

WebAssign
CH14-HW03-FALL2010 (Homework)Yinglai Wang
PHYS 272-FALL 2012, Fall 2012
Instructor: Virendra Saxena**Current Score :** 11.5 / 12 **Due :** Tuesday, September 4 2012 11:59 PM EDT1. 1/1 points | [Previous Answers](#)

MI3 14.6.X.062

Which of these statements about a dipole are correct? Select all that are true.

- ☒ At a distance d from a dipole, where $d \gg s$ (the separation between the charges), the magnitude of the electric field due to the dipole is proportional to $\frac{1}{d^3}$
- ☒ A dipole consists of two particles whose charges are equal in magnitude but opposite in sign.
- ☐ The net electric field due to a dipole is zero, since the contribution of the negative charge cancels out the contribution of the positive charge.
- ☒ The electric field at any location in space, due to a dipole, is the vector sum of the electric field due to the positive charge and the electric field due to the negative charge.
- ☐ At a distance d from a dipole, where $d \gg s$ (the separation between the charges), the magnitude of the electric field due to the dipole is proportional to $\frac{1}{d^2}$



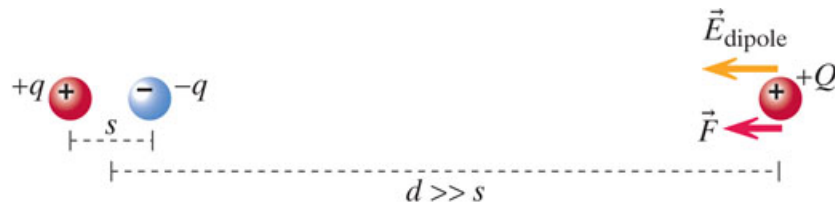
- [Read the eBook](#)
- [Section 14.6](#)

2. 1/1.5 points | [Previous Answers](#)

MI3 14.6.X.010.alt02

If the charge of the point charge in the figure were $-2Q$ (instead of $+Q$), by what factor would the magnitude of the force on the point charge due to the dipole change?

(new force / old force) = ✓



Would the direction of the force change?

- ☐ The force would be in the opposite direction.
- ☒ The direction of the force would stay the same.



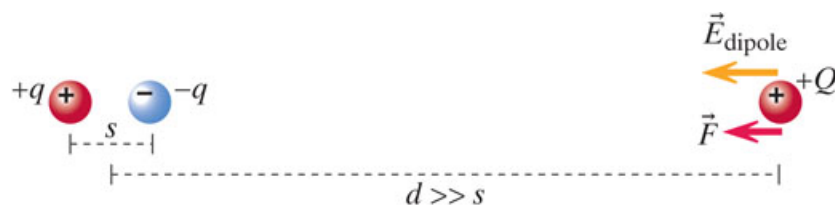
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3. 1/1 points | [Previous Answers](#)

MI3 14.6.X.010

The distance between the dipole and the point charge in the diagram in the figure is d . If the distance between them were changed to $0.1*d$, by what factor would the force on the point charge due to the dipole change?

(new force / old force) = ✓



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4. 2/2 points | [Previous Answers](#)

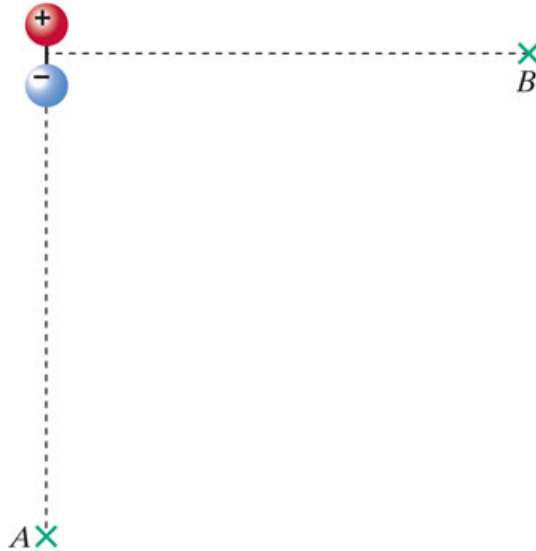
MI3 14.6.X.063

A dipole consists of two charges $+q$ and $-q$, held apart by a rod of length s , as shown in the diagram. If $q = 8 \text{ nC}$ and $s = 2 \text{ mm}$, what is the magnitude of the electric field due to the dipole at location A , a distance $d = 5 \text{ cm}$ from the dipole?

$$E = \boxed{2.304\text{e}3} \quad \checkmark \quad \text{N/C}$$

What is the magnitude of the electric field due to the dipole at location B , a distance $d = 5 \text{ cm}$ from the dipole?

$$E = \boxed{1.152\text{e}3} \quad \checkmark \quad \text{N/C}$$



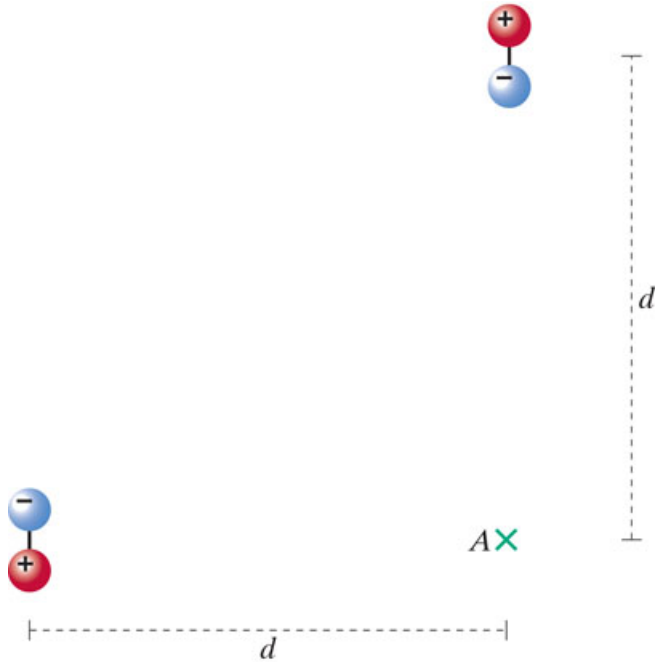
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5. 4.5/4.5 points | [Previous Answers](#)

MI3 14.6.P.073

Two dipoles are oriented as shown in the diagram below. Each dipole consists of two charges $+q$ and $-q$, held apart by a rod of length s , and the center of each dipole is a distance d from location A. If $q = 5 \text{ nC}$, $s = 1 \text{ mm}$, and $d = 6 \text{ cm}$, what is the electric field at location A?

Hint: draw a diagram and show the direction of each dipole's contribution to the electric field on the diagram (you do not have to turn in the diagram).



$\vec{E} =$ N/C



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6. 2/2 points | [Previous Answers](#)

MI3 14.6.P.070.alt01

A dipole is centered at the origin, and is composed of charged particles with charge $+e$ and $-e$, separated by a distance 7×10^{-10} m along the y axis. The $+e$ charge is on the $-y$ axis, and the $-e$ charge is on the $+y$ axis. A proton is located at $\langle 0, 1 \times 10^{-8}, 0 \rangle$ m. What is the force on the proton, due to the dipole?

$\vec{F} =$  N

An electron is located at $\langle -1 \times 10^{-8}, 0, 0 \rangle$ m. What is the force on the electron, due to the dipole?

$\vec{F} =$  N

(Hint: Make a diagram! Note that one approach is to calculate magnitudes, then figure out directions from your diagram.)

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