Announcements

- Homework 3 is due tonight!
  - Please remember to associate pages with problems once you upload
  - Take a look over your scans/upload to make sure everything is visible and readable
- I'll be curious and posting a poll about how long HW3 took you, but HW2 took most people longer than I intended, so I'm trying to take that into account
- Bring your laptops on Wednesday as we'll be doing a tutorial on finding electric fields and potentials numerically!

Q1

Determine which of the electric fields below are legitimate:

$$
\begin{aligned}
A: &\quad k(xy\hat{\mathbf{x}} + 2yz\hat{\mathbf{y}} + 3xz\hat{\mathbf{z}}) \\
B: &\quad k(y^2\hat{\mathbf{x}} + (2xy + z^2)\hat{\mathbf{y}} + 2yz\hat{\mathbf{z}})
\end{aligned}
$$

A. A is legit but B is not
B. B is legit but A is not
C. Both A and B are legitimate electric fields
D. Neither A nor B are legitimate electric fields

Q1

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Q2

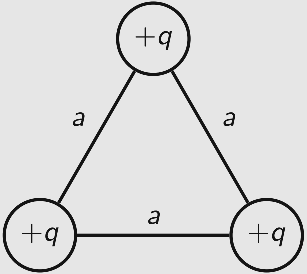
Three identical charges $+q$ sit at the vertices of an equilateral triangle. What would the final kinetic energy of the top charge be if you released it (keeping the other two fixed)?

A. $\dfrac{1}{4\pi\epsilon_0}\dfrac{q^2}{a}$

B. $\dfrac{1}{4\pi\epsilon_0}\dfrac{2q^2}{3a}$

C. $\dfrac{1}{4\pi\epsilon_0}\dfrac{2q^2}{a}$

D. $\dfrac{1}{4\pi\epsilon_0}\dfrac{3q^2}{a}$



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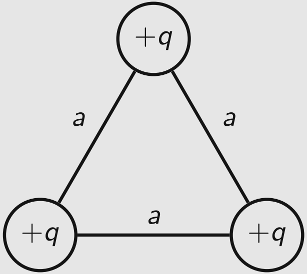


Q3

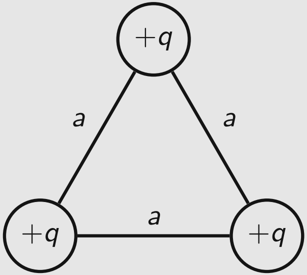
Three identical charges $+q$ sit at the vertices of an equilateral triangle. What would the final kinetic energy of the top charge be if you released all three charges?

A. $\frac{1}{4\pi\epsilon_0}\frac{q^2}{a}$

B. $\frac{1}{4\pi\epsilon_0}\frac{2q^2}{3a}$

C. $\frac{1}{4\pi\epsilon_0}\frac{2q^2}{a}$

D. $\frac{1}{4\pi\epsilon_0}\frac{3q^2}{a}$



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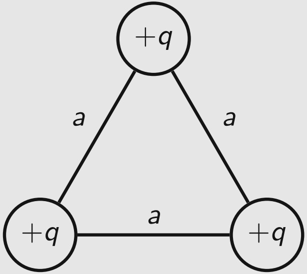

Q4

Does system energy obey superposition?

That is, if you have one system of charges with total stored energy W_1, and a second system of charges with stored energy W_2, if you take the two systems to be one single system, is the total energy of the new system $W_1 + W_2$?

A. Yes
B. No

Q4

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A. Yes

B. No

Q5

What is the energy of a single point charge?

A. 0

B. $\dfrac{1}{4\pi\epsilon_0}\dfrac{q^2}{r}$

C. $\dfrac{1}{4\pi\epsilon_0}\dfrac{q^2}{2r}$

D. ∞

Q5

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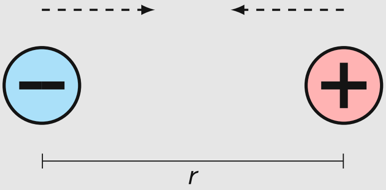
A. 0

B. $\dfrac{1}{4\pi\epsilon_0}\dfrac{q^2}{r}$

C. $\dfrac{1}{4\pi\epsilon_0}\dfrac{q^2}{2r}$

D. ∞

Q6



Two charges, $+q$ and $-q$, are a distance r apart. As the charges are slowly moved together, the total field energy:

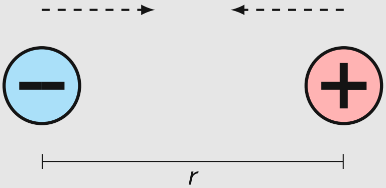
$$\frac{\epsilon_0}{2}\int E^2\,d\tau$$

A. Increases

B. Decreases

C. Remains constant

Q6



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