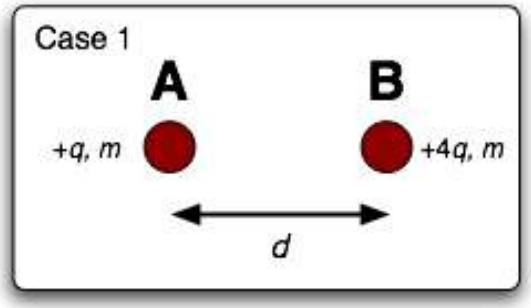
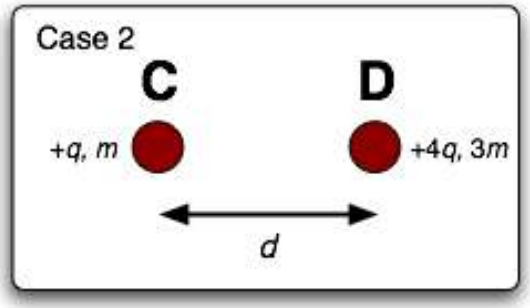
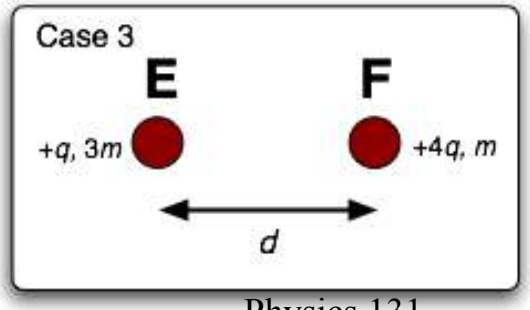
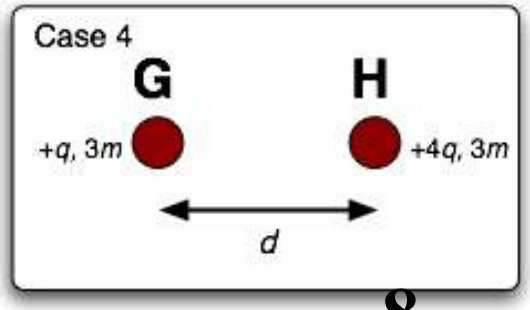
In each of the four cases shown below, a particle of charge +q is placed a distance d from a particle of charge +4q. The particles are then released simultaneously. The masses of the particles are indicated in the diagram. Which case has the largest magnitude of the acceleration of the RIGHT HAND particle just after it is released? (Click all if there are more than one.)

A. Case 1
B. Case 2
C. Case 3
D. Case 4









Three identical charges are lined up in a row. If we compare the electric force charge q_1 exerts on charge q_3 ($F_{1\rightarrow 3}$) to the force q_2 exerts on charge q_3 ($F_{2\rightarrow 3}$)

A. $F_{1\rightarrow 3}$ is twice as big as $F_{2\rightarrow 3}$.

B. $F_{1\rightarrow 3}$ is half as big as $F_{2\rightarrow 3}$.

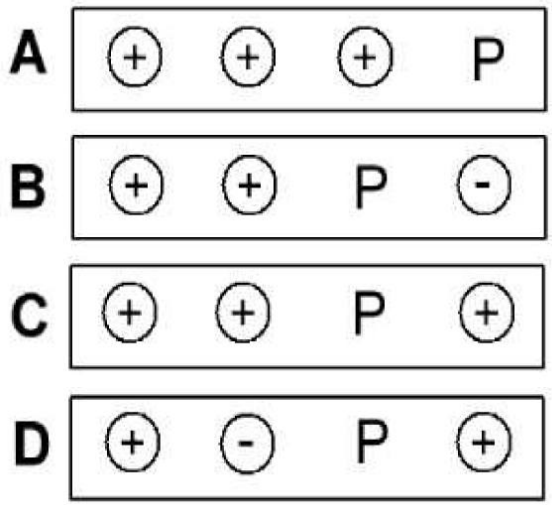
C. $F_{1\rightarrow 3}$ is more than twice as big as $F_{2\rightarrow 3}$.

D. $F_{1\rightarrow 3}$ is less than half as big as $F_{2\rightarrow 3}$.

E. $F_{1\rightarrow 3}$ doesn't affect q_3 at all since q_2 is in the way.

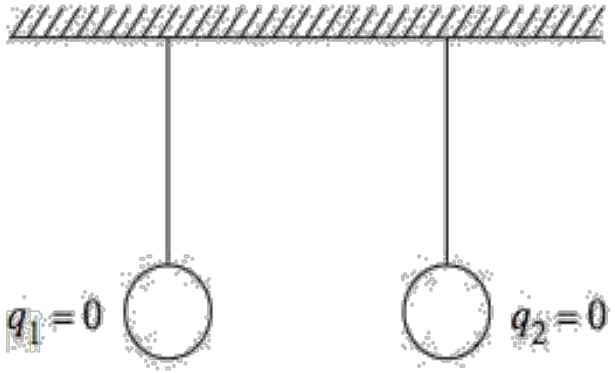
In the figure are shown four arrangements of charge. Each charge has the same magnitude, but some are + and some are -. All distances are to the same scale.
In which would the magnitude of the force felt by a positive test charge placed at P be the largest?

1. A
2. B
3. C
4. D
5. You can't tell.



Two identical conductors hang from nonconducting strings.They are given charges $q_1 = Q$ and $q_2 = 3Q$.
After charging, the two strings make angles of θ_1 and θ_2 with the vertical.
How do the angles compare?

1. $\theta_1 > \theta_2$
2. $\theta_1 < \theta_2$
3. $\theta_1 = \theta_2$
4. You don't have enough information to tell.



Vector Aerobics

- Given that

$$\vec{a} = \hat{i} + 2\hat{j} \qquad \vec{b} = -3\hat{j} \qquad \vec{c} = 4\hat{i}$$

- For each of the following vector operations, find the results both algebraically and show their meaning geometrically.

$$\vec{a} + \vec{c} \qquad \vec{a} - \vec{b} \qquad 2\vec{a} + \vec{b} - \vec{c}$$

In the figure below are shown four two-dimensional arrangements of charge. Each of the charges has the same magnitude, but some are positive and some are negative. In each diagram a point is labeled "P".

Rank the diagrams by the magnitude of the force felt by a positive test charge placed at P.