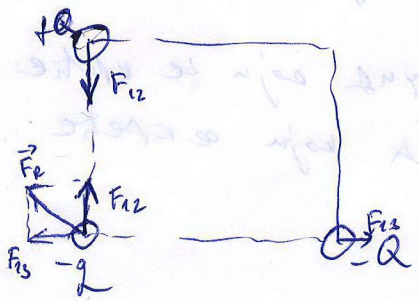


Kad se dovedu u kontakt negativno naelektrisanje prešte

$\Rightarrow$ Z pozitivno, X negativno

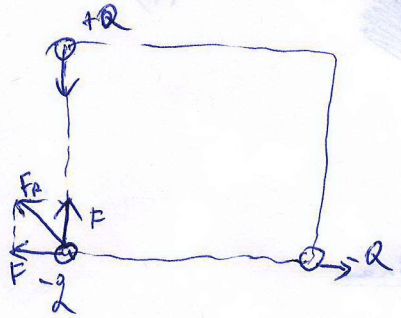
e^- odbijaju e^- a „privlače" pozitivno naelektrisanje (a)

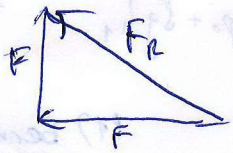
(7.) (Slajd 6)



(1.)

(8.) (Slajd 7)





$\vec{F}_R = \vec{F} + \vec{F}$

$F_R^2 = F^2 + F^2 = 2F^2$

$F_R = \sqrt{2}F$

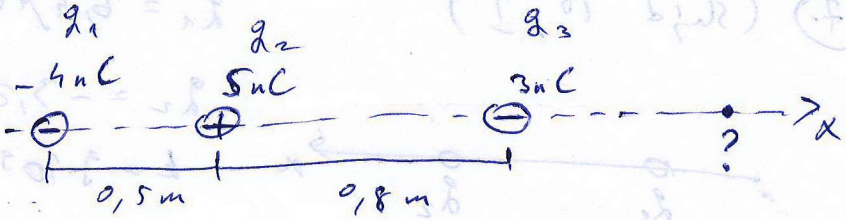
(9.) (Slajd 8)

$\Phi = \frac{\Sigma Q}{\varepsilon_0}$ (e)

10. (slajd 9)

$k = 8{,}98 \cdot 10^9 \frac{Nm^2}{C^2}$

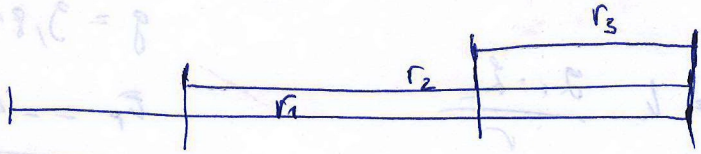
$E(2m) = ?$



$r_1 = 2{,}5m$

$r_2 = 2m$

$r_3 = 1{,}2m$



$\leftarrow E_1$ jer $q_1 < 0$

$\rightarrow E_2$

$\rightarrow E_3$

$$E = -E_1 + E_2 + E_3 = -\frac{q_1 k}{r_1^2} + \frac{q_2 k}{r_2^2} + \frac{q_3 k}{r_3^2} = 24{,}2 \frac{V}{m}$$

11. (slajd 10)

$I = 80mA$

$t = ?$ $N = 3 \cdot 10^{20} (e^-)$

$Q = N \cdot e^-$

$$I = \frac{\Delta Q}{\Delta t} \Rightarrow \Delta t = \frac{\Delta Q}{I} = \frac{N \cdot e}{I} = 6000s$$

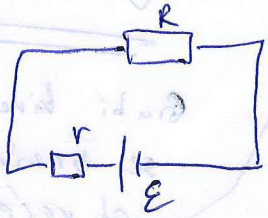
$\Delta t = 100min$

12. (slajd 20, drugi zadatak)

$R = 1{,}6\,\Omega$

$U = 20V$, $r = 2\,\Omega$

$I = ?$



$\mathcal{E} = I \cdot R_e$

$\mathcal{E} = I(R + r)$

$$I = \frac{\mathcal{E}}{R + r} = 2{,}78\,A$$

13. (slajd 11)

C)

A: $I = \frac{\mathcal{E}}{4r}$

B: $I = \frac{\mathcal{E}}{r}$

14. (slajd 12)

a) ostaje $I = \frac{\mathcal{E}}{r}$

15. (slajd 13)

C) $I = \frac{\mathcal{E}}{3r}$ jer je jedan otpornik manje $\Rightarrow$ više osvetljene

16. a) $\frac{1}{R_{e1}} = \frac{1}{18\Omega} + \frac{1}{9\Omega} + \frac{1}{6\Omega} = \frac{6}{18\Omega} \Rightarrow R_{e1} = 3\Omega \Rightarrow R_e = 3\Omega + 12\Omega = 15\Omega$

b) $U = 30V \Rightarrow I_{12} = \frac{U}{R_e} = \frac{30V}{15\Omega} = \boxed{2A} \Rightarrow$ struja kroz $R_4 = 12\Omega$; $U = I \cdot R_{e1} = 6V \Rightarrow$

$I_{12} = I_1 + I_2 + I_3$

$\Rightarrow I_{18} = \frac{6V}{18\Omega} = \frac{1}{3}A$, $I_9 = \frac{6V}{9\Omega} = \frac{2}{3}A$, $I_6 = \frac{6V}{6\Omega} = 1A$

17. (slajd 15, I)

$q_1 = 6,4\,\mu C$

$q_2 = -3,2\,\mu C$

$k = 9\cdot 10^9 \frac{Nm^2}{C^2}$

$g = 9,81 \frac{m}{s^2}$

$E_p = -4,1\cdot 10^{-2}\,J$

$r = ?$

$$E_p = k\frac{q_1\cdot q_2}{r}$$

$$r = \frac{k\,q_1 q_2}{E_p} = 0,2\,m$$

18. (slajd 15, II)

$\varphi_1 - \varphi_2 = U = ?$

$v_{0e^-} = 3\cdot 10^6 \frac{m}{s}$

$\Delta x = 2\,cm$

$v_{e^-} = 10^5 \frac{m}{s}$

$m = 9,1\cdot 10^{-31}\,kg$

$q_{e^-} = -1,6\cdot 10^{-19}\,C$

$\Delta E_k + \Delta E_p = 0$ jer je rad nula

$$-q_e\Delta\varphi = \frac{m v_{e^-}^2}{2} - \frac{m v_{0e^-}^2}{2}$$

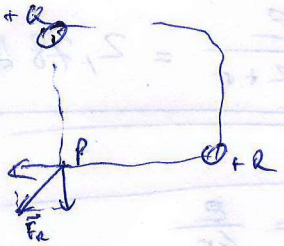
$$\Delta\varphi = \frac{m}{2q_e}\left(v_{0e^-}^2 - v_{e^-}^2\right)$$

$$U = \Delta\varphi = -25,6\,V$$

Gubi kinetičku energiju. ⇒ Smanjuje mu se brzina pa mora da se kreće od većeg ka manjem potencijalu

19. (slajd 16)

3.



20. (slajd 17)

$C = 4\,\mu F$, $U = 12\,V$, $q = ?$

$$C = \frac{q}{U} \Rightarrow q = C\cdot U = 48\cdot 10^{-6}\,C$$

21. (slajd 17)

$U = 1,5\,V$

$q = C\cdot U = 6\,\mu C$

22. (slajd 18)

C_1, A_1, d_1

$C_2, 2A_1, 2d_1$

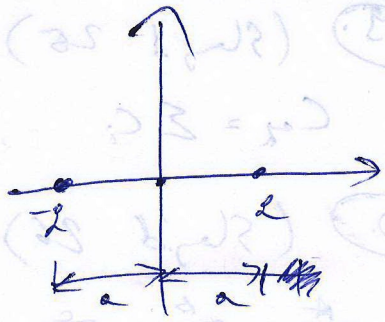
$$C = \varepsilon_0\frac{A}{d}$$

$$\frac{C_2}{C_1} = \frac{\cancel{\varepsilon_0}\frac{\cancel{2}\cancel{A_1}}{\cancel{2}\cancel{d_1}}}{\cancel{\varepsilon_0}\frac{\cancel{A_1}}{\cancel{d_1}}} = 1 \qquad C_2 = C_1$$

c

23. (slajd 19)

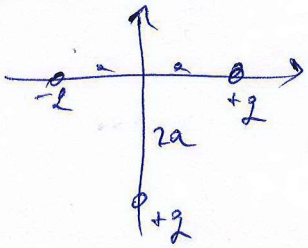
$V = k\frac{q}{r}$



$$V = V_q + V_{-q} = k\frac{q}{a} - k\frac{q}{a} = 0$$

a

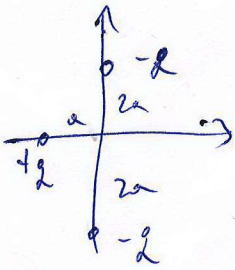
24. (slajd 20)



$$V = k\frac{q}{a} - k\frac{q}{a} + \frac{kq}{2a} = \frac{kq}{2a} > 0$$

b

25. (slajd 21)



$$V = k\frac{q}{a} - \frac{kq}{2a} - \frac{kq}{2a} = k\frac{q}{a} - \frac{\cancel{2}kq}{\cancel{2}a} = 0$$

a

26. (slajd 22)

Ista priča ... $V = \frac{kq}{2a} + \frac{kq}{2a} - k\frac{q}{a} = 0$ a

27. (slajd 23)

$\Delta q = 10C$

$I = 5A$

$\Delta t = ?$

$$I = \frac{\Delta q}{\Delta t} \Rightarrow \Delta t = \frac{\Delta q}{I} = \frac{10C}{5A} = 2s$$

a

28. (slajd 24)

$I = 1,6A$

$e = 1,6 \cdot 10^{-19}C$

$N = ?$ $t = 1s$

$q = N \cdot e$

$$I = \frac{\Delta q}{\Delta t} = \frac{N \cdot e}{1s} \Rightarrow N = \frac{I \cdot 1s}{e} = \frac{1,6A \cdot 1s}{1,6 \cdot 10^{-19}C}$$

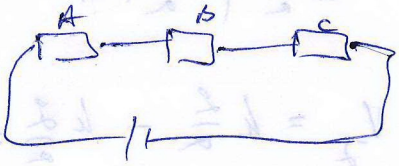
$N = 0,84 \cdot 10^{19}$ e^- u sekundi

$N \approx 10^{19} \Rightarrow$ c

29. (Slajd 25)

$C_{eq} = \sum C_i$ (c)

30. (Slajd 26)



$A < B < C$

$R_e = A + B + C$

$I_A = I_B = I_C$

$\boxed{U = I \cdot R}$

$\Delta U_A = I \cdot A$

$\Delta U_B = I \cdot B$

$\Delta U_C = I \cdot C$

$U_A < U_B < U_C$

na C je pad napona najveći $\Rightarrow$ (c)

31. (Slajd 27)

(c) i (b)