

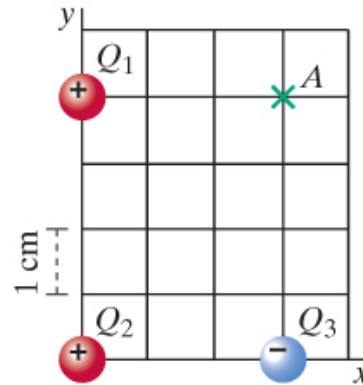
WebAssign**CH14-HW04-FALL2010 (Homework)**

Yinglai Wang
PHYS 272-FALL 2012, Fall 2012
Instructor: Virendra Saxena

Current Score : 22 / 22 **Due :** Tuesday, September 4 2012 11:59 PM EDT

1. 12/12 points | [Previous Answers](#)

MI3 14.5.P.052.alt01

Field and force with three charges

At a particular moment, three small charged balls, one negative and two positive, are located as shown in the figure. $Q_1 = 3 \text{ nC}$, $Q_2 = 6 \text{ nC}$, and $Q_3 = -3 \text{ nC}$.

Remember that you must first convert all quantities to S.I. units. $1 \text{ nC} = 1 \text{ nanocoulomb} = 1\text{e-}9 \text{ C}$.

(a1) What is the electric field at the location of Q_1 , due to Q_2 ?

$$\vec{E}_2 = \quad \checkmark \quad \text{N/C}$$

(a2) What is the electric field at the location of Q_1 , due to Q_3 ?

$$\vec{E}_3 = \quad \checkmark \quad \text{N/C}$$

(a3) What is the net electric field at the location of Q_1 , due to Q_2 and Q_3 ?

$$\vec{E}_{\text{net}} = \quad \checkmark \quad \text{N/C}$$

(b) Use the electric field you calculated above to find the force on Q_1 due to Q_2 and Q_3 .

$$\vec{F} = \quad \checkmark \quad \text{N}$$

(c1) What is the electric field at location A , due to Q_1 ?

$$\vec{E}_{A,1} = \quad \checkmark \quad \text{N/C}$$

(c2) What is the electric field at location A , due to Q_2 ?

$$\vec{E}_{A,2} = \quad \checkmark \quad \text{N/C}$$

(c3) What is the electric field at location A , due to Q_3 ?

$$\vec{E}_{A,3} = \quad \checkmark \quad \text{N/C}$$

(c4) What is the net electric field at location A ?

$$\vec{E}_{A,\text{net}} = \quad \checkmark \quad \text{N/C}$$

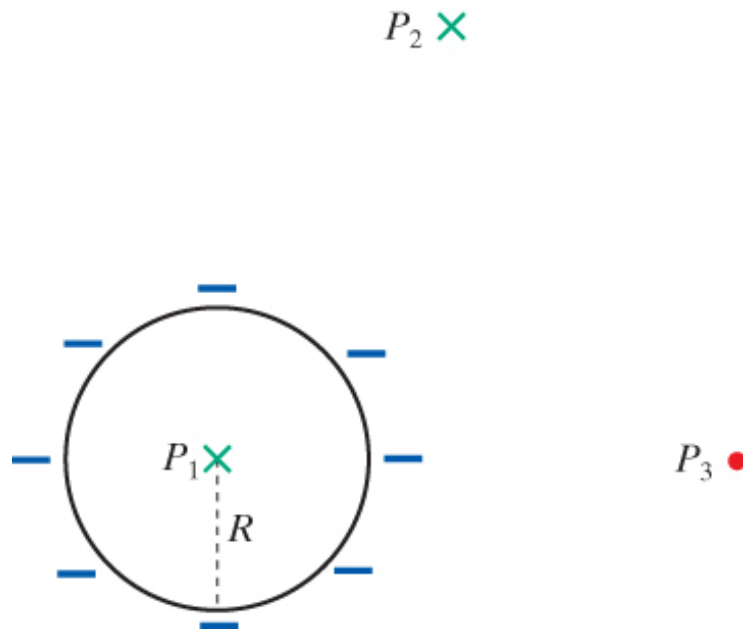
(d) An alpha particle (He^{2+} , containing two protons and two neutrons) is released from rest at location A . At the instant the particle is released, what is the electric force on the alpha particle, due to Q_1 , Q_2 and Q_3 ?

$$\vec{F} = \quad \checkmark \quad \text{N}$$

- *Read the eBook*
- [Section 14.5](#)

A hollow ball with radius $R = 2$ cm has a charge of -2 nC spread uniformly over its surface (see the

figure). The center of the ball is at $P_1 = \langle -4, 0, 0 \rangle$ cm. A point charge of 7 nC is located at $P_3 = \langle 6, 0, 0 \rangle$ cm. (The diagram below is not drawn exactly to scale.)



What is the net electric field at location $P_2 = \langle 0, 7, 0 \rangle$ cm?

$\vec{E} =$ ✓ N/C

At a particular instant an electron is at location P_2 . What is the net electric force on the electron at that instant?

$\vec{F} =$ ✓ N.

What is the direction of the net electric force on the electron?

- ☒ The force is opposite to the direction of the net electric field at P_2
- ☐ The force is at right angles to the direction of the electric field at P_2
- ☐ The force is in the same direction as the electric field at P_2
- ☐ There is not enough information to determine the direction of the force



- *Read the eBook*
- [Section 14.5](#)

