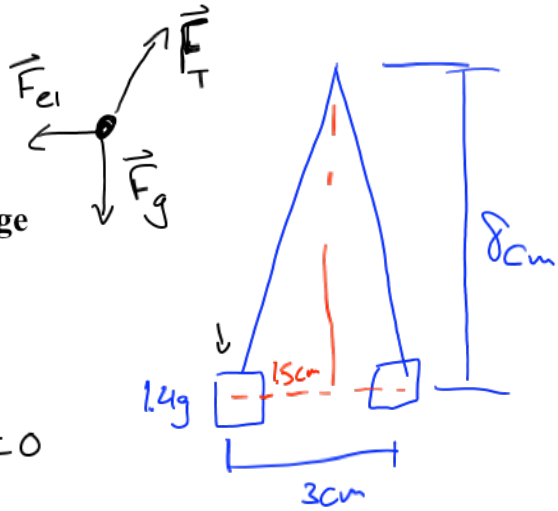
Jan 16

Get Clickers and Whiteboards

Ponderable: Finding E force and charge



$Q = ?$

$\frac{d\vec{p}}{dt} = \vec{F}_{net} = m\vec{a}$

$= 0$

$F_{net,x} = 0$

$F_{net,y} = 0$

$\vec{F}_T = |\vec{F}_T|\hat{r}$

$\vec{r} = \langle 1.5\text{cm}, 8\text{cm}, 0\rangle$

$|\vec{r}| = \sqrt{1.5^2 + 8^2}$ cm

$\hat{r} = \frac{\vec{r}}{|\vec{r}|} = \langle 0.184, 0.983, 0\rangle$

$\vec{F}_T = |\vec{F}_T|\langle 0.184, 0.983, 0\rangle$

$F_{net,x} = 0.184 F_T - F_{el} = 0$

$F_{net,y} = 0.983 F_T - mg = 0$

$$0.184\,F_T = \frac{1}{4\pi\varepsilon_0}\frac{Q^2}{r^2}$$

$$0.983\,F_T = mg$$

r: 3 cm

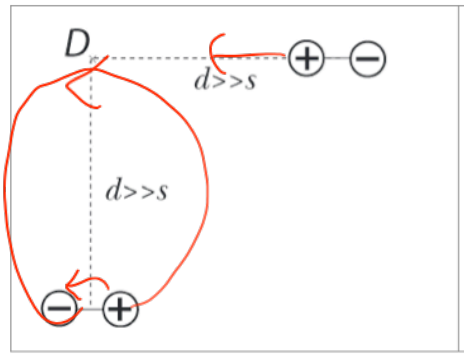
m: 1.4 g

} 2 eqn, 2 unknowns

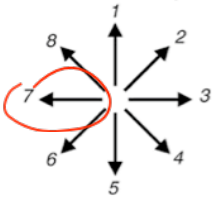
eliminate F_T

Solve for Q

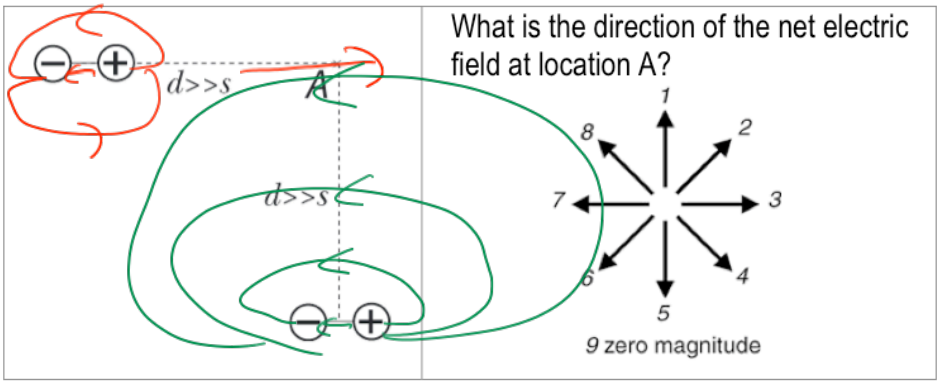
$$Q = \sqrt{4\pi\varepsilon_0 r^2 mg\,\frac{0.184}{0.983}} = 1.6\times10^{-8}\,C$$



A proton is placed at location D. What is the direction of the net electric force on the proton?

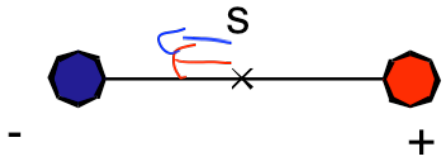


A. 1
B. 3
C. 5
D. 7
E. 9


What is the direction of the net electric field at location A?
d>>s
A
d>>s
1
2
3
4
5
6
7
8
9 zero magnitude

A. 1
B. 3
C. 5
D. 7
E. 9

What is the magnitude of the electric field at location x, the center of this dipole (separation s)?



A) $\frac{1}{4\pi\varepsilon_0}\frac{2qs}{r^3}$

B) $\frac{1}{4\pi\varepsilon_0}\frac{qs}{r^3}$

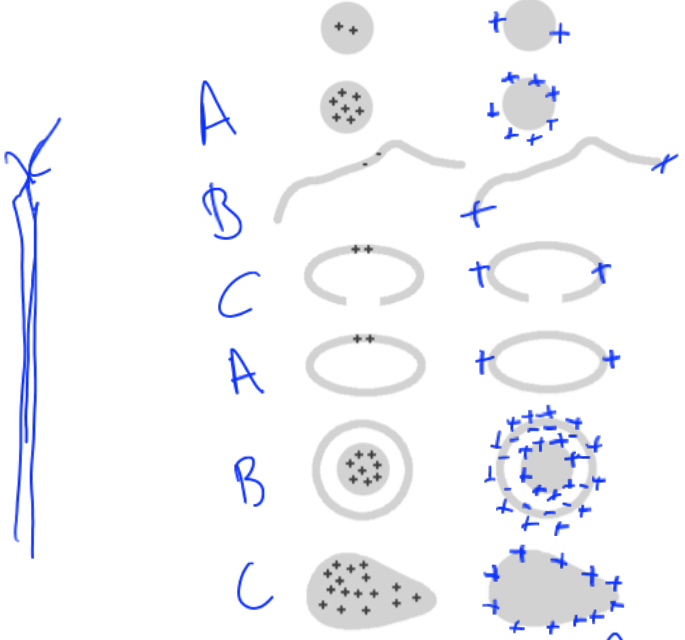
C) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{s^2}$

D) $\frac{1}{4\pi\varepsilon_0}\frac{2q}{(s/2)^2}$

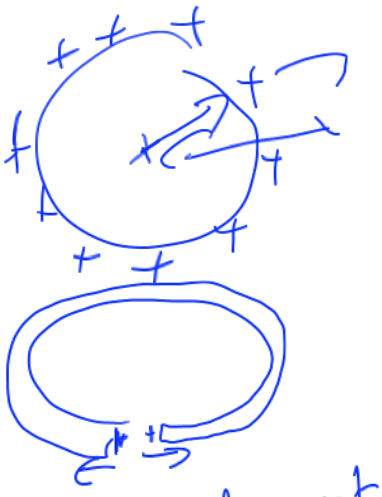
E) 0

$\frac{1}{4\pi\varepsilon_0}\frac{q}{(s/2)^2} + \frac{1}{4\pi\varepsilon_0}\frac{q}{(s/2)^2}$

Ponderable: Conductors and Charges



move charge around points.



Insulator does not block $\vec{E}$.

Tangible: Insulating skin? No sweat!

Na^+ Cl^- on body

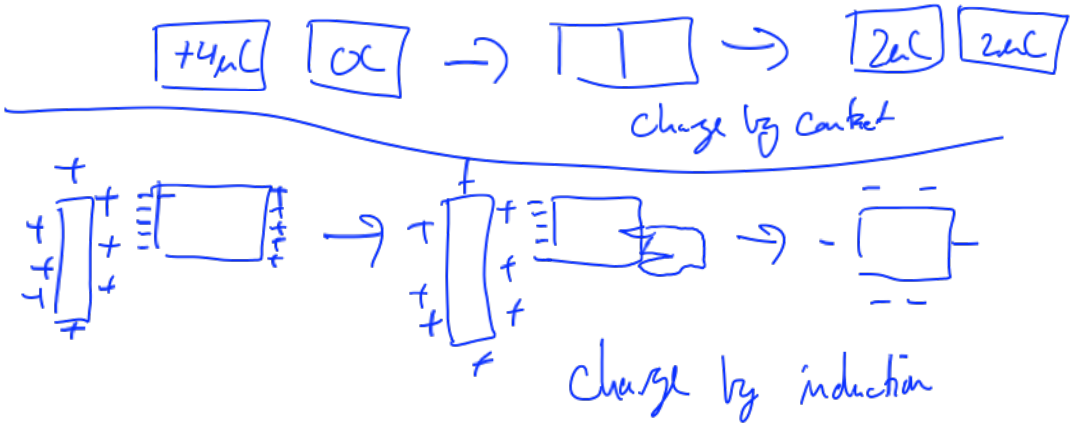
e^- can join Na^+ leaving Cl^-

Charge by induction: Charging without contact by polarizing object

Tangible: The Conducting Nameblock

Each name block has 4 μC of charge

touch this to identical nameblock that is neutral, How much charge on each?



VPython Lab: E field of particle