

True or False: The electric potential of a pure dipole is given exactly by:

$$V(r) = \frac{\mathbf{p} \cdot \mathbf{r}}{4\pi\epsilon_0 r^3}$$

A. True

B. False

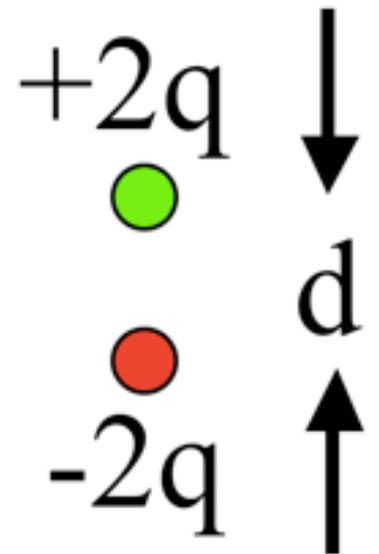
ANNOUNCEMENTS

- Homework 7 Problem 5 graded as pure extra credit
- Exam 2 is coming up (2 weeks from today)
 - BPS 1415 (this room), 7pm-9pm, Nov 8th
 - Same format as Exam 1
 - Details next week

$$\mathbf{p} = \sum_i q_i \mathbf{r}_i$$

What is the magnitude of the dipole moment of this charge distribution?

- A. qd
- B. $2qd$
- C. $3qd$
- D. $4qd$
- E. It's not determined

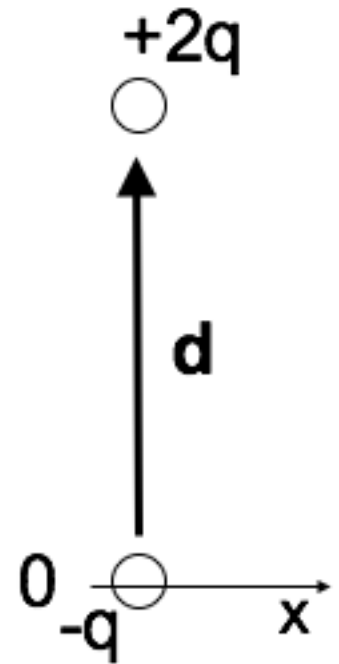


$$\mathbf{p} = \sum_i q_i \mathbf{r}_i$$

What is the dipole moment of this system?

(BTW, it is NOT overall neutral!)

- A. $q\mathbf{d}$
- B. $2q\mathbf{d}$
- C. $\frac{3}{2}q\mathbf{d}$
- D. $3q\mathbf{d}$
- E. Something else (or not defined)

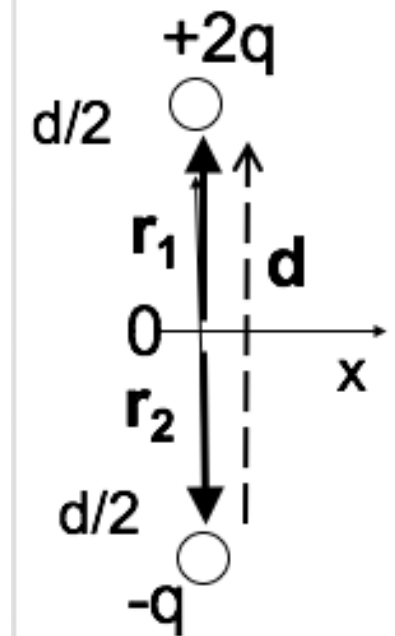


$$\mathbf{p} = \sum_i q_i \mathbf{r}_i$$

What is the dipole moment of this system?

(Same as last question, just shifted in z .)

- A. $q\mathbf{d}$
- B. $2q\mathbf{d}$
- C. $\frac{3}{2}q\mathbf{d}$
- D. $3q\mathbf{d}$
- E. Something else (or not defined)



You have a physical dipole, $+q$ and $-q$ a finite distance d apart. When can you use the expression:

$$V(\mathbf{r}) = \frac{1}{4\pi\epsilon_0} \frac{\mathbf{p} \cdot \hat{\mathbf{r}}}{r^2}$$


- A. This is an exact expression everywhere.
- B. It's valid for large r
- C. It's valid for small r
- D. No idea...

You have a physical dipole, $+q$ and $-q$ a finite distance d apart. When can you use the expression:


$$V(\mathbf{r}) = \frac{1}{4\pi\epsilon_0} \sum_i \frac{q_i}{\mathfrak{R}_i}$$

- A. This is an exact expression everywhere.
- B. It's valid for large r
- C. It's valid for small r
- D. No idea...



Which charge distributions below produce a potential that looks like $\frac{C}{r^2}$ when you are far away?

+2q






A)

+2q

+2q

B)

+q +q


-q -q

C)

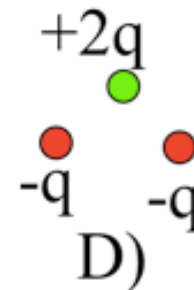
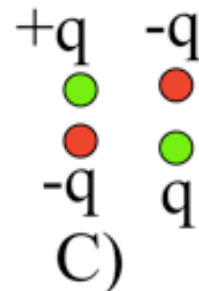
+2q +q


-q
+q


-2q

D)

E) None of these, or more than one of these!

(For any which you did not select, how DO they behave at large r ?)

Which charge distributions below produce a potential that looks like $\frac{C}{r^2}$ when you are far away?

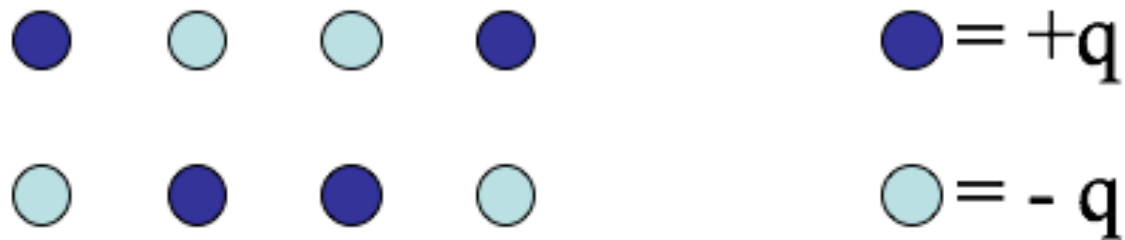


E) None of these, or more than one of these!

(For any which you did not select, how DO they behave at large r ?)

In terms of the multipole expansion

$V(r) = V(\text{mono}) + V(\text{dip}) + V(\text{quad}) + \dots$, the following charge distribution has the form:



- A. $V(r) = V(\text{mono}) + V(\text{dip}) +$ higher order terms
- B. $V(r) = V(\text{dip}) +$ higher order terms
- C. $V(r) = V(\text{dip})$
- D. $V(r) =$ only higher order terms than dipole
- E. No higher terms, $V(r) = 0$ for this one.