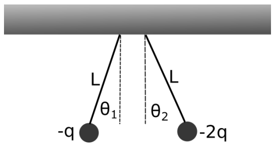


Two small spheres (mass, m) are attached to insulating strings (length, L) and hung from the ceiling as shown.

How does the angle (with respect ot the vertical) that the string attached to the $-q$ charge (θ_1) compare to that of the $-2q$ charge (θ_2)?

A. $\theta_1 > \theta_2$
B. $\theta_1 = \theta_2$
C. $\theta_1 > \theta_2$
D. ????

ANNOUNCEMENTS

- Homework 1 solutions posted immediately after class
- Graded Homework 1 returned next Friday
- Homework 2 posted (due next Friday)

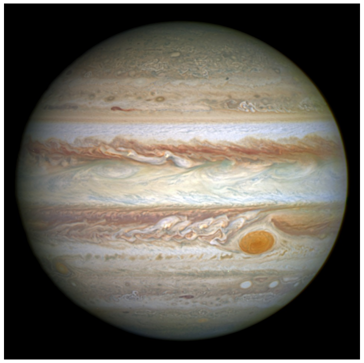
For me, the first homework was ...

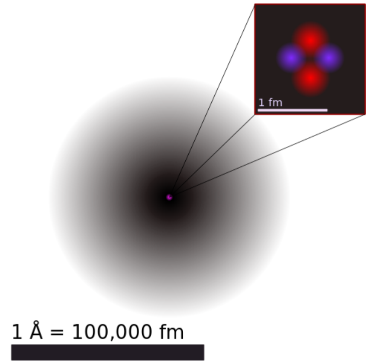
A. entirely a review.
B. mostly a review, but it had a few new things in it.
C. somewhat of a review, but it had quite a few new things in it.
D. completely new for me.

I spent ... hours on the first homework.

A. 1-2
B. 3-4
C. 5-6
D. 7-8
E. More than 9

CLASSICAL ELECTROMAGNETISM

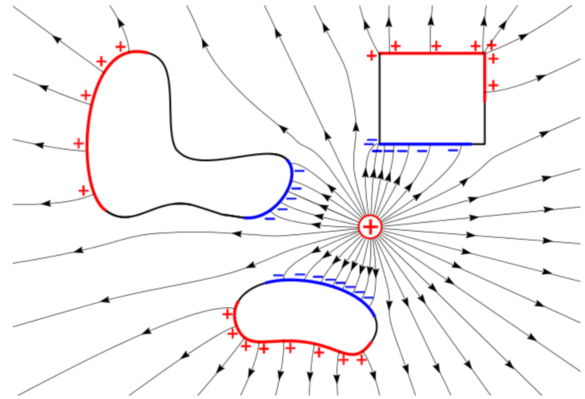




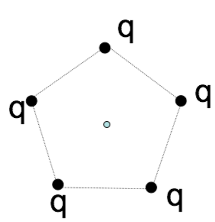
$\sim 10^8\text{m} \longrightarrow\longrightarrow\longrightarrow\longrightarrow\longrightarrow\longrightarrow \sim 10^{-16}\text{m}$

24 orders of magnitude

ELECTROSTATICS

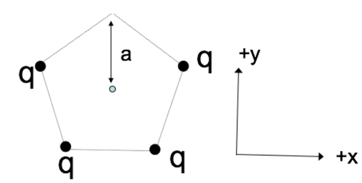


5 charges, q, are arranged in a regular pentagon, as shown. What is the E field at the center?



A. Zero
B. Non-zero
C. Really need trig and a calculator to decide

1 of the 5 charges has been removed, as shown. What's the E field at the center?



A. $+(kq/a^2)\hat{y}$
B. $-(kq/a^2)\hat{y}$
C. 0
D. Something entirely different!
E. This is a nasty problem which I need more time to solve

If all the charges live on a line (1-D), use:

$$\lambda \equiv \frac{\text{charge}}{\text{length}}$$

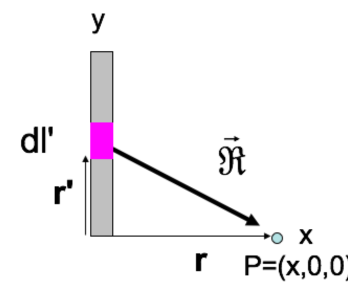
Draw your own picture. What's $\mathbf{E}(\mathbf{r})$?

To find the E-field at P from a thin line (uniform charge density λ):

$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\varepsilon_0} \int \frac{\lambda dl'}{\mathfrak{R}^2} \hat{\mathfrak{R}}$$

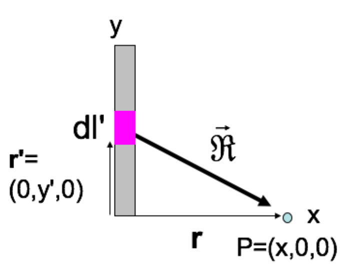
What is $\mathfrak{R}$?

A. x
B. y'
C. $\sqrt{dl'^2 + x^2}$
D. $\sqrt{x^2 + y'^2}$
E. Something else



$$\mathbf{E}(\mathbf{r}) = \int \frac{\lambda dl'}{4\pi\varepsilon_0 \mathfrak{R}^3} \hat{\mathfrak{R}}, \text{ so: } E_x(x,0,0) = \frac{\lambda}{4\pi\varepsilon_0} \int \ldots$$

A. $\int \frac{dy' x}{x^3}$
B. $\int \frac{dy' x}{(x^2 + y'^2)^{3/2}}$
C. $\int \frac{dy' y'}{x^3}$
D. $\int \frac{dy' y'}{(x^2 + y'^2)^{3/2}}$
E. Something else



What do you expect to happen to the field as you get really far from the rod?

$$E_x = \frac{\lambda}{4\pi\varepsilon_0} \frac{L}{x\sqrt{x^2 + L^2}}$$

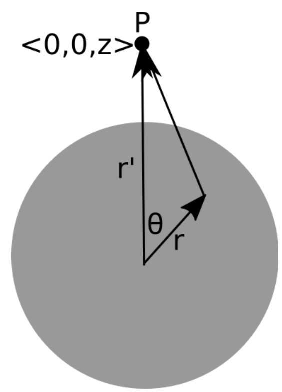
A. E_x goes to 0.
B. E_x begins to look like a point charge.
C. E_x goes to ∞.
D. More than one of these is true.
E. I can't tell what should happen to E_x.

Activity:

You determine that a particular electrostatics problem cannot be integrated analytically. How do you instruct a computer to do it for you?

Work with those around you to come up with a series of instructions (in plain words) to tell the computer to do it.

Given the location of the little bit of charge (dq), what is $|\vec{\mathfrak{R}}|$?



A. $\sqrt{z^2 + r'^2}$
B. $\sqrt{z^2 + r'^2 - 2zr' \cos\theta}$
C. $\sqrt{z^2 + r'^2 + 2zr' \cos\theta}$
D. Something else