

Fysikk Øving 1

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

$$\frac{-3,70 \cdot 10^{-9}}{-1,6 \cdot 10^{-19}} = \underline{\underline{7,94 \cdot 10^{10} \text{ elektroner}}}$$

b) $\frac{7,9}{207} \cdot 6,022 \cdot 10^{23}$

$$= \frac{2,3 \cdot 10^{22}}{4,94 \cdot 10^{22}} \text{ atomer}$$

$$\frac{2,3 \cdot 10^{22}}{4,94 \cdot 10^{22}} = 7,29 \cdot 10^{-1}$$

$$\frac{7,94 \cdot 10^{10}}{2,3 \cdot 10^{22}} = \underline{\underline{8,43 \cdot 10^{-13}}}$$

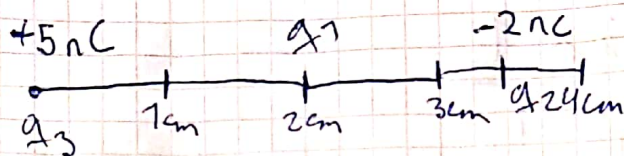
7. $F = k \frac{|q_1 \cdot q_2|}{r^2}$

$$600 = 8,99 \cdot 10^9 \frac{\text{Nm}^2}{\text{C}^2} \cdot \frac{2,5 \cdot 2,5 \text{ C}^2}{r^2}$$

$$r = \sqrt{8,99 \cdot 10^9 \cdot 2,5 \cdot 2,5 / 600} \text{ m}$$

$$\underline{\underline{r = 9677,1 \text{ m}}}$$

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$$F = 899 \cdot 10^9 \cdot \frac{5 \cdot 10^{-9} \cdot 2 \cdot 10^{-9}}{(0,035)^2}$$

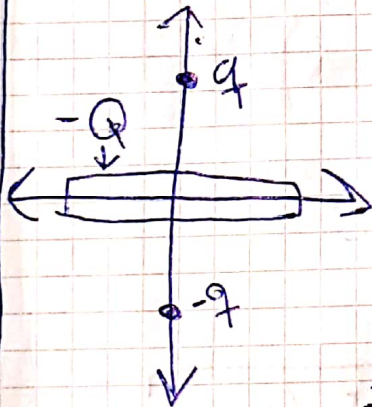
$$F = -7,34 \cdot 10^{-5} \text{ N}$$

$$-7,34 \cdot 10^{-5} = \frac{5 \cdot 10^{-9} \cdot q_1 \cdot 899 \cdot 10^9}{0,02^2}$$

$$q_1 = \frac{-7,34 \cdot 10^{-5} \cdot 0,02^2}{5 \cdot 10^{-9} \cdot 899 \cdot 10^9}$$

$$\underline{\underline{q_1 = 0,65 \text{ nC}}}$$

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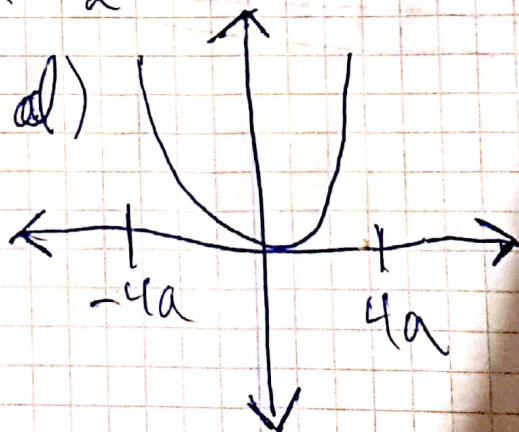


$$b) F = k \frac{-q^2}{a^2}$$

$$c) F = k \frac{q^2}{a^2} - k \frac{qQ}{a^2}$$

$$\underline{\underline{F = 2k \frac{qQ}{a^2}}}$$

d)



23) a) $q = 1,602 \cdot 10^{-19} \text{ C}$

$$F = qE$$

$$F = 1,602 \cdot 10^{-19} \cdot 2,950 \cdot 10^3 \text{ N}$$

$$F = 4,726 \cdot 10^{-16} \text{ N}$$

$$F = ma$$

$$a = \frac{F}{m}$$

b)

$$a = \frac{4,726 \cdot 10^{-16}}{1,673 \cdot 10^{-27}} = 2,825 \cdot 10^{11} \text{ m/s}^2$$

c)

$$2,825 \cdot 10^{11} \text{ m/s}^2 \cdot 1,8 \cdot 10^{-6}$$

$$= 5,085 \cdot 10^5 \text{ m/s}$$

29) $V_0 = 2,00 \cdot 10^6 \text{ m/s}$

$$a) s = s_0 + V_0 t + \frac{1}{2} a t^2$$

$$F = ma$$

$$F = qE$$

$$qE = ma$$

$$a = \frac{qE}{m}$$

$$0,59 \text{ cm} = V_0 t + \frac{1}{2} \frac{qE}{m} t^2$$

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$$a) s = s_0 + v_0 t$$

$$t = \frac{s}{v}$$

$$t = \frac{2,00 \text{ cm}}{2,00 \cdot 10^6 \text{ m/s}} = \frac{2,00 \text{ m} \cdot 10^{-8}}{2,00 \cdot 10^6 \text{ m/s}}$$

$$t = 7,00 \cdot 10^{-9} \text{ s} = 7 \text{ ns}$$

$$0,50 \text{ cm} = v_0 t + \frac{1}{2} \frac{qE}{m} t^2$$

$$\frac{1}{2} \frac{qE}{m} t^2 = 0,50 \text{ cm} - v_0 t$$

$$E = \frac{(7,00 \text{ cm} - 2v_0 t)m}{q \cdot t^2}$$

$$E = \frac{7,00 \cdot 10^{-3} \text{ m} - 2 \cdot 1,602 \cdot 10^{-19} \cdot 10^{-9} \cdot 9,109 \cdot 10^{-31}}{1,602 \cdot 10^{-19} \cdot (10^{-9})^2}$$

$$E = 6,242 \cdot 10^{33} \text{ N/C}$$

$$b) E = \frac{(2,00 \text{ cm} - 2v_0 t)m}{q \cdot t^2}$$

$$E = \frac{2(5 - v_0 t)m}{q \cdot t^2}$$

$$6,242 \cdot 10^{33} \text{ N/C}$$

←

29) b) $E = \frac{2m(s - v_0 t)}{q \cdot t^2}$

$$\frac{s - v_0 t}{q \cdot t^2} = \frac{E}{2m}$$

$$s - v_0 t = \frac{E \cdot q \cdot t^2}{2m}$$

$$s = \frac{E \cdot q \cdot t^2}{2m} + v_0 t$$

$$s = \frac{6,242 \cdot 10^{33} \cdot 1,602 \cdot 10^{-19} \cdot (10^{-9})^2}{2 \cdot 9,109 \cdot 10^{-31}} + 200 \cdot 10^6 \cdot 10^{-9}$$

$$\underline{s = 2,989 \cdot 10^{23} \text{ m} \quad ?}$$

3) $E = k \frac{|Q|}{r^2}$

$$|Q| = \frac{E \cdot r^2}{k}$$

$$Q = \frac{7,37 \cdot 10^6 \cdot (0,165)^2}{8,99 \cdot 10^9}$$

$$\underline{Q = 5,792 \cdot 10^{-5}}$$

$$U = \frac{1}{2} \epsilon_0 E^2$$

$$U = \frac{1}{2} 8,854 \cdot 10^{-12} \cdot (7,37 \cdot 10^6)^2$$

$$\underline{U = 6,059 \cdot 10^{-16}}$$

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$$E = k \frac{|Q|}{r^2}$$

$$7770 = 8,99 \cdot 10^9 \cdot \frac{|Q|}{(0,2)^2}$$

$$|Q| = 5,206 \cdot 10^{-9}$$

$$\frac{5,206 \cdot 10^{-9}}{1,602 \cdot 10^{-19}} = \underline{\underline{3,250 \cdot 10^{10} \text{ elektroner}}}$$

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~~ikke~~ Skjønte ikke.

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$$W_{ab} = U_a - U_b = -\Delta U$$

$$E_p = k \frac{Qa}{r}$$

$$E_p = k \frac{28nC \cdot e}{0,450}$$

$$E_p = 8,99 \cdot 10^9 \cdot \frac{28 \cdot 10^{-9} \cdot 1,602 \cdot 10^{-19}}{0,450}$$

a) $E_p = \underline{\underline{8,967 \cdot 10^{-17}}}$ Q ingen arbeid

$$b) E_p = k \frac{28nC \cdot e}{-0,670}$$

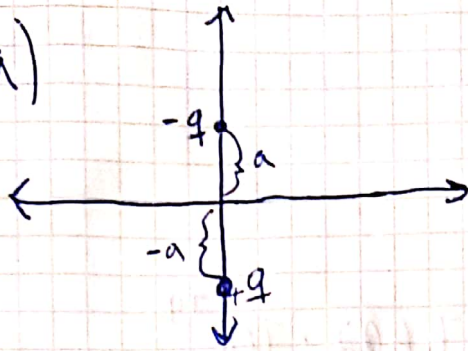
$$E_p = \underline{\underline{6,07 \cdot 10^{-17}}}$$

$$c) E_p = k \frac{28nC \cdot e}{2,6/2}$$

$$E_p = \underline{\underline{3,702 \cdot 10^{-17}}}$$

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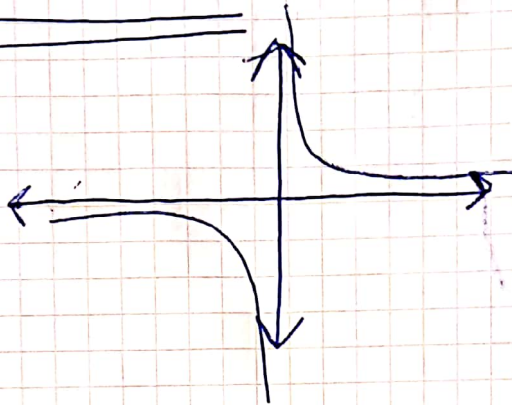
a)



$$b) V = \frac{kQ}{r}$$

$$f(a) = \frac{kQ}{a}$$

c)



d) Q øker eller synker avhengig av hvor de flytter seg

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$$a) \lambda = \frac{h}{p} = \frac{h}{mv}$$

$$\lambda = \frac{hc}{E} = \frac{hc}{mc^2} = \frac{h}{mc}$$

$$\lambda = \frac{6,626 \cdot 10^{-34} \text{ Js}}{1,673 \cdot 10^{-27} \text{ kg} \cdot 2 \cdot 3 \cdot 10^8 \text{ m/s}}$$

$$\lambda = 6,626 \cdot 10^{-16} \text{ m}$$

$$E = mc^2 = 1,673 \cdot 10^{-27} \cdot (3 \cdot 10^8)^2$$

$$E = 1,506 \cdot 10^{-10} \text{ J} = 939,784 \text{ MeV}$$

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$$b) V = \frac{kQ}{r}$$

$$r = \frac{kQ}{V}$$

$$r = \frac{8,99 \cdot 10^9 \cdot 2 \cdot 7,602 \cdot 10^{-19}}{9,398 \cdot 10^8}$$

~~$7,506 \cdot 10^{-10}$~~

$$\underline{\underline{r = 3,065 \cdot 10^{-18} \text{ m}}}$$