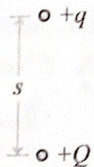


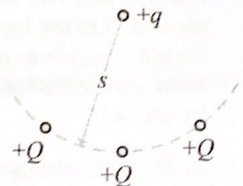
A. Two positive point charges $+q$ and $+Q$ (with $|Q| > |q|$) are held in place a distance s apart.



1. Indicate the direction of the electric force exerted on each charge by the other.
2. Is the force on the $+q$ charge by the $+Q$ charge *greater than, less than, or equal to* the force on the $+Q$ charge by the $+q$ charge? Explain.

3. By what factor would the magnitude of the electric force on the $+q$ charge change if the charges were instead separated by a distance $2s$?

B. Two more $+Q$ charges are held in place the same distance s away from the $+q$ charge as shown. Consider the following student dialogue concerning the net force on the $+q$ charge:



Student 1: "The net electric force on the $+q$ charge is now three times as large as before, since there are now three positive charges exerting forces on it."

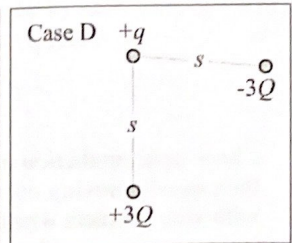
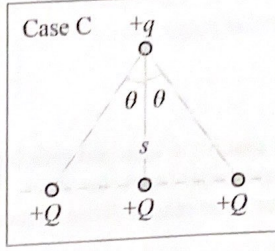
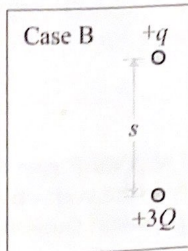
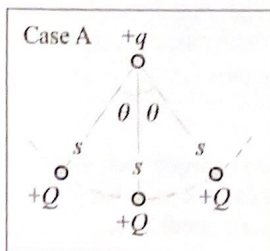
Student 2: "I don't think so. The force from the $+Q$ charge on the left will cancel the force from the $+Q$ charge on the right. The net electric force will be the same as in part A."

1. Do you agree with either student? Explain.

2. Indicate the direction of the net electric force on the $+q$ charge. Explain.

3. What, if anything, can be said about how the magnitude of the net electric force on the $+q$ charge changes when the two $+Q$ charges are added? Explain.

C. Rank the four cases below according to the magnitude of the net electric force on the $+q$ charge. Explain how you determined your ranking.

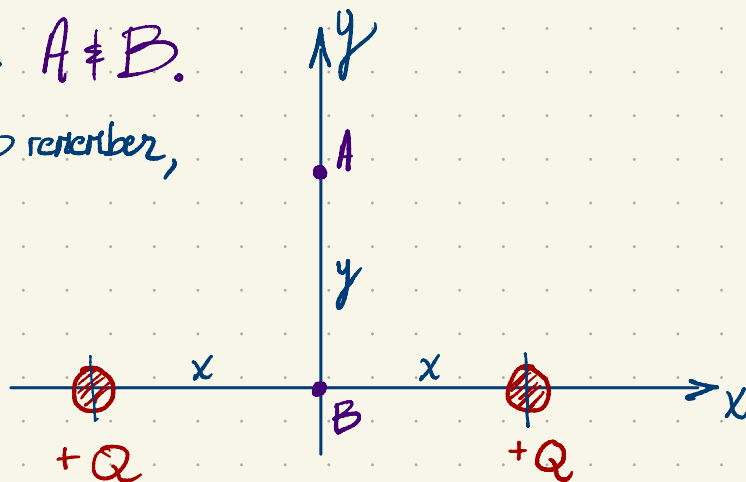


☞ Check your ranking with a tutorial instructor before continuing.

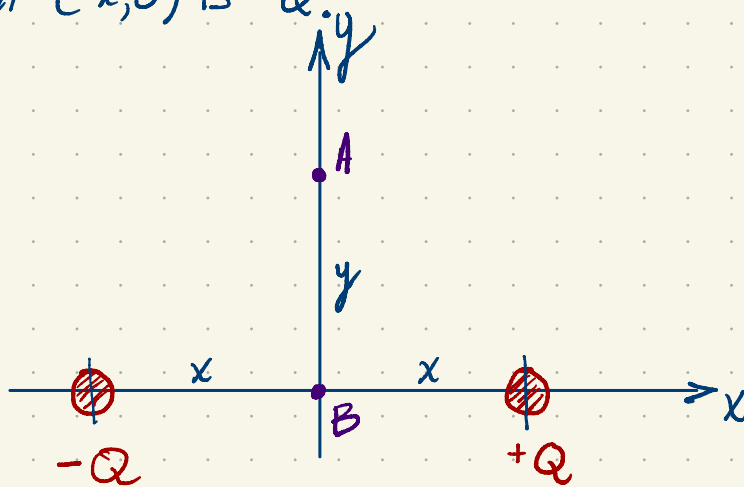
PHYSICS 123 1st Friday session

1) Two charges, both $+Q$, are shown below. Compute the electric field at points $A \neq B$.

(your answer will be in terms of $k, Q, x, \neq y$; and remember, the electric field is a vector!)



2) Same question, but now the charge at $(-x, 0)$ is $-Q$.



3) Two charges are situated as shown below. Where should one place a charge $q = +4 \mu\text{C}$ so that the net force on q is zero?

